

Kjøreregler for Forelesningen

NB: Forelesningen vil bli tatt opp og lagt ut på YouTube etterpå. Hvis du ikke ønsker å komme med på opptaket, skru av mikrofon og video, og ikke del skjermen din. Du kan også velge å forlate denne forelesningen nå.

Stille spørsmål? Du kan når som helst bruke **Chat feltet på Skype** til å stille spørsmål. Du kan også **melde deg med navn** i feltet til å muntlig stille spørsmål med påsatt lyd og video. Men jeg følger ikke med på dette feltet mens jeg gir forelesning. Etter forelesningen, kan jeg besvare spørsmål (skriftlig & muntlig).





Acquired equivalence test and its clinical relevance

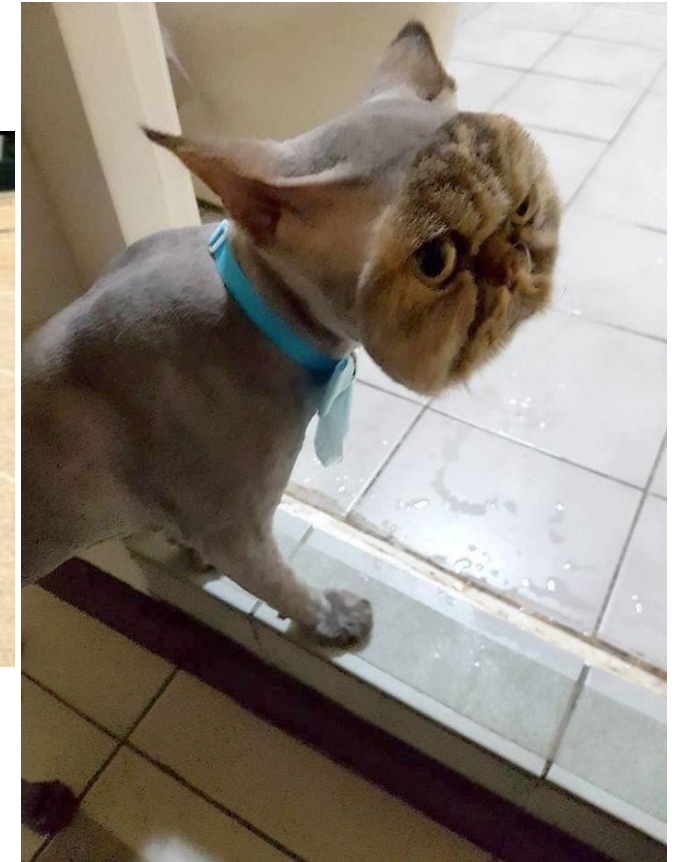
*András Pusztai MD PhD
Post doctoral researcher
Department of Neuropsychology
Helgelandssykehuset HF*

About me..

- 2015: University of Szeged , Hungary (medical doctor)
- 2015-2019: PhD of Neuroscience (Institute of Physiology)
 - Scholarship in Aachen, Germany (fMRI basics)
 - and in Leuven, Belgium (optogenetical manipulation in monkeys)
- 2020 – Postdoc in Mosjøen, Neuropsychology avd., Helgeland Hospital
 - Adult ADHD II project

