LSE Literary Festival discussion

TLS LIFE IN EVERY WORD

Self-Help: myth or reality?

Dr Julian Baggini
Founding Editor of The Philosophers' Magazine, *books including* The Ego Trick *and* The Virtues of the Table

Professor Barbara J Sahakian
Professor of Clinical Neuropsychology, University of Cambridge and author of Bad Moves

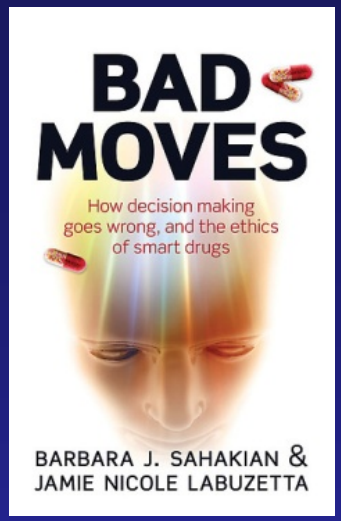
Professor Paul Dolan
Professor of Behavioural Science, Department of Social Policy, LSE

Professor Ilina Singh
Chair, KCL

LSE events

Suggested hashtag for Twitter users: **#LSElitfest**

CPD CERTIFIED The CPD Certification Service

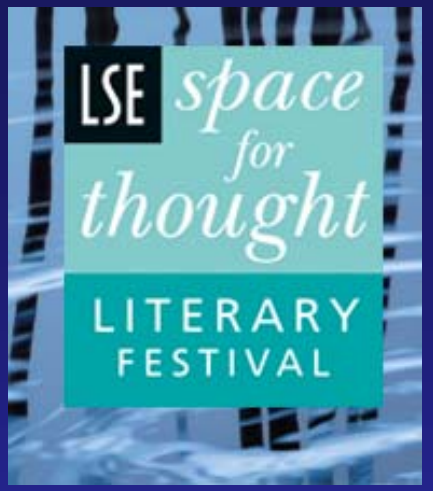


Clinical Behavioural Neuroscience Institute

UNIVERSITY OF CAMBRIDGE

MRC Medical Research Council

wellcome trust



‘Smart drugs’: Brain actions and ethical issues

Professor Barbara J Sahakian FMedSci

President of the British Association for Psychopharmacology
President of the International Neuroethics Society
University of Cambridge Department of Psychiatry
MRC/Wellcome Trust Behavioural and Clinical Neuroscience Institute
Cambridge UK

We need cognitive enhancing drugs to treat the cognitive disability of people with mental health disorders and brain injury

Disorders such as attention deficit hyperactivity disorder (ADHD), schizophrenia and Alzheimer's disease all have associated cognitive problems

Cognitive enhancing drugs (Smart Drugs) are needed to treat cognitive disabilities and improve functional outcome, quality of life and wellbeing for people with neuropsychiatric disorders and brain injury.

Estimated total annual costs including health service costs, lost earnings, lost productivity and human costs	
Depression	£20.2-23.8 billion
Anxiety	£8.9 billion
Schizophrenia	£13.3 billion
Dementia	£17 billion
Somatisation disorder	£17.6 billion

Department of Health (2011) No health without mental health: The economic case for improving efficiency and quality in mental health
http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/documents/digitalasset/dh_123993.pdf
The Conversation : http://theconversation.com/burden-of-brain-disorders-ignored-by-government-16641

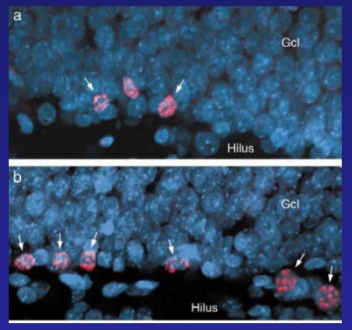
Some Possible Methods of Boosting Your Brain Power

- **Pharmacological (Smart Drugs)**
- **Neuroprosthetics for cognition**
- **Education**
- **Neurocognitive activation/ cognitive training/ brain training**
- **Physical exercise**

Beddington, Cooper, Field, Goswami, Huppert, Jenkins, Jones, Kirkwood, Sahakian & Thomas

'The mental wealth of nations' (2008) Nature, 455

Learning helps to generate new brain cells

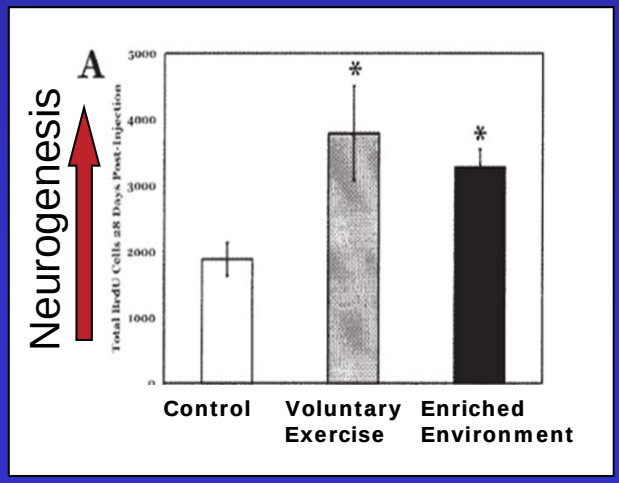


New brain cells in control

'new' brain cells after spatial learning

Gould et al (2000) Nature Neurosci

Voluntary exercise leads to an increase in overall neurogenesis



In rats, after 2-3 weeks of access to an exercise wheel, the number of BrdU positive cells (a DNA precursor) has almost doubled after 28 days

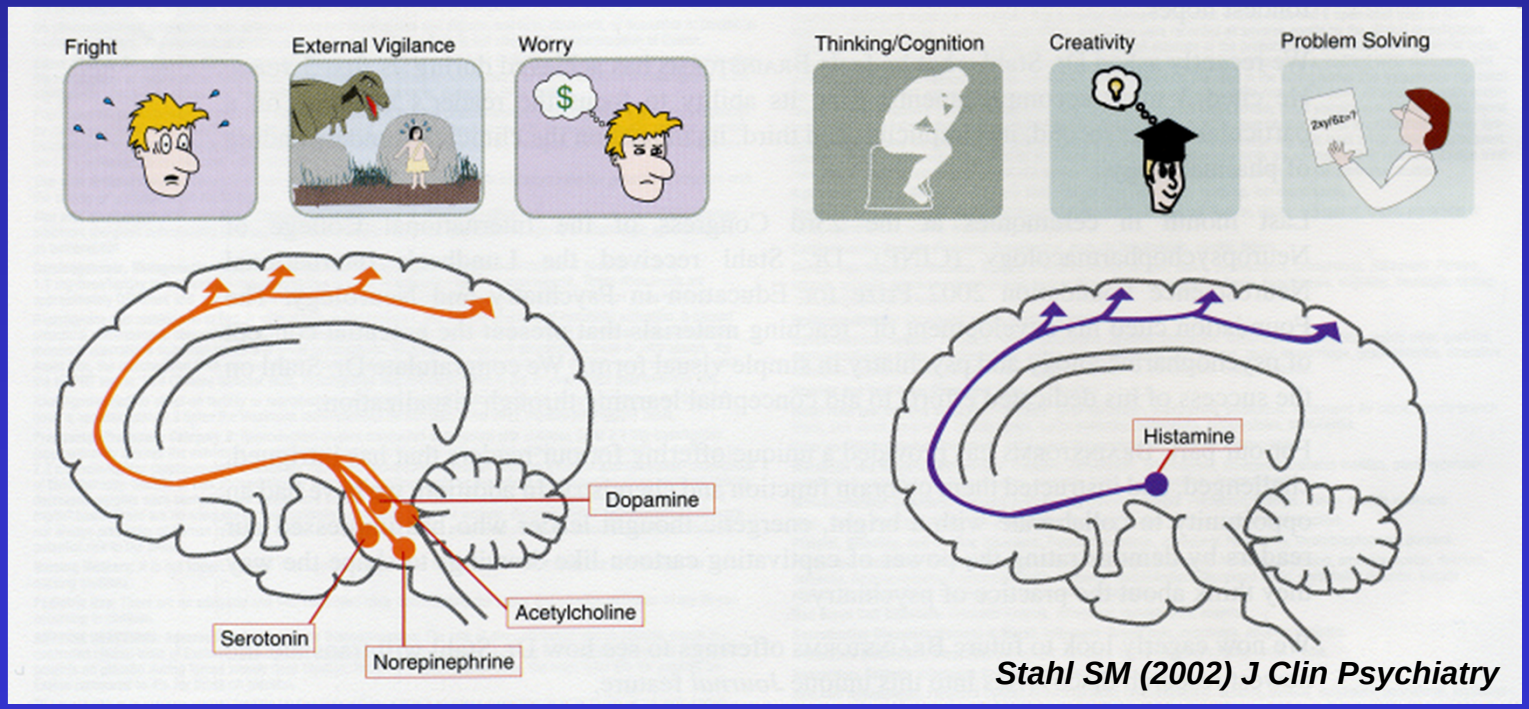
Olson et al (2006) Hippocampus
Eadie et al (2005) J Comp Neurol

Action of methylphenidate, modafinil, and atomoxetine

Methylphenidate (Ritalin) increases synaptic concentration of Dopamine and Noradrenaline by blocking their reuptake.

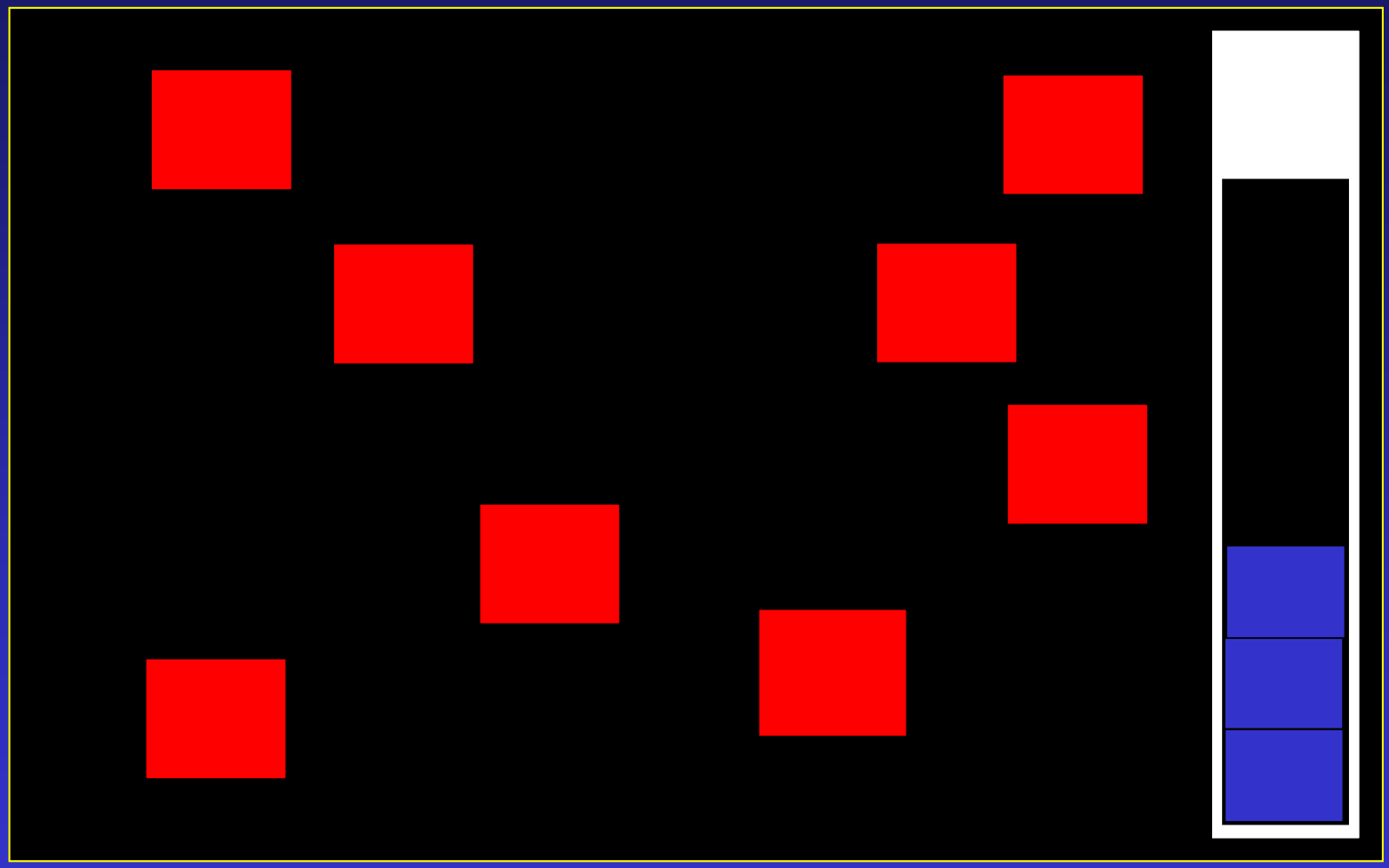
Atomoxetine (Strattera) is a relatively selective noradrenaline reuptake inhibitor (SNRI).