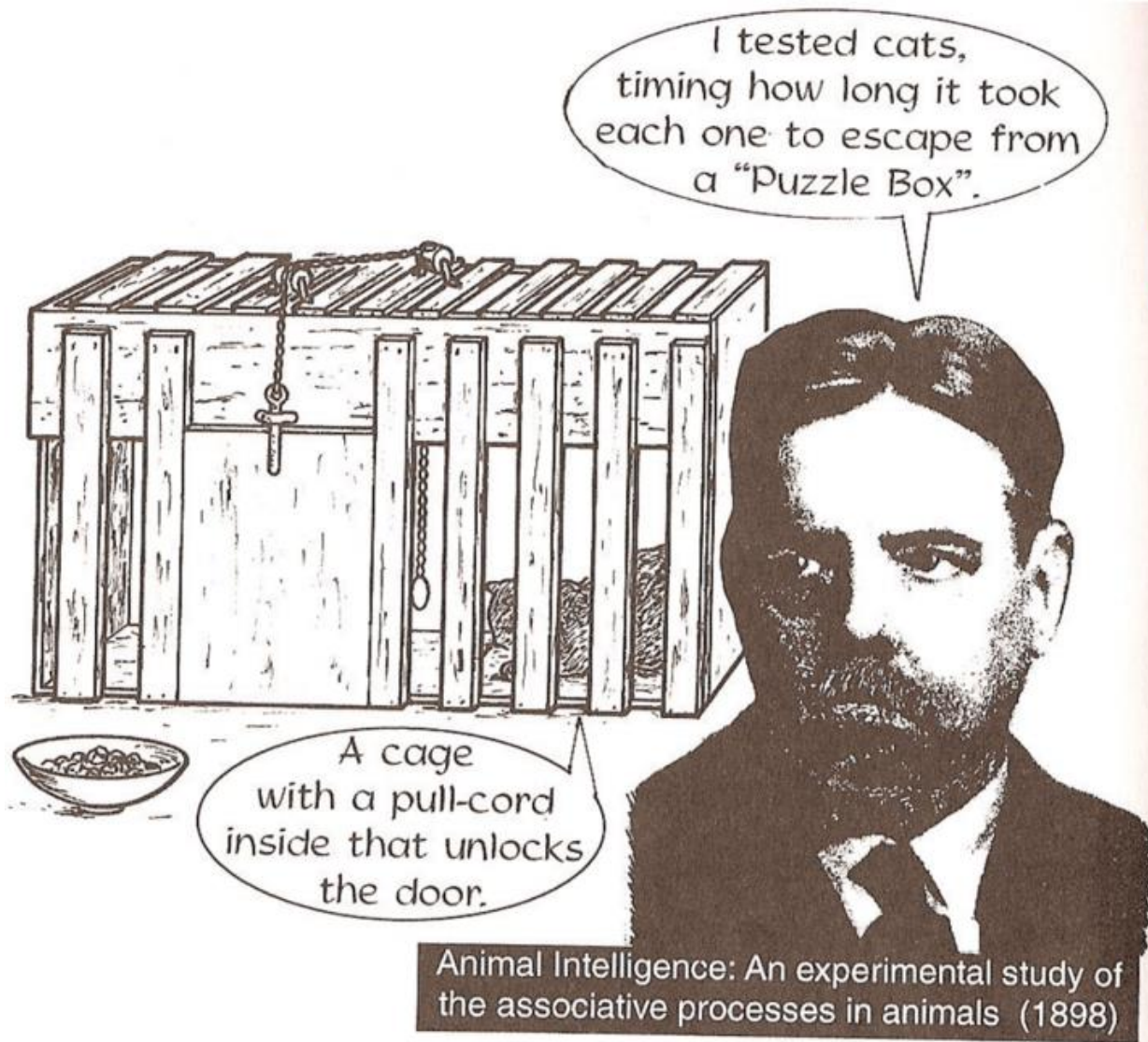


Mistakes we make

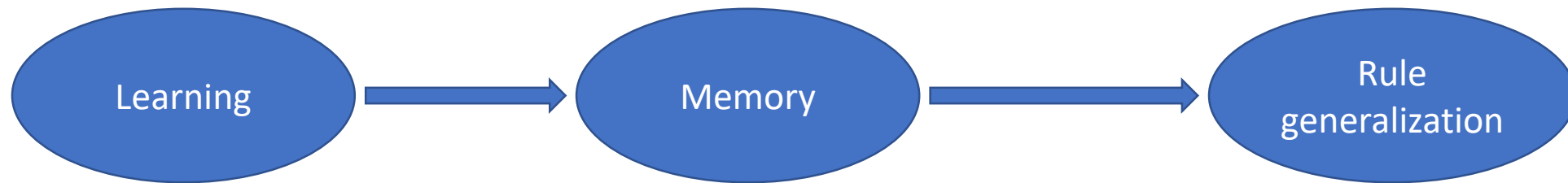


Trial and error learning

Thorndike
1898, 1911

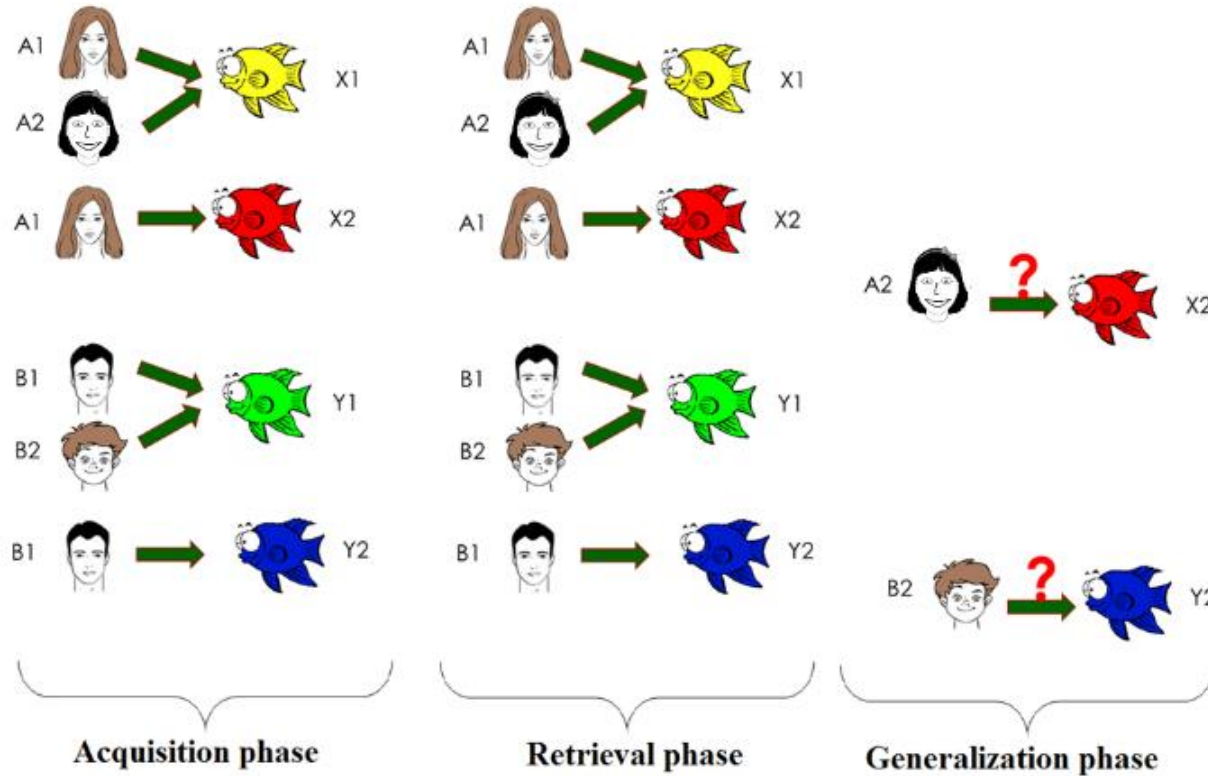


Associative learning



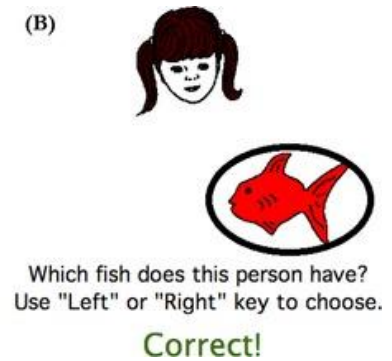
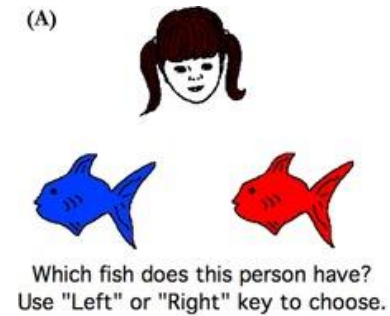
Acquired equivalence test