Modafinil (Provigil) action is unclear; Possibilities include: indirect mediation of ACh and/or Adrenergic alpha –1 receptor activity. Appears to effect hypothalamic orexin and histamine, and has a small effect on dopamine transporter activity. Recent evidence suggests NA (Minzenberg et al 2008), DA (Volkow et al 2009) and glutamatergic mechanisms (Scoriels, Jones, Sahakian 2012).



How can we objectively measure cognitive processes such as working memory?

CANTAB Spatial Working Memory (SWM)



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Cambridge Cognition (www.camcog.com)

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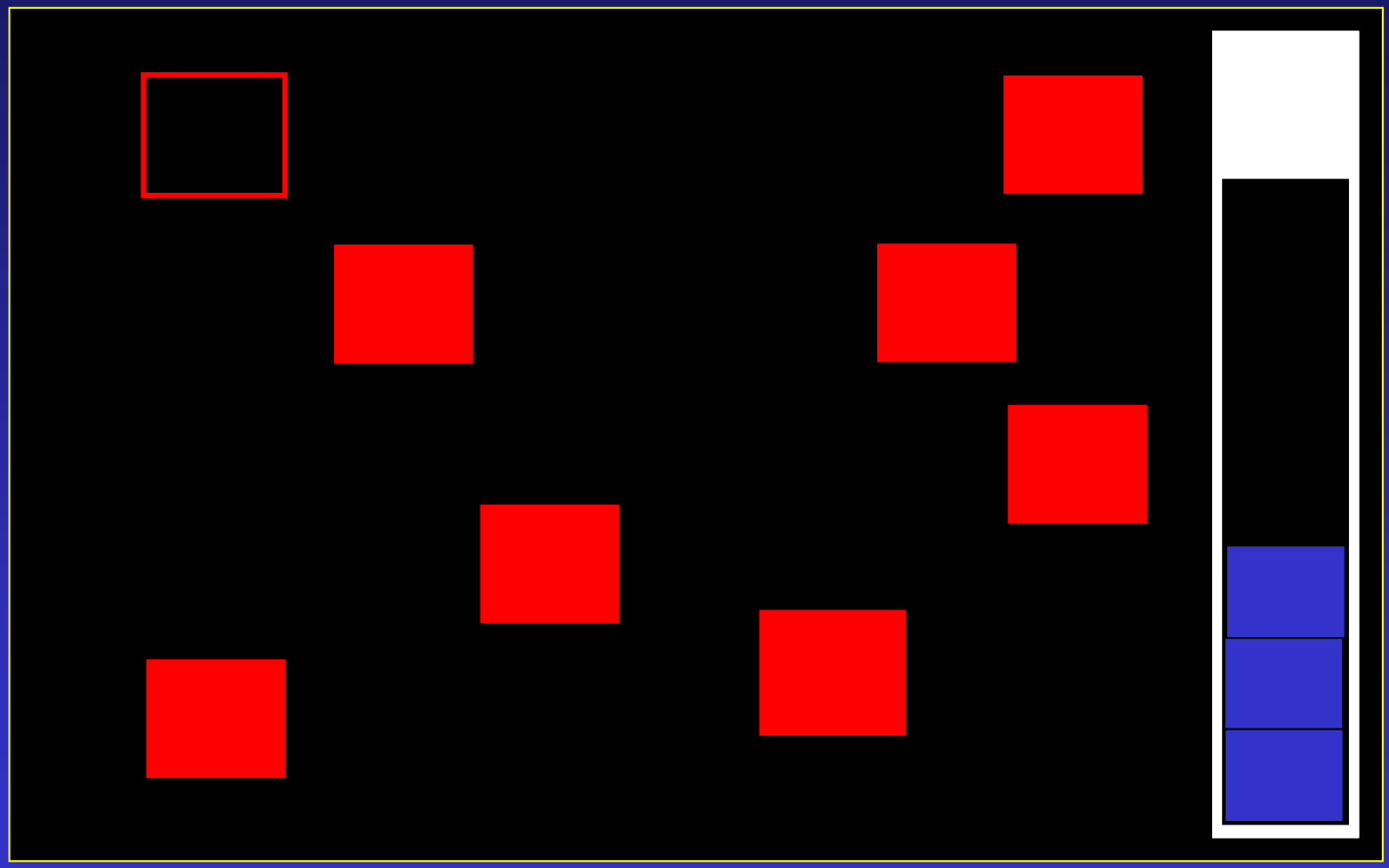

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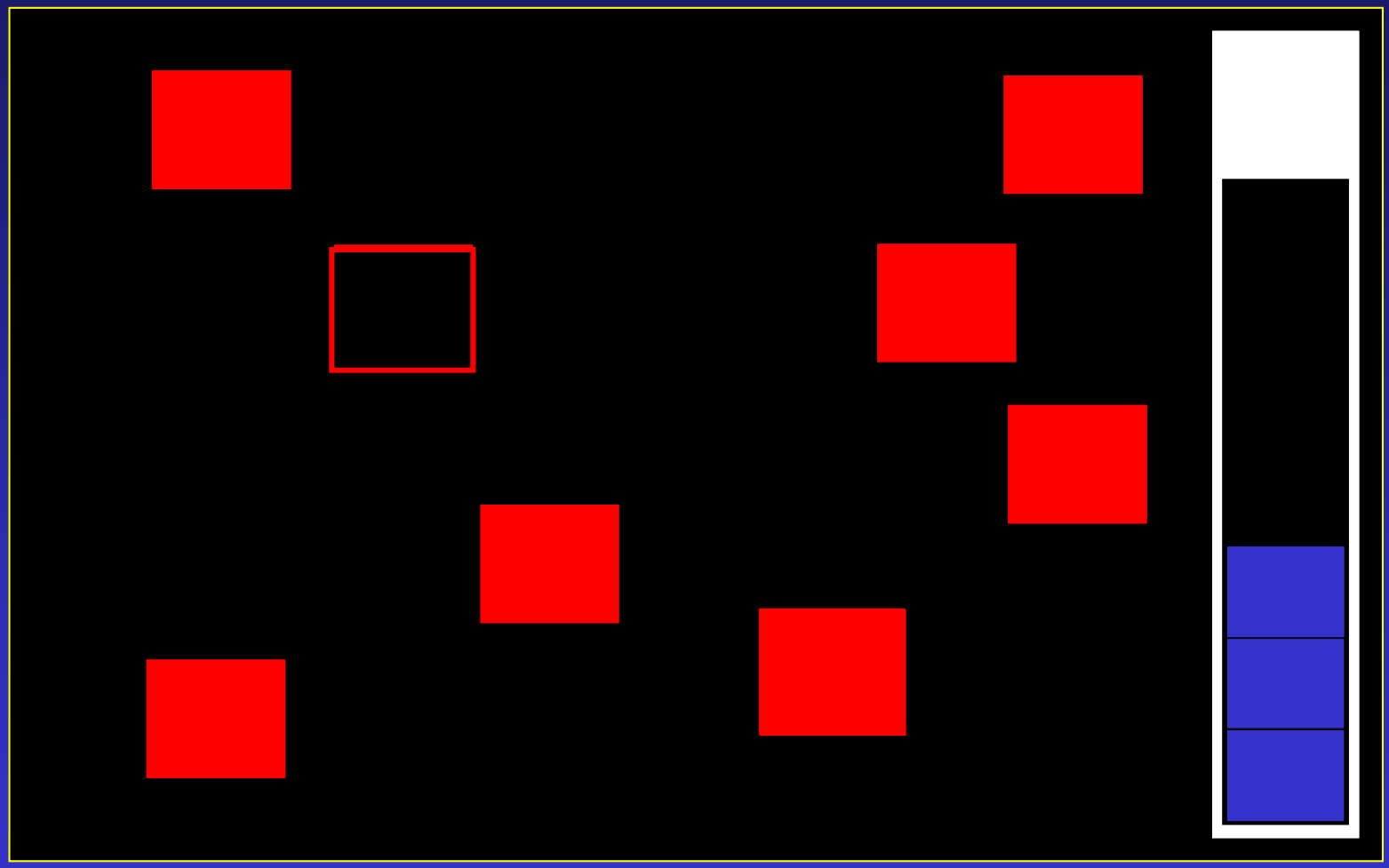

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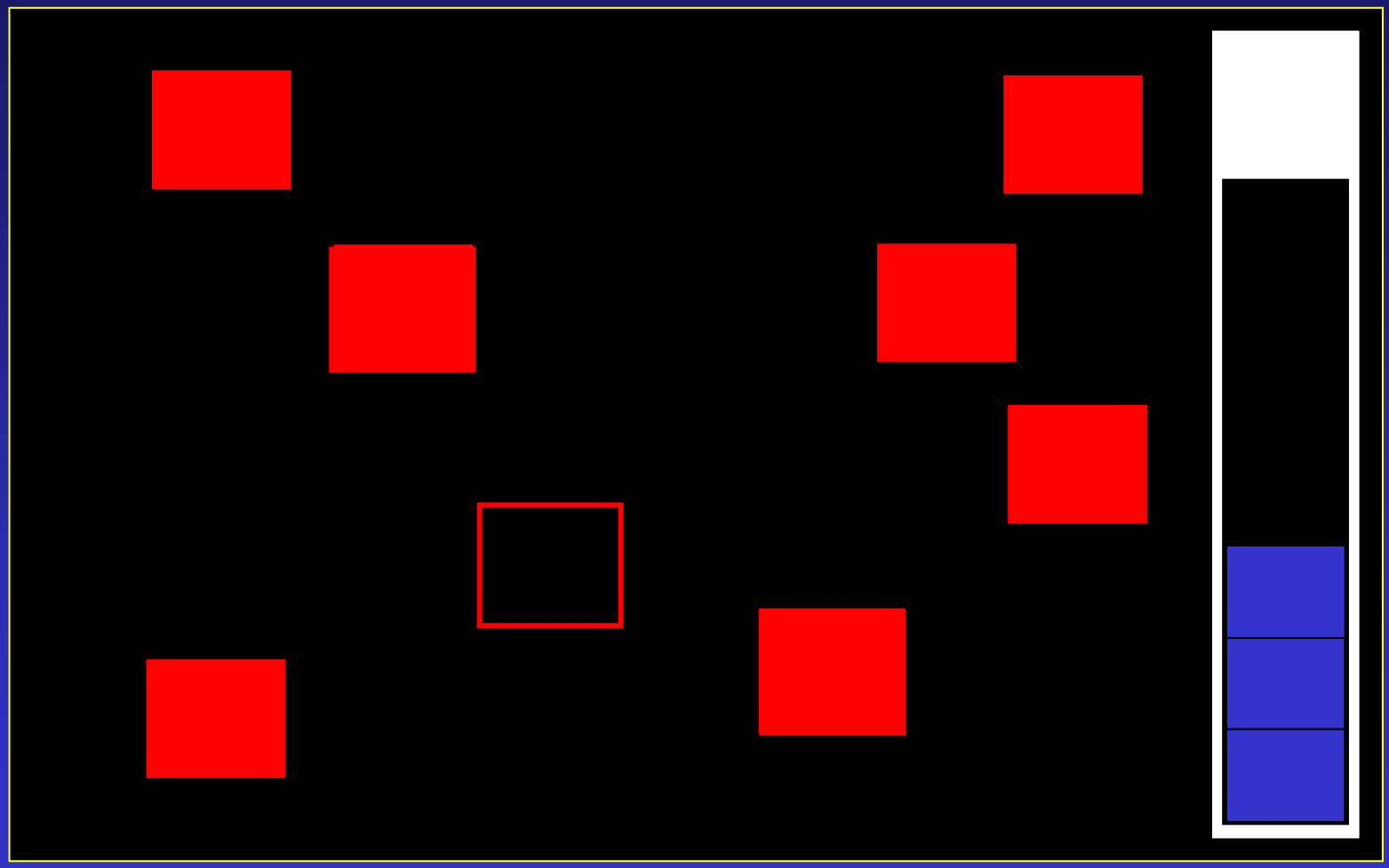

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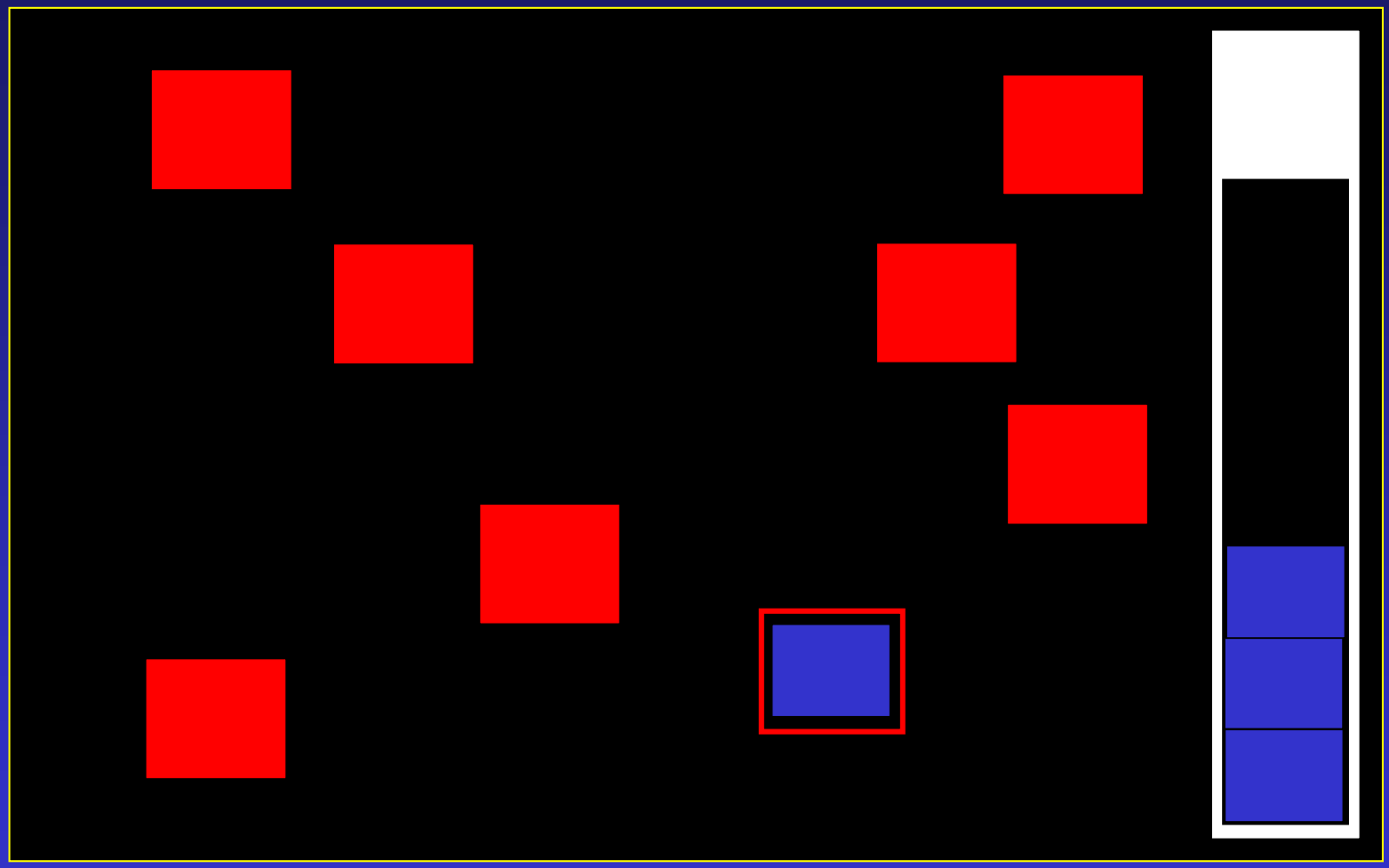

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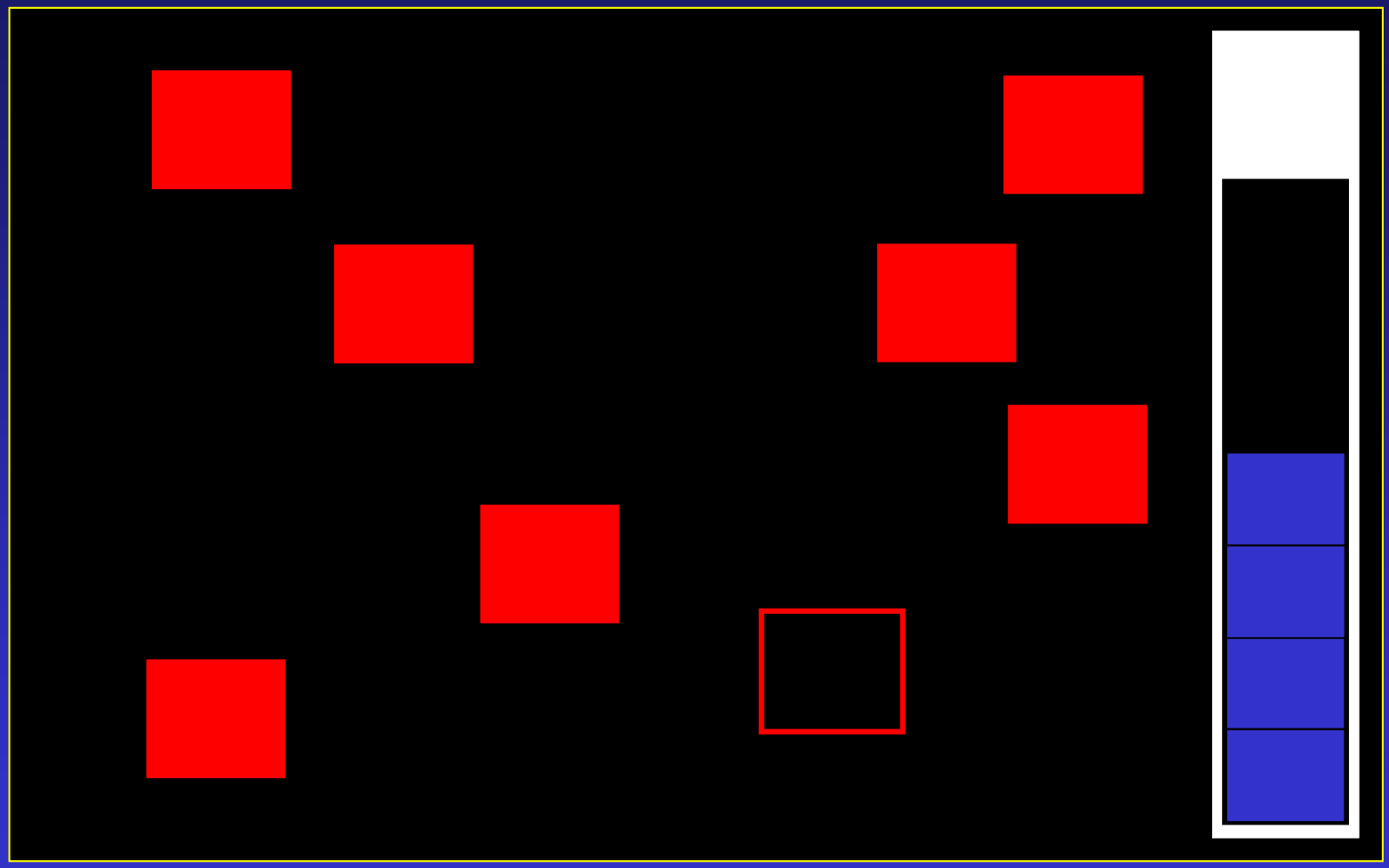