Visual

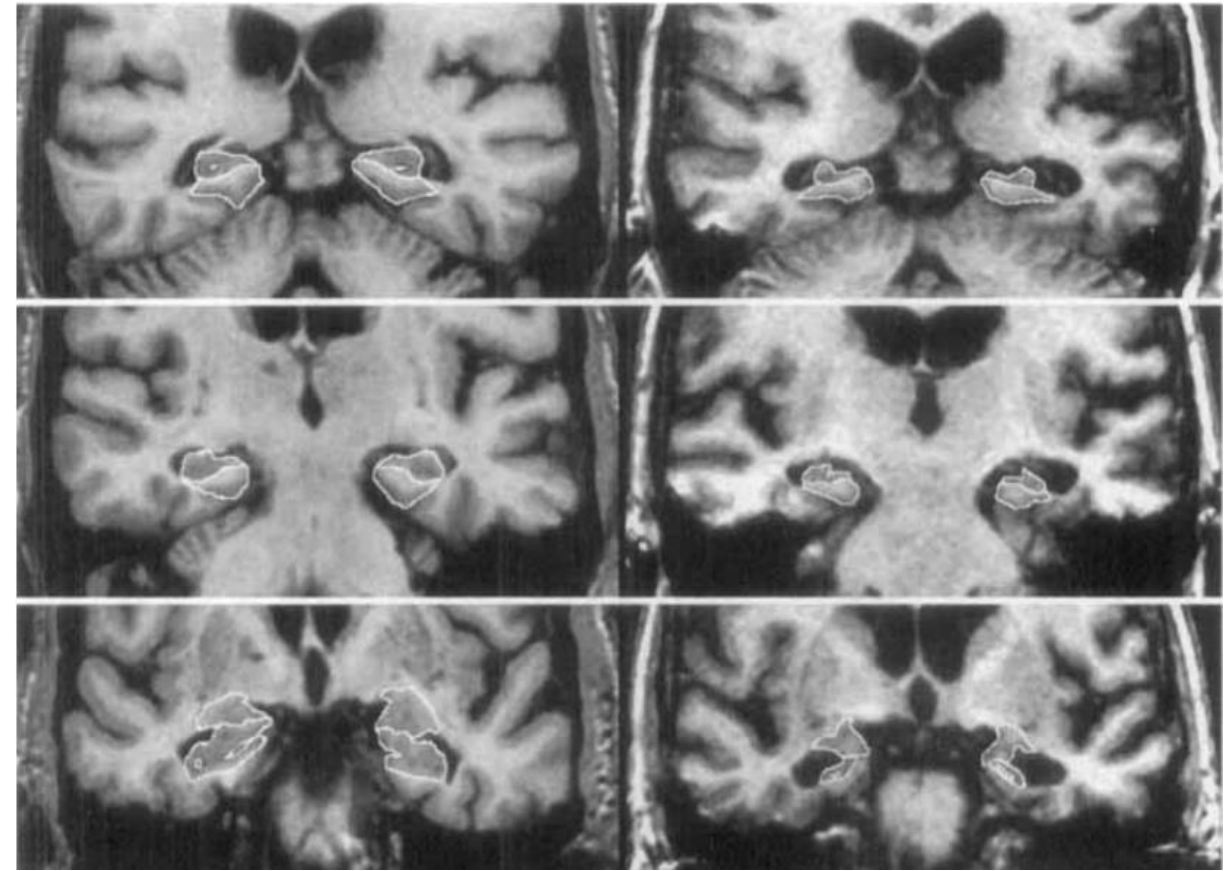
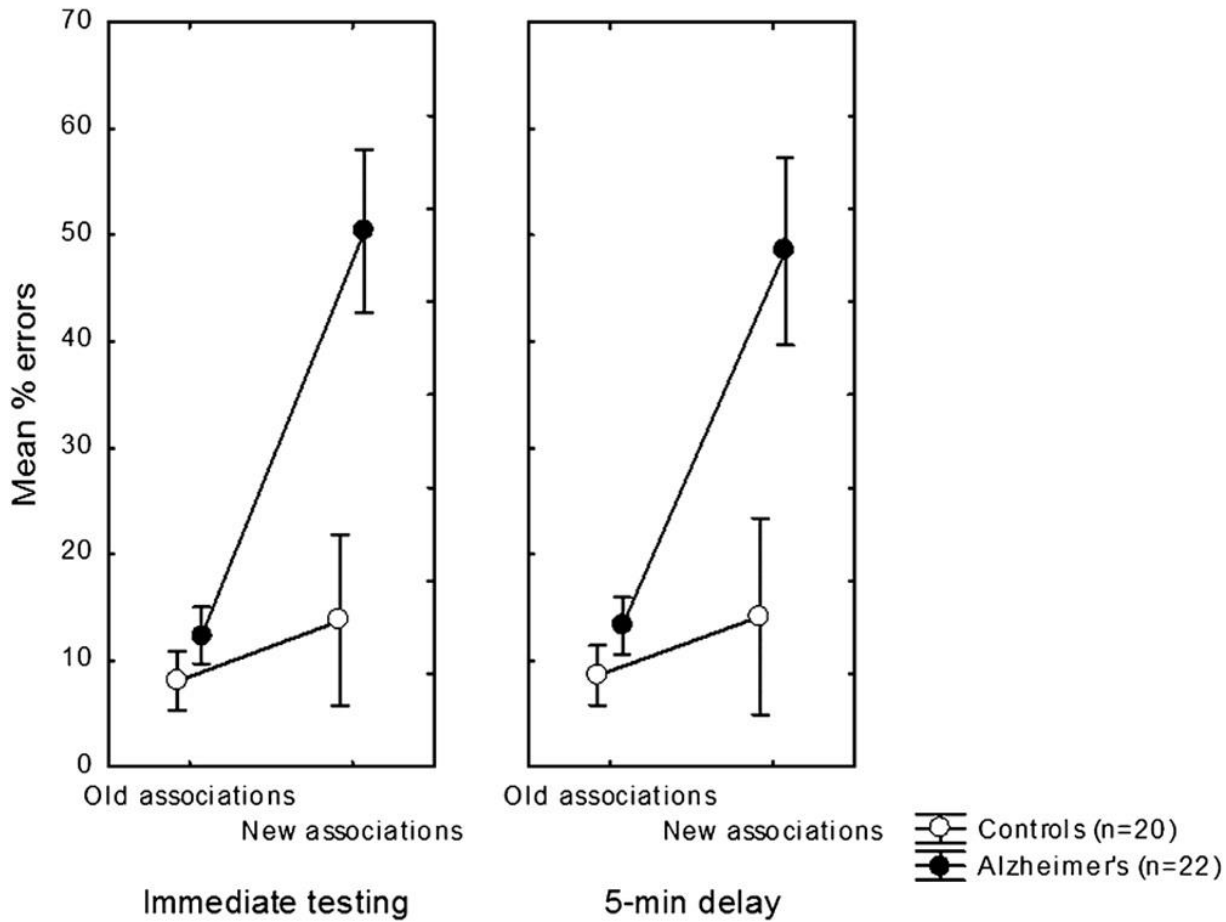


Feedback

No feedback (Test phase)



Alzheimer



Control

Patient

Jack, C. R., Petersen, R. C., Xu, Y. C., Waring, S. C., O'Brien, P. C., Tangalos, E. G., ... Kokmen, E. (1997). *Medial temporal atrophy on MRI in normal aging and very mild Alzheimer's disease. Neurology, 49(3), 786–794.* doi:10.1212/wnl.49.3.786

Bódi, N., Csibri, É., Myers, C. E., Gluck, M. A., & Kéri, S. (2009). Associative learning, acquired equivalence, and flexible generalization of knowledge in mild Alzheimer disease. *Cognitive and Behavioral Neurology, 22(2), 89-94.*

Basal ganglia

Basal Ganglia and Related Structures of the Brain



Available online at www.sciencedirect.com



Drug and Alcohol Dependence 93 (2008) 155–162

**DRUG and
ALCOHOL
DEPENDENCE**

www.elsevier.com/locate/drugaldep

Stimulus–response learning in long-term cocaine users: Acquired equivalence and probabilistic category learning[☆]

Nehal P. Vadhan^{a,b,*}, Catherine E. Myers^c, Eric Rubin^{a,b}, Daphna Shohamy^a, Richard W. Foltin^{a,b}, Mark A. Gluck^c

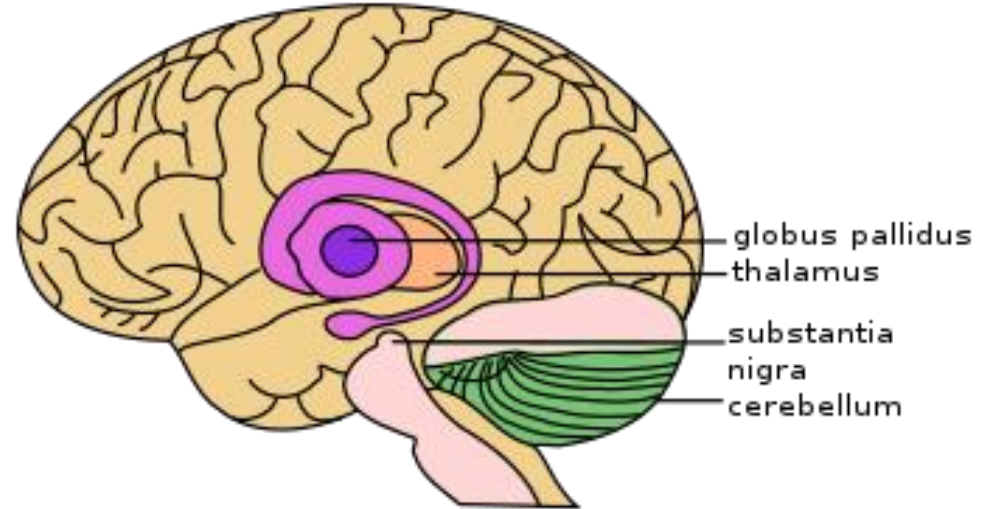
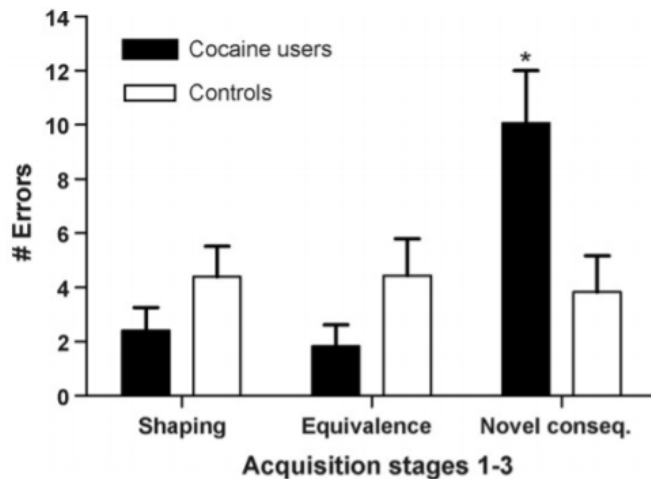
^a Columbia University, 2960 Broadway, New York, NY 10027-6902, USA

^b New York State Psychiatric Institute, 1051 Riverside Drive, New York, NY 10032, USA

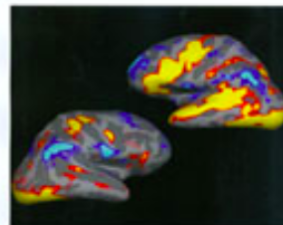
^c Rutgers University, 197 University Avenue, Newark, NJ 07102, USA

Received 11 July 2007; received in revised form 13 September 2007; accepted 14 September 2007

Available online 31 October 2007



Journal of
Cognitive Neuroscience



Dissociating Hippocampal versus Basal Ganglia Contributions to Learning and Transfer

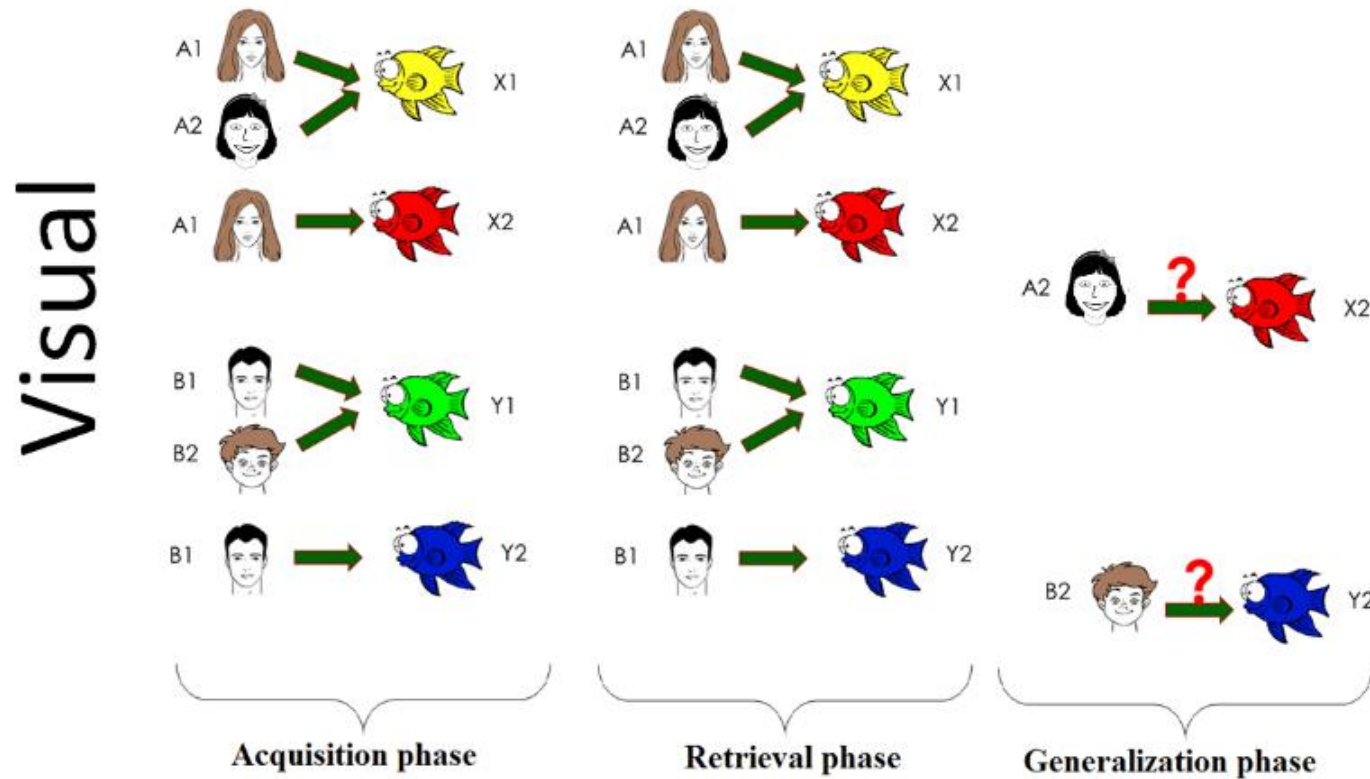
[Show all authors](#)