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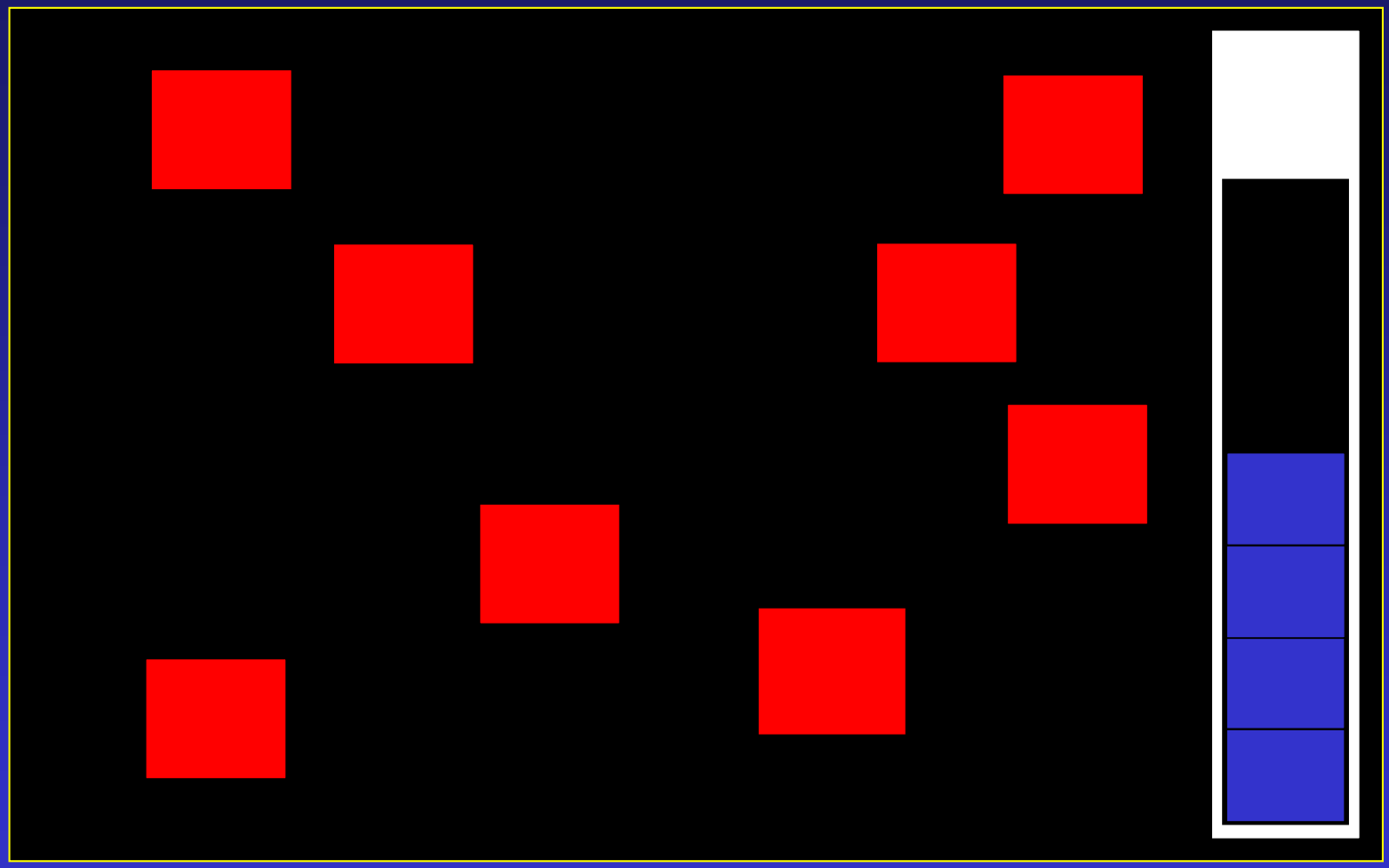

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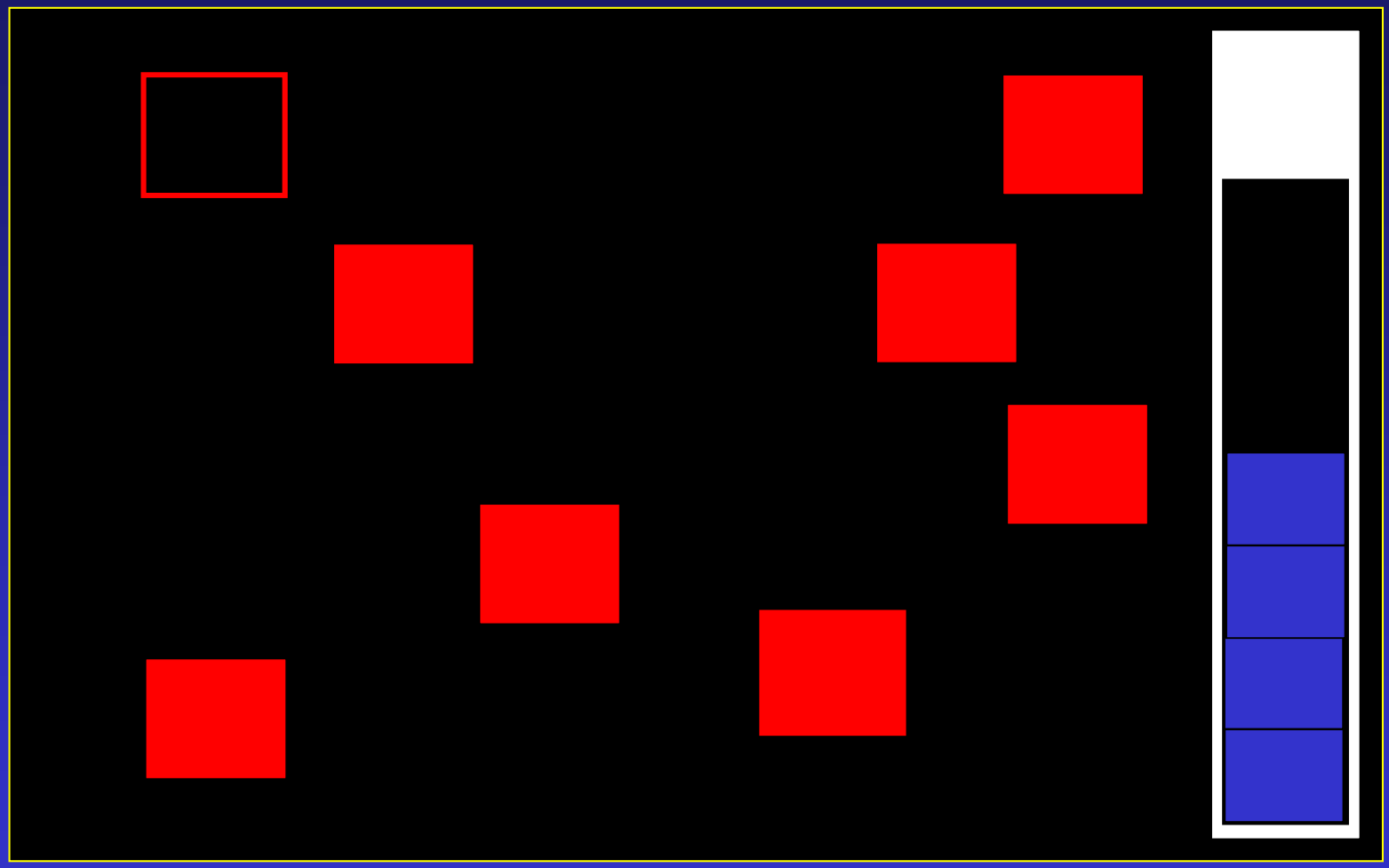

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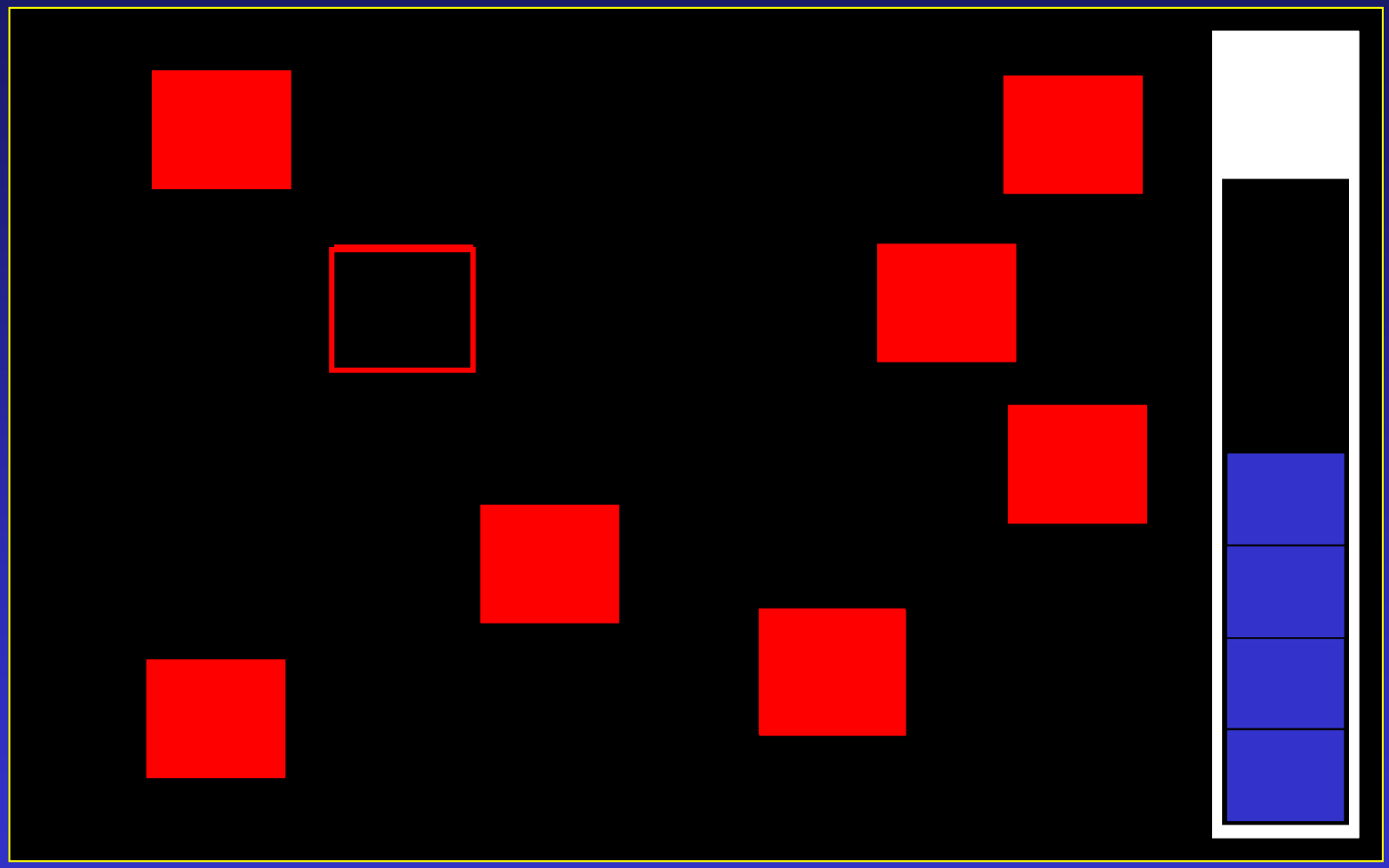