[Catherine E. Myers](#), [Daphna Shohamy](#), [Mark A. Gluck](#), [Steven Grossman](#),

Posted Online March 13, 2006

<https://doi.org/10.1162/089892903321208123>

Acquired equivalence test



Feedback

No feedback (Test phase)

Nigrostriatal DA-system

Hippocampus

Mediotemporal lobe

Interim summary

- Learning from mistakes: Basal ganglia
 - Parkinson
 - Substance abuse disorder
 - OCD, Tourette, etc.
- Maintaining memory, rule generalization:
 - Hippocampus, mediotemporal lobe

Migraine

- Primary headache disorder
- Some studies denoted volume reduction of the basal ganglia and other brain areas in migraine patients

MIGRAINE CHARACTERISTICS



- HEADACHE ATTACKS LASTING 4-72 HOURS
- UNILATERAL LOCATION
- PULSATING SENSATION
- MODERATE OR SEVERE PAIN INTENSITY
- AGGRAVATED BY ROUTINE PHYSICAL ACTIVITY
- ACCOMPANIED BY NAUSEA AND/OR VOMITING
- SENSITIVITY TO LIGHT AND/OR SOUND

Our aims

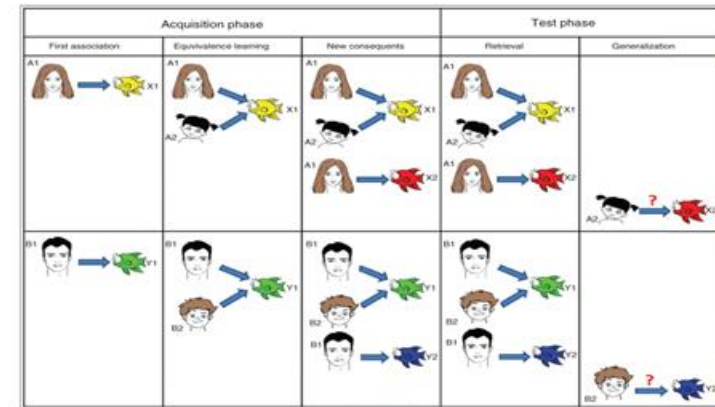
- Investigate how the migraine disturbs cognitive functions
 - Adulthood
 - Childhood
- Acquired equivalence test

Our findings

- Decreased performance of the adult patients
- No difference in pediatric patients

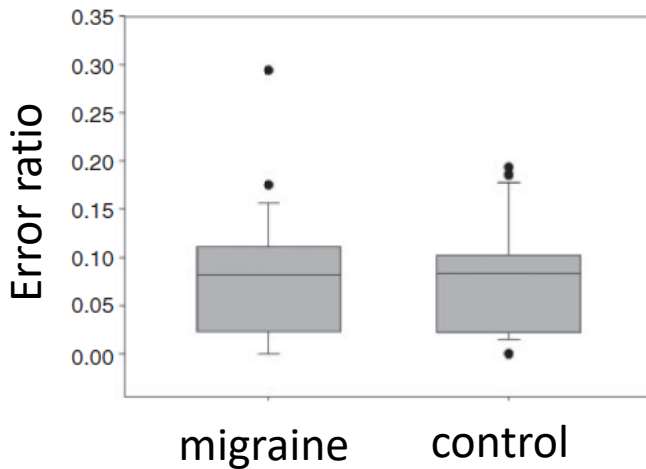
Cephalalgia

An International Journal of Headache

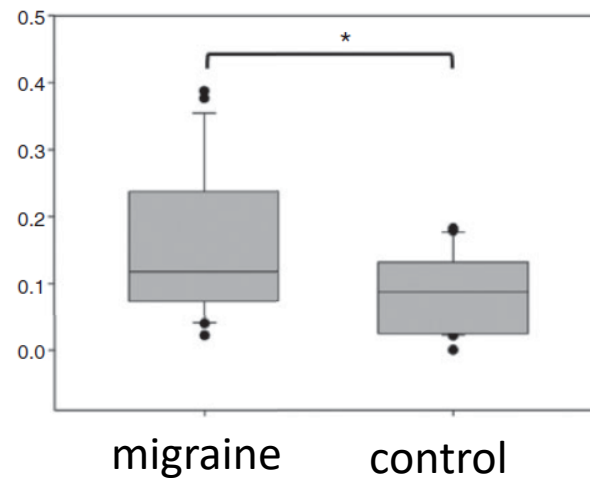


Paradigm used for testing visually guided associative learning in pediatric and adult migraine. Adapted from *Cephalalgia* 41/2, 176–184, Z Giricz et al.