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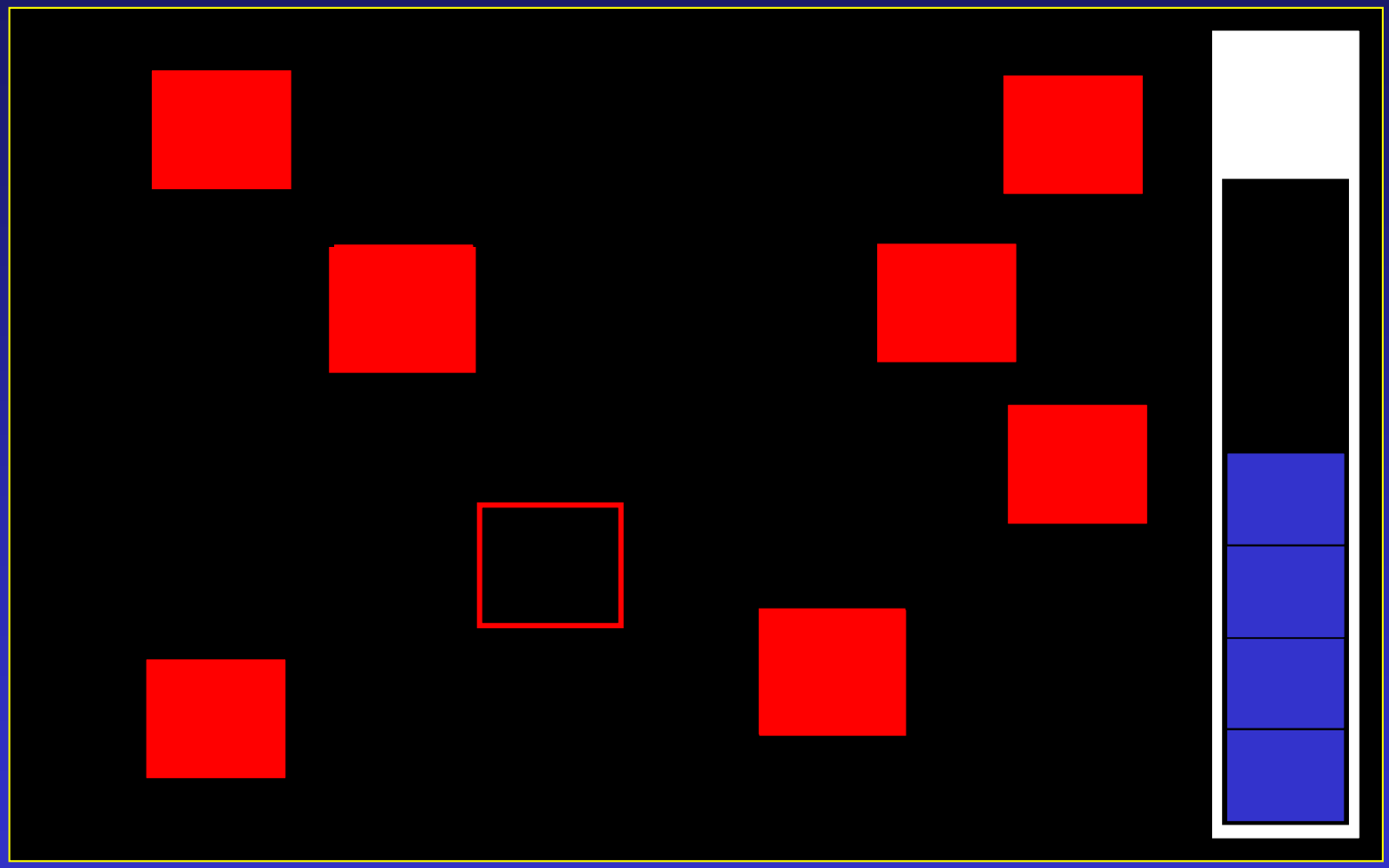

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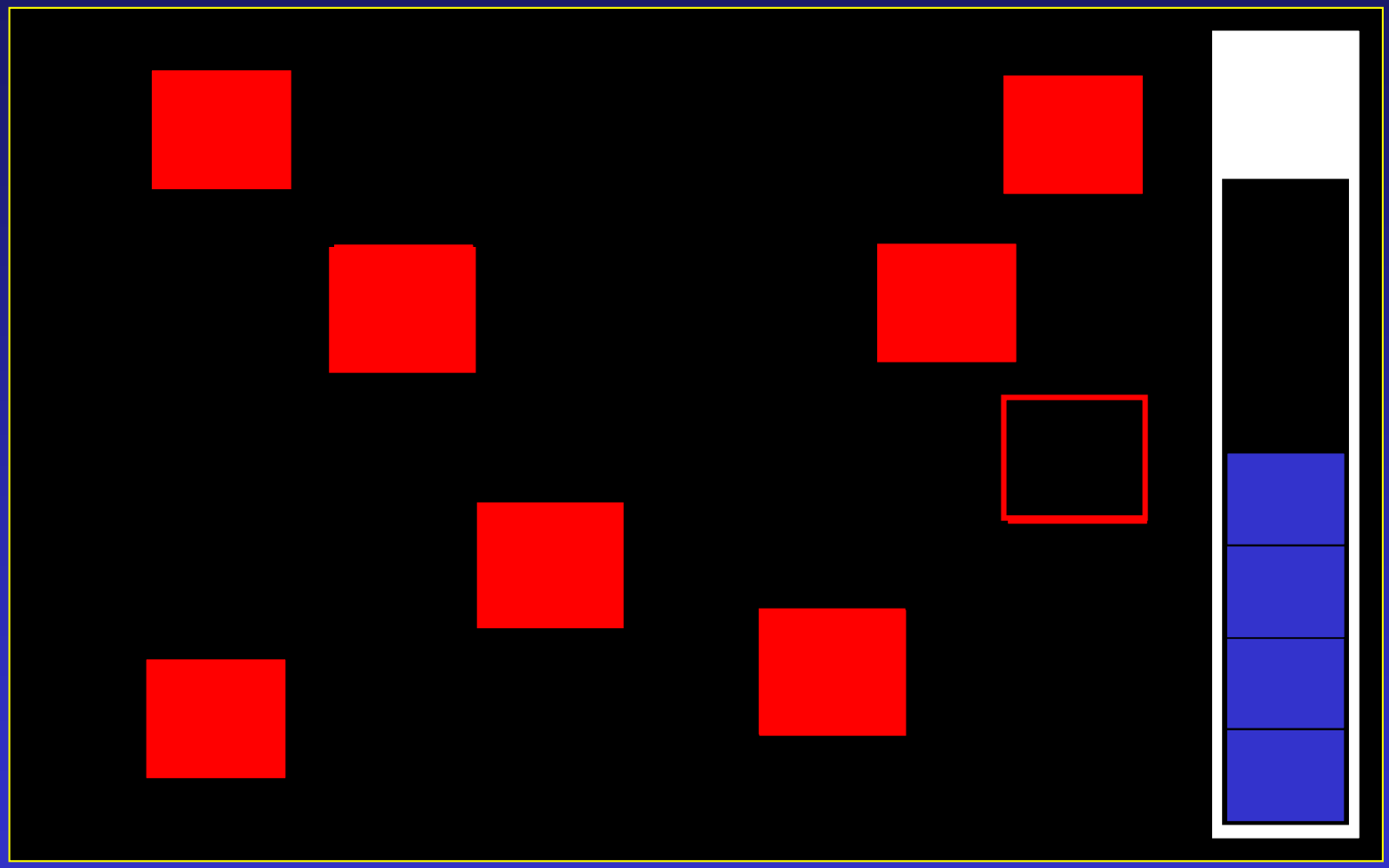

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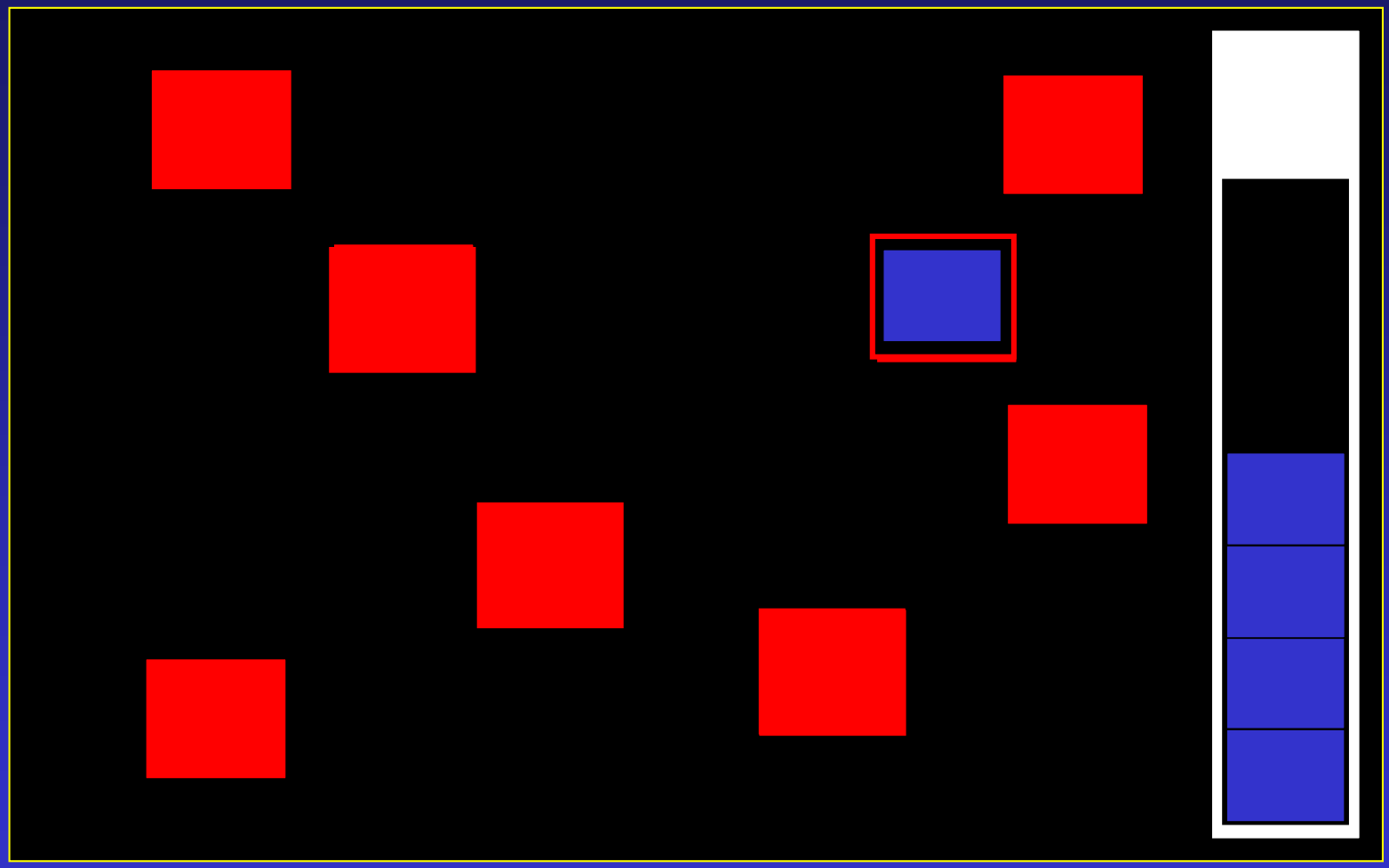