Pediatric group



Adult group



- Predicting the response to a triptan in migraine using deep attack phenotyping: A feasibility study
M Viana et al.
- A potential role for two brainstem nuclei in craniovascular nociception and the triggering of migraine headache
AS Zagami et al.
- The relation between the placebo response, observed treatment effect, and failure to meet primary endpoint: A systematic review of clinical trials of preventative pharmacological migraine treatments
K Evans et al.
- Plasma levels of vasoactive neuropeptides in pediatric patients with migraine during attack and attack-free periods
F Hanci et al.

Full table of contents on page 133



International Headache Society

www.ihs-headache.org
journals.sagepub.com/home/cep



Discussion – migraine acquired equivalence test

- Limitations:
 - small sample size (n=27 in each group)
 - Limitations of the test

The behavioural results suggest that the decreased performance in the test is not a herited damage that comes with the migraine, but rather a damage that develops with the disorder

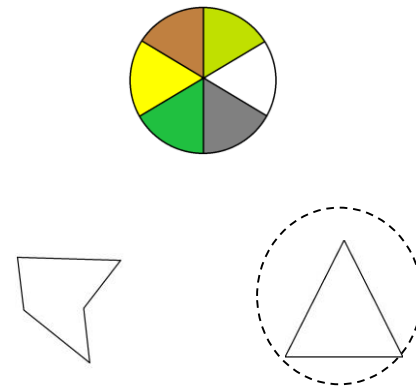
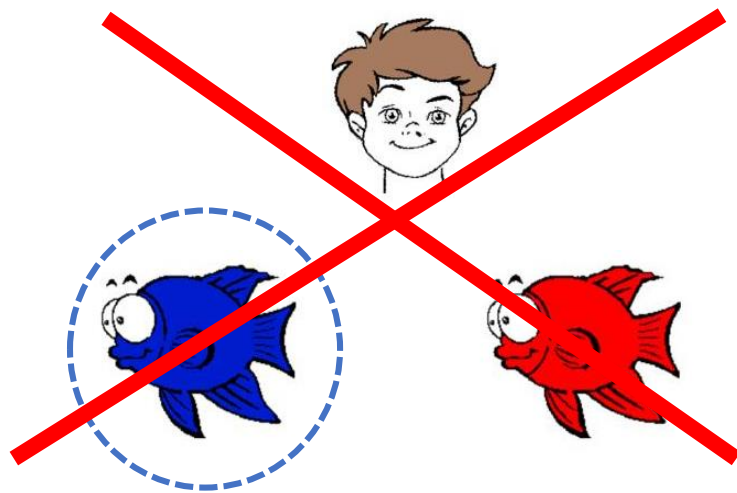
- Neurodegenerative disorder?
- Selectivity?
 - Are these damages only located to basal ganglia system or it is rather a diffuse damage?
- Follow-up study is needed.

Future perspectives

- Improving the test:
 1. Omit preconceptions (for example blue – boy, red – girl)
 2. Investigate the working memory instead of trial-and-error learning
 3. Spatial attention
 - how it influence the performance
- Usage on other clinical groups

Improving the test 1: omit preconceptions

- Color-face associations are highly effected by social preconceptions



Improving 2: Working memory / learning

Trial-and-error learning:



Working memory:

- Holding information in your mind while you manipulate it
- Not short term memory! (phone number –numbers backwards)

Working memory load: number of item that you are holding currently (maximum 5-7)

Improving 2: Working memory / learning

During the test:

1. Learning through trial-and-error:

- Randomly pick a shape
- Get feedback
- Optimize your performance based on the feedback