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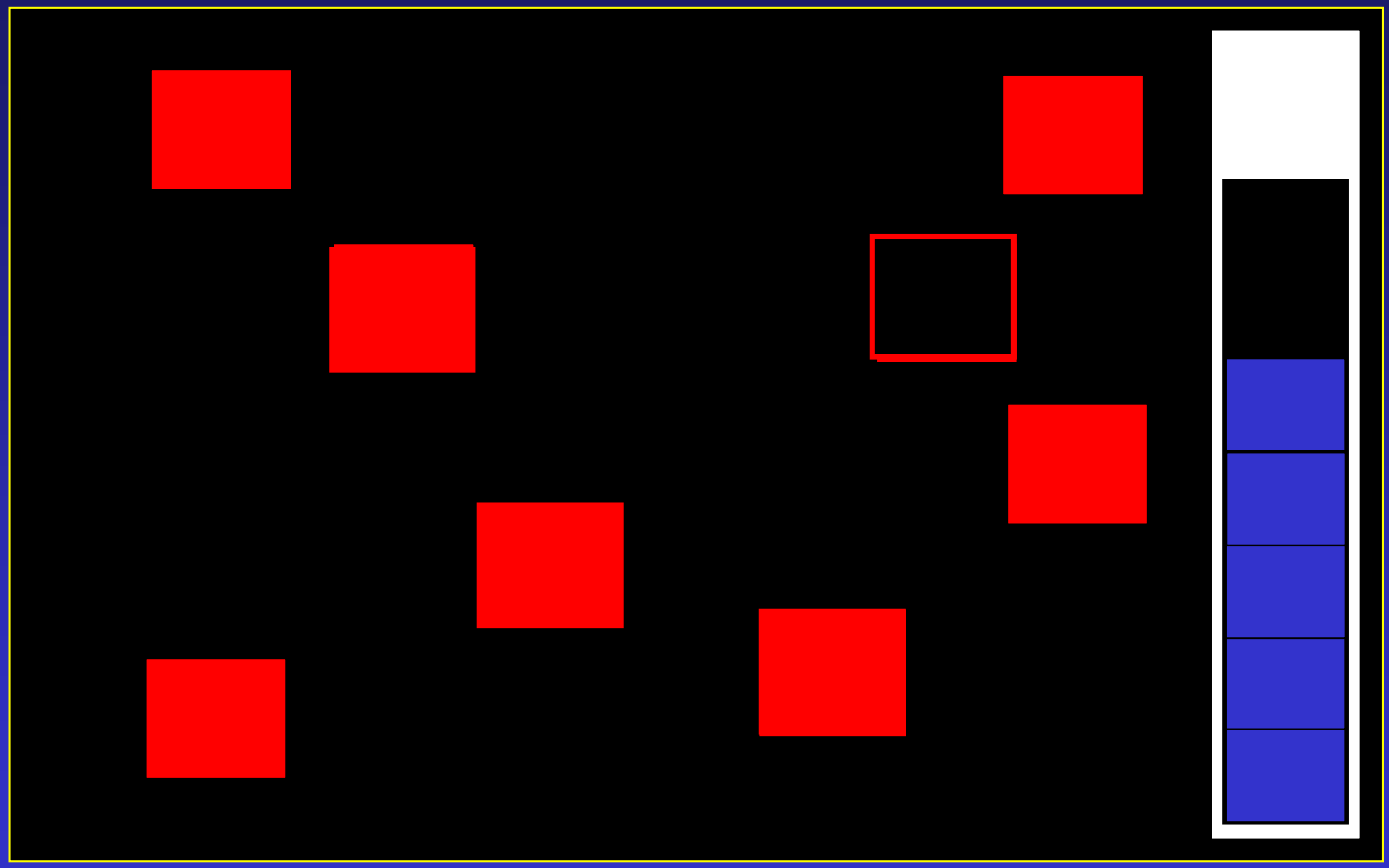

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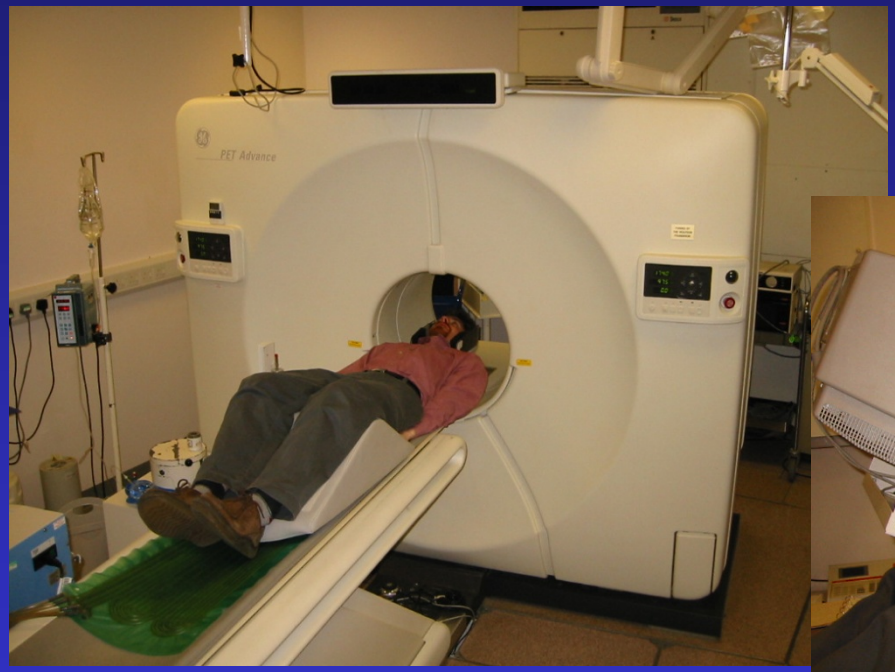
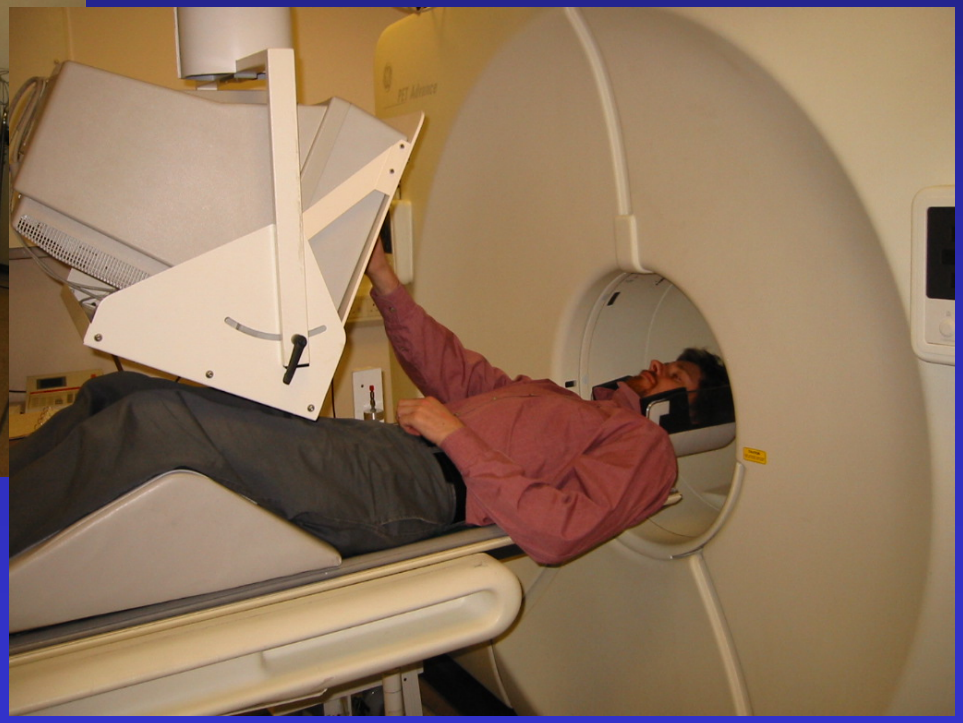
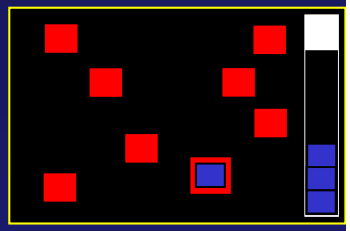
Cambridge Cognition (www.camcog.com)

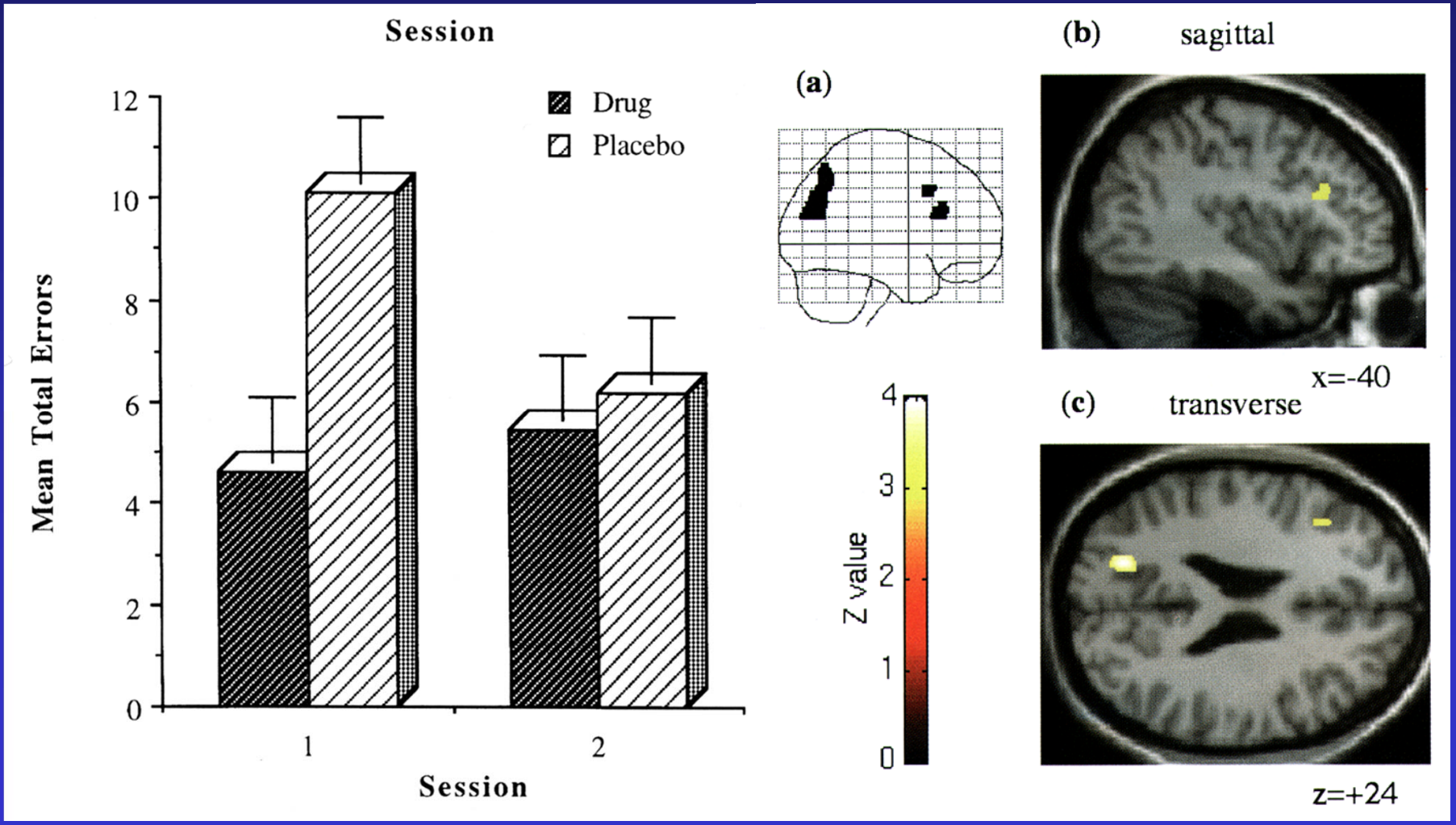
Neuroimaging at the Wolfson Brain Imaging Centre





Methylphenidate (Ritalin) improves working memory & increases 'efficiency' of dorsolateral prefrontal cortical network in healthy volunteers

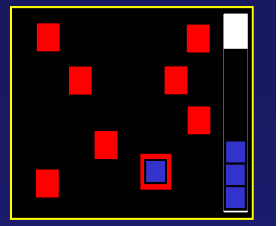




Elliott, Sahakian, Matthews, et al (1997) Psychopharm

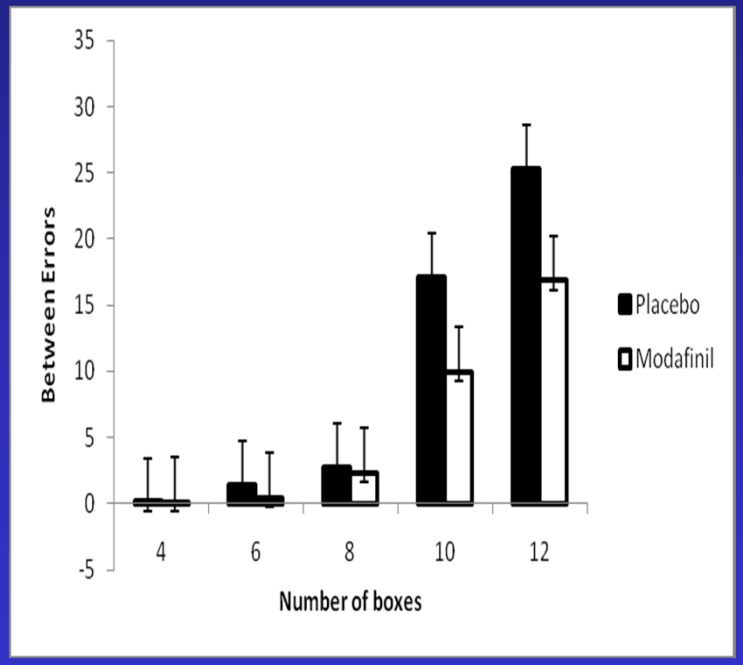
Mehta, Owen, Sahakian, et al (2000) J Neuroscience

Modafinil improves working memory in healthy volunteers and in patients with first episode psychosis



healthy volunteers

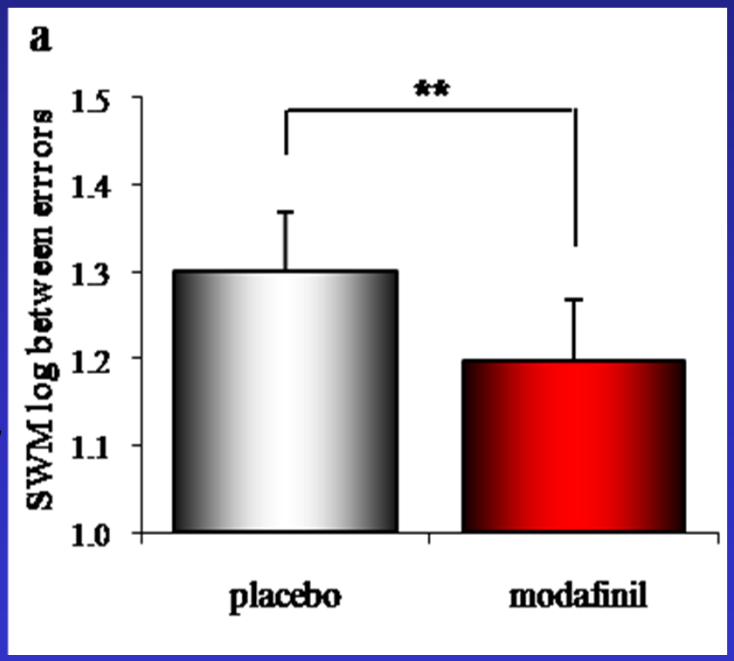
Improvement



Müller, Rowe, Rittman, Lewis, Robbins and Sahakian (2012) Neuropharmacology

patients with first episode psychosis

Improvement



Scoriels, Barnett, Soma, Sahakian & Jones (2011) Psychopharmacology

CNN.com

Ritalin abuse scoring high on college illegal drug circuit

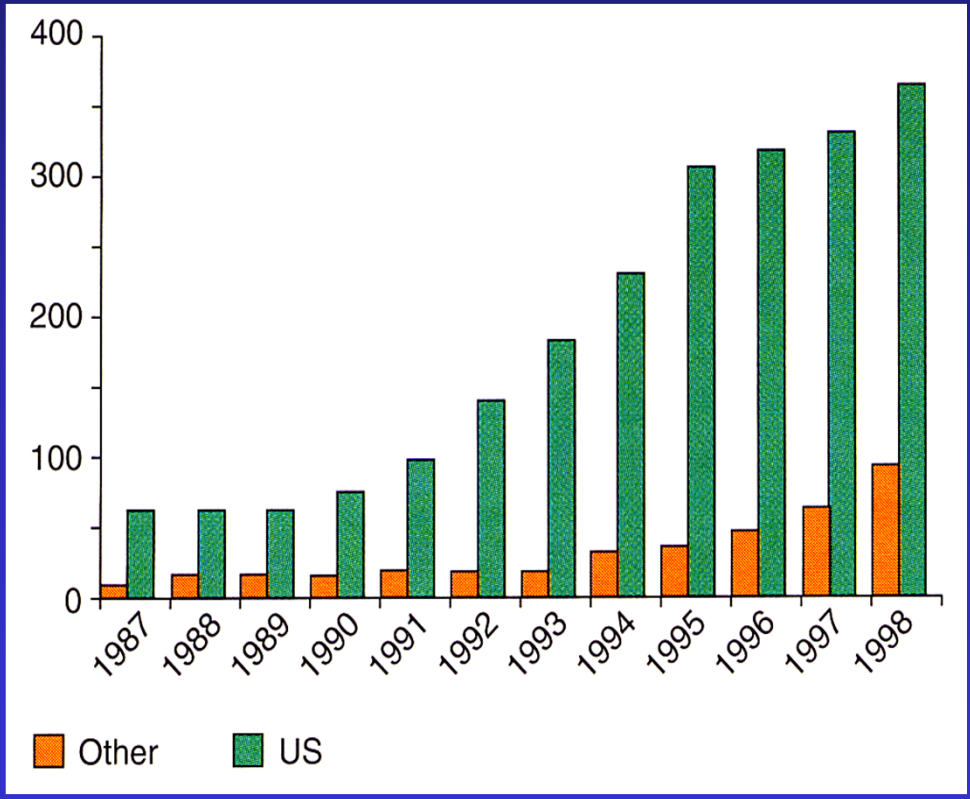
January 8, 2001
Web posted at: 2:55 PM EST (1955 GMT)

From Linda Ciampa
CNN Medical Correspondent

(CNN) -- There's a popular drug on the streets with nicknames such as "Vitamin R" and "R-Ball" that's making its way into the college scene. But it's not for kicks -- students use this drug to improve concentration and study longer.
The drug is Ritalin, a mild stimulant commonly prescribed for young children to treat attention deficit/hyperactivity disorder, or ADHD.
But on U.S college campuses, students are popping Ritalin without a doctor's prescription -- which is illegal -- before taking on all-night study sessions or to boost alertness during an important test.
"People find this drug enticing because they can get their academic work done quicker or do more in a shorter period of time," said Dr. Eric Heiligenstein, of the University of Wisconsin. "So for students who have put off work or are not very strong academically, we find some are using it to kind of counteract or remedy their problems."

Methylphenidate

Increasing prescriptions for Ritalin



Farah 2005, TiCS

Rise in prescription for methylphenidate (Ritalin) in England. Increase of 56% in the past five years (Care Quality Commission).

The Telegraph

18 | ★★★
Features

Pill popping not such a smart move for students

Today's undergraduates could be tomorrow's addicted workers as the use of performance-enhancing 'smart drugs' rises, says ***Joe Shute***

It is no longer caffeine but pills to which a rising number of students turn when revising

"Prof Sahakian is regularly approached by students who say they feel under pressure to take the drugs for fear of falling behind their peers. "

13 August 2013

Care Quality Commission

"The prescribing of methylphenidate has continued to increase in both the NHS and private sectors. This is likely to be attributable to its use in the management of childhood and adult ADHD and, due to its potential for diversion, and misuse, its use should also be monitored carefully."

Increasing lifestyle use of ‘smart drugs’ by healthy people

- **16% of students on some college campuses in the USA**
  (Babcock & Byrn, 2000, J. Am College Health)
- **Prescriptions rates in England of stimulants have been rising steadily from 220,000 in 1998 to 418,300 in 2004.**
  (Postnote, Parliamentary Office of Science and Technology, May 2007; Researched by G. Niyadurupola)
- **Varsity Newspaper survey of Cambridge University students (2009)**

VARSITY

Friday March 6th 2009 | The Independent Cambridge Student Newspaper since 1947 | Issue no 693 | varsity.co.uk

»p17 Features
We speak to Oliver Letwin

»Centrefold Special pull-out
Pomegranate: exclusive four-page preview issue inside

»p18 Fashion
Hats off for the return of hats

One in ten takes drugs to study

» Survey reveals extent of students' medication usage
» Prescription-only drugs readily available online

Natasha Lennard

Ten per cent of Cambridge students have admitted to taking medication without prescription to help them work.

A *Varsity* survey, completed by 1,000 students, has revealed that one in ten Cambridge students has taken

dafinil for the first time. All of the five reported increased alertness on the day of taking the drug, with four of the five stating that their ability to concentrate on work improved.

Two students reported that they also felt more motivated. Further-

Cambridge report attacks state education

Beth Staton

State school students are failing to get in to top universities simply because they don't get good enough grades, according to research by Cambridge Assessment.

Social mobility in education will struggle to improve until "the pernicious link between deprivation and educational attainment is broken," Cambridge's admissions chiefs have said.

"State school students are not, by and large, being deprived of places at leading universities by their choice of A-level subjects. The critical obstacle for

- **In 2008, the global market share of modafinil was more than $700 million per year**
- **It is estimated that around 90% of modafinil use is ‘off-label’ by healthy individuals.**

Normann & Berger (2008), Neuroenhancement: status quo and perspectives. *Eur Arch Psych Clinic Neuro, 258 [Suppl 5], 110-114*

Vastag (2004), Poised to challenge need for sleep, “wakefulness enhancer” rouses concerns. *JAMA, 291(2), 167-169*

Maher (2008), Poll results: look who’s doping, *Nature, 452 (7188), 674-675*

Sahakian & Morein-Zamir (2011), Neuroethical issues in cognitive enhancement. *J Psychopharmacol, 25(2), 197-204.*

Why are healthy people using cognitive enhancing drugs?