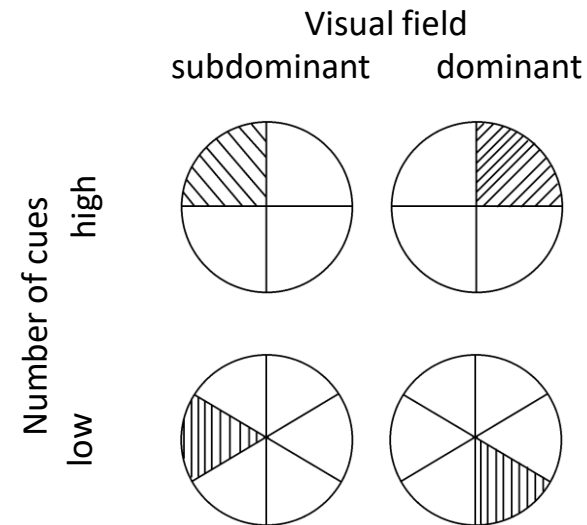
Tell the rule before the test

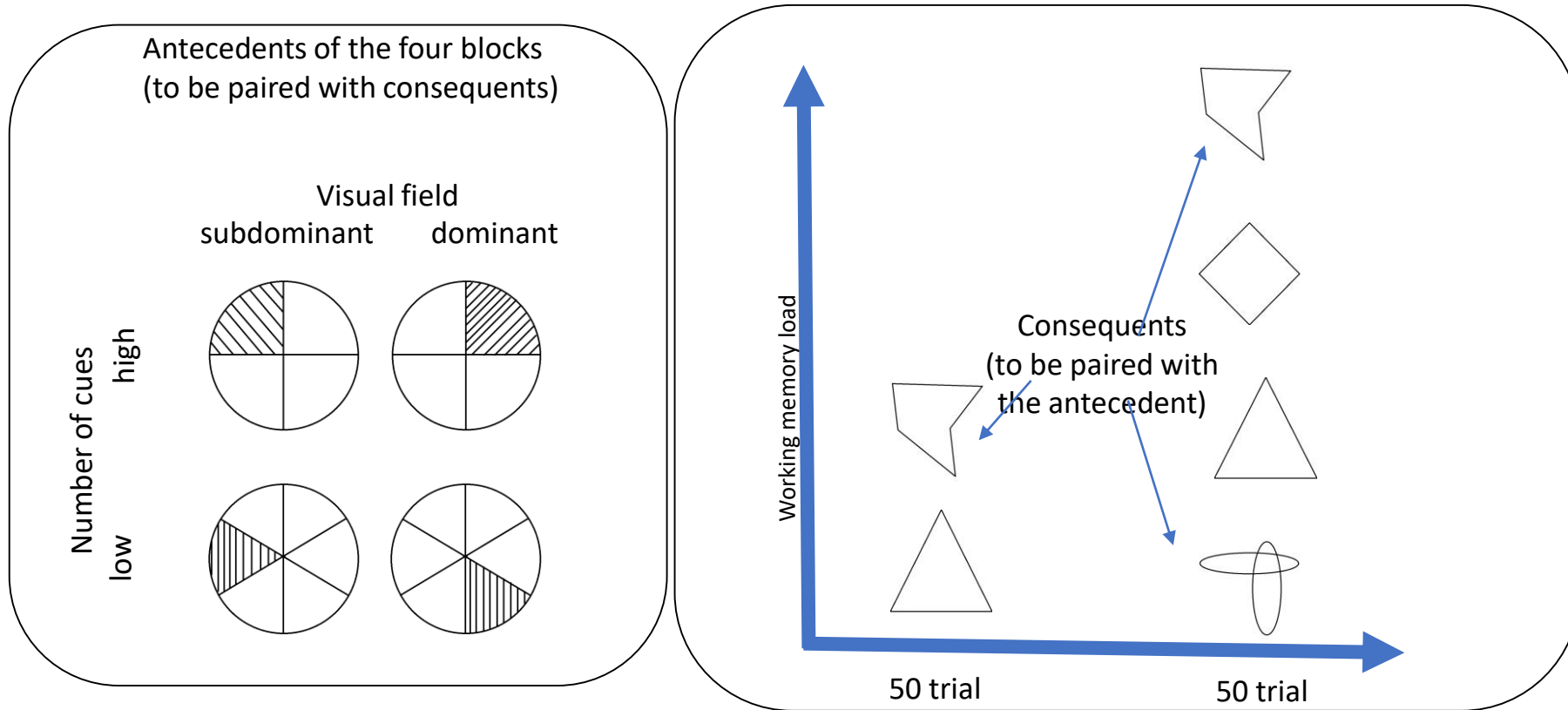
2. Working memory

- Need to remember more and more pairs during the test (first one pair, then 2, 3 ...)

Improving the test 3: Spatial attention

- Focus attention to the right-left visual field
- Solution: manipulate the focusing point
 - Change the number of distractors
 - Change the left or right visual field dominance





Interim summary

- Progressive acquired equivalence task:
 - Associative learning task
- Working memory
- Spatial attention

Usage on clinical groups

1. Normative data

- We are currently planning to send out the test for healthy volunteers
- They do the test at home – we get the data back
- Anonymous data –no chance to track back

2. Working memory and attention is highly affected in ADHD

- This test will be used as one of our test in the research project



Project ADHD II:

Main goal: investigate executive functions and connected brain waves in adult ADHD.

1. Neuropsychological assesment
2. Clinical questionnaires
3. EEG with three experimental tests:
 - Mind-wandering task
 - Stop signal task
 - Acquired equivalence test



Contact us!

Neuropsychology avd. Mosjøen

Venke Arntsberg Grane (Venke.Arntsberg.Grane@helgelandssykehuset.no)

Andras Puzsta (Andras.Puzsta@Helgelandssykehuset.no)

Take home messages (apart from funny fail pictures)

- Acquired equivalence test
 - Trial-and-error learning (basal ganglia dependent)
- Migraine
 - No behavioral changes in childhood, decrement in behavioural performance in adulthood
- Modified acquired equivalence test:
 - Focus on working memory and spatial attention
- Project Adult ADHD II: Be involved!



Thank you for your attention!