- **Increased performance / 'competitive edge'** (effect sizes are generally small to moderate)

  Small percentage increments in performance can lead to significant improvements in functional outcome; it is conceivable that a 10% improvement in memory score could lead to an improvement in an A-level grade or degree class (Academy of Medical Sciences Report on Brain Science, Addiction and Drugs, 2008)

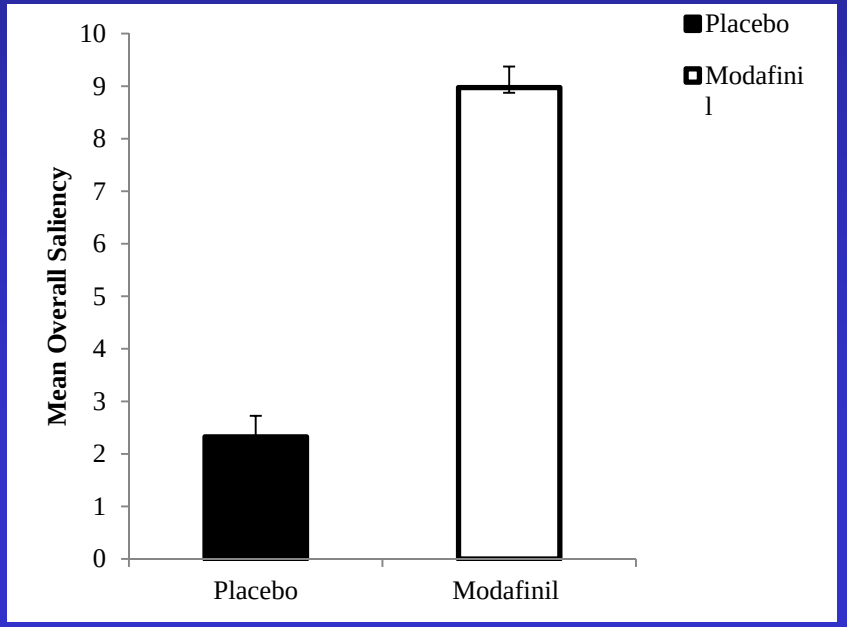
- To reduce the effects of jetlag and to stay awake for longer periods of time

- Increased motivation and enjoyment of tasks

  People report that they find it easier to carry out tasks that they had been putting off

- Significant increase in pleasure rating for the modafinil group on all tasks ($p<0.001$)

Increased motivation



Muller, Rowe, Rittman, Lewis, Robbins & Sahakian (2012) Neuropharmacology

THE INDEPENDENT HEALTH & FAMILI

'Tired' locum doctor overdosed patient

Inquest told foreign GP gave pensioner 10 times normal dose of painkiller

By Jeremy Laurance, Health Editor

BBC NEWS

You are in: Health

Thursday, 24 January, 2002, 00:49 GMT

Sleep deprivation 'fazes junior doctors'

THE INDEPENDENT NEWS

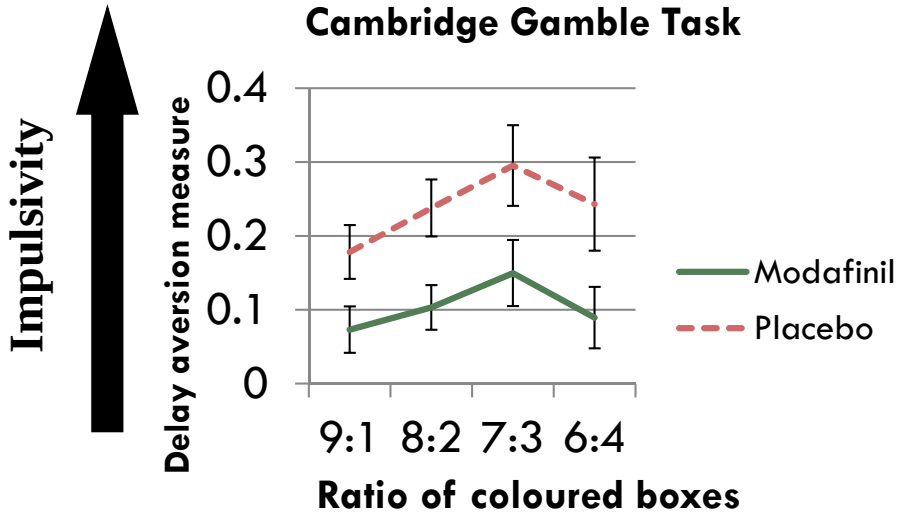
Baby killed by `tired' doctor's error

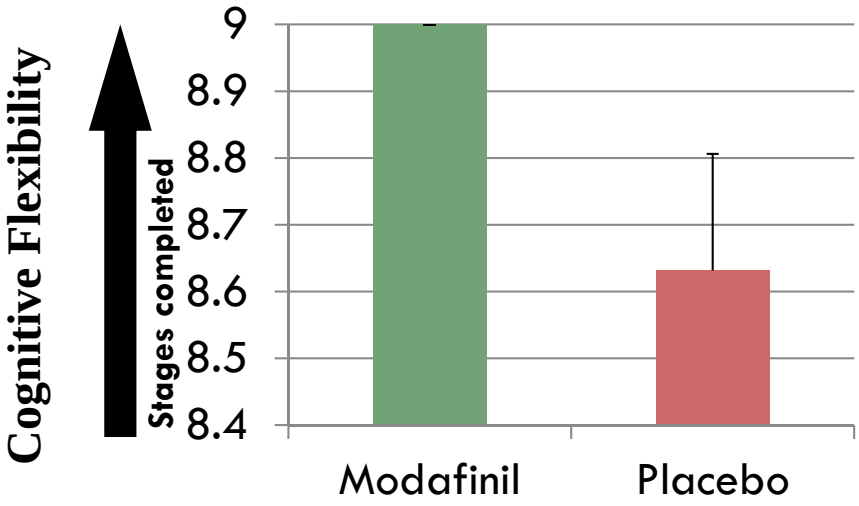
Rachel Crofts

Tuesday, 9 March 1999 SHARE

Modafinil reduces impulsivity and improves cognitive flexibility in sleep deprived doctors

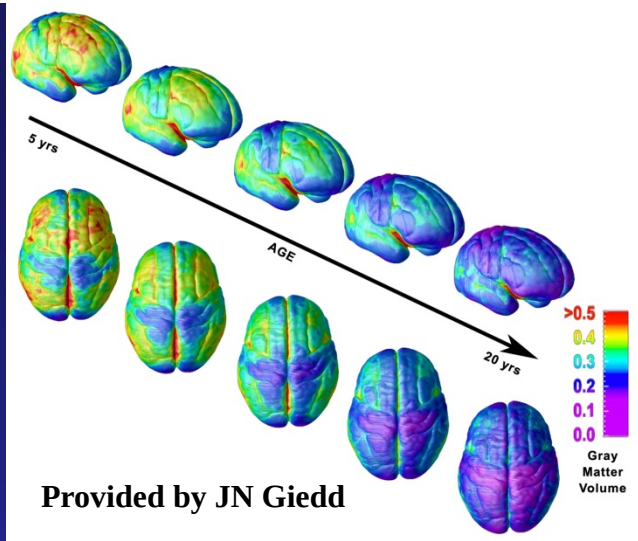
Sugden, Housden, Aggarwal, Sahakian & Darzi (2011) Annals of Surgery





What are the potential harms and concerns in regard to pharmacological cognitive enhancement?

- There could be long-term side-effects, especially in the developing brain. Long-term studies in healthy people are required



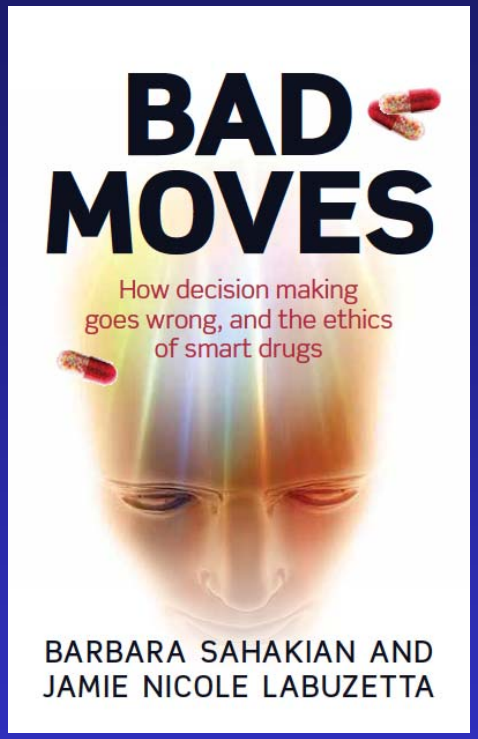
Provided by JN Giedd

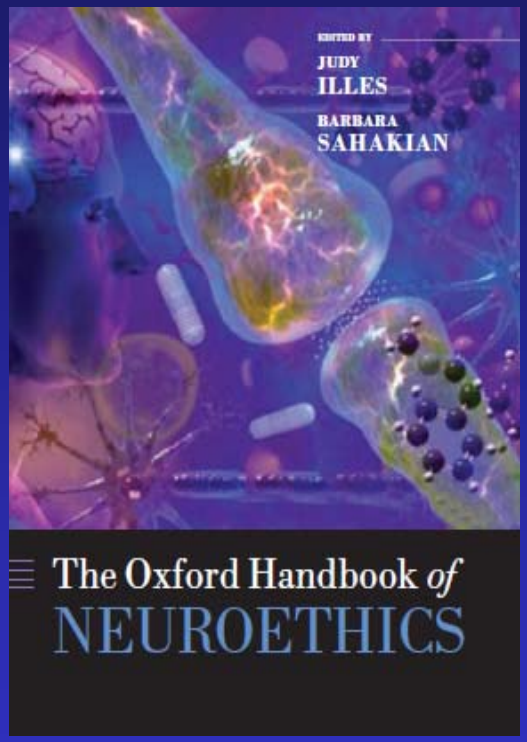
- People could be coerced, or even forced, into taking cognitive enhancers (24/7 society)
- There could be greater inequality, with access dependent on wealth
- Cheating, unfair advantage over others
- Abuse potential for certain PCEs (e.g., methylphenidate)
- Dangers of buying prescription drugs over the internet
- You could be “over-enhanced” e.g. plagued by unwanted memories

- We run the risk of becoming a homogeneous society
- Our perception of ourselves could change (mechanistic beings) and we will be unable to take credit for our achievements
- Virtues such as motivation and working hard could become outdated (students will just take a drug)

Neuroscience, Ethics and Society

http://www.neuroethicssociety.org/





Oxford University Press, April 2013

Human enhancement and the future of work:

Academy of Medical Sciences, British Academy, Royal Academy of Engineering and Royal Society (November 2012).

http://royalsociety.org/policy/projects/human-enhancement/workshop-report/

University of Cambridge Science Festival 2014

http://www.bap.org.uk/

Overcoming stress and anxiety: healthy brains for a flourishing society
11 March 2014
http://www.cam.ac.uk/science-festival

LSE Literary Festival discussion

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Professor of Behavioural Science, Department of Social Policy, LSE

Professor Ilina Singh
Chair, KCL

LSE events

Suggested hashtag for Twitter users: **#LSElitfest**

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