



Implicit  
**BIASES**

Sara Bengtsson

# Introduction

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Ph.D. cognitive neuroscience, Karolinska Institutet

- 20+ years of research in the field of brain imaging including studies on implicit biases
- Currently a research and teaching position at UEA, UK

# Overview

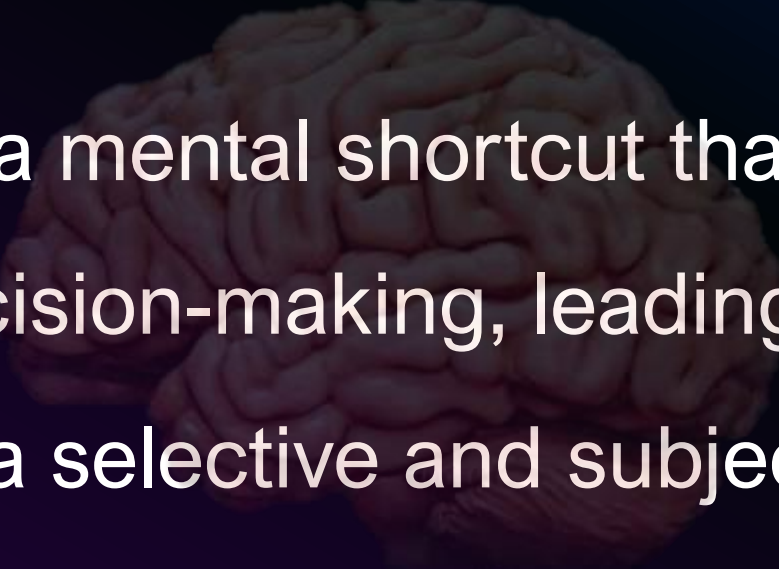
A model of  
cognitive bias

How implicit  
processes are  
formed -  
A neural model

Reducing biases

# What is a cognitive bias?

Cognitive bias is a mental shortcut that influences our thinking and decision-making, leading us to process information in a selective and subjective manner.

A human brain is shown in the background, centered behind the text. It is a realistic, anatomical illustration of the brain, showing its characteristic folds and grooves. The brain is rendered in a light, naturalistic color, contrasting with the dark blue background of the slide.

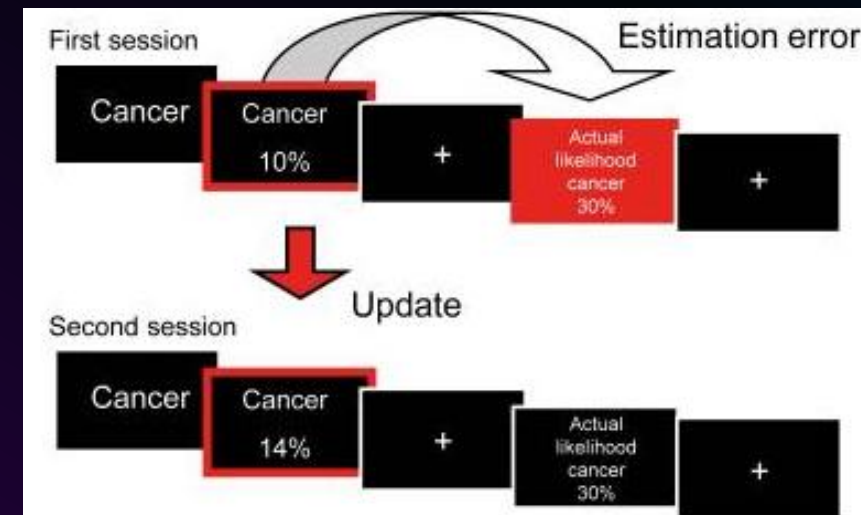
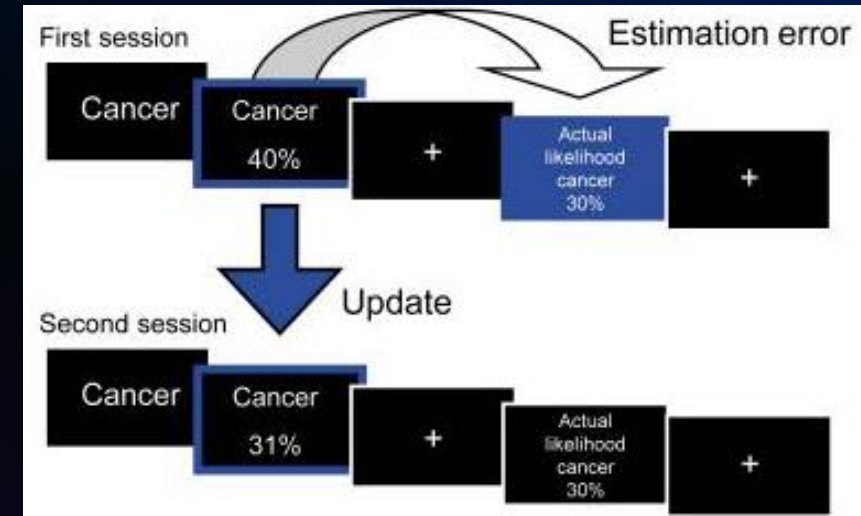
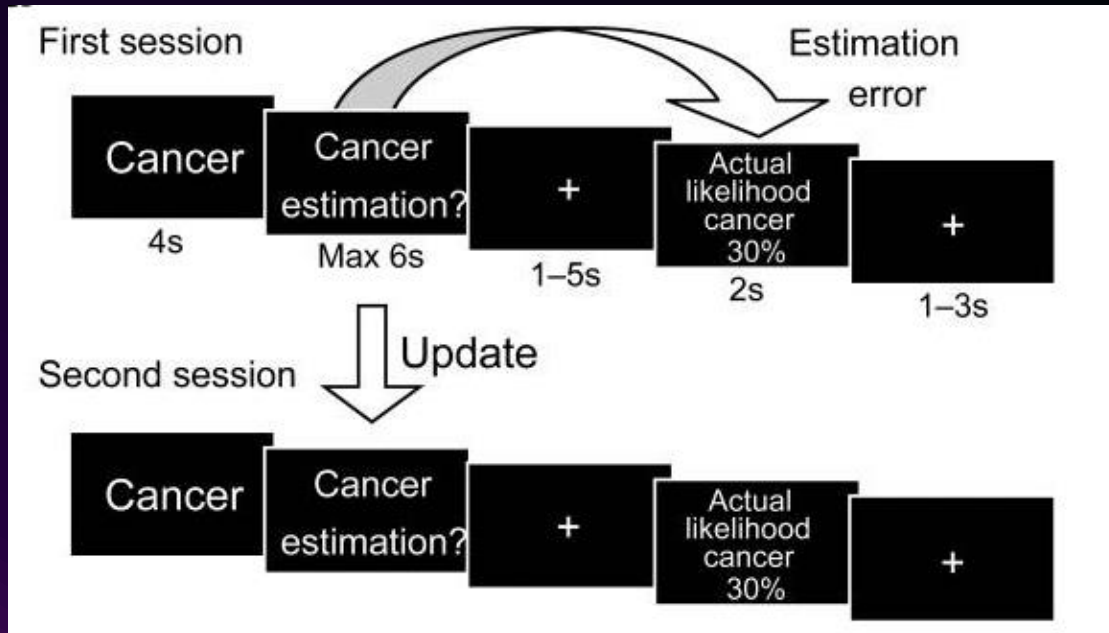
As opposed to rational thinking

We tend to learn facts that are in our favour faster than negative facts

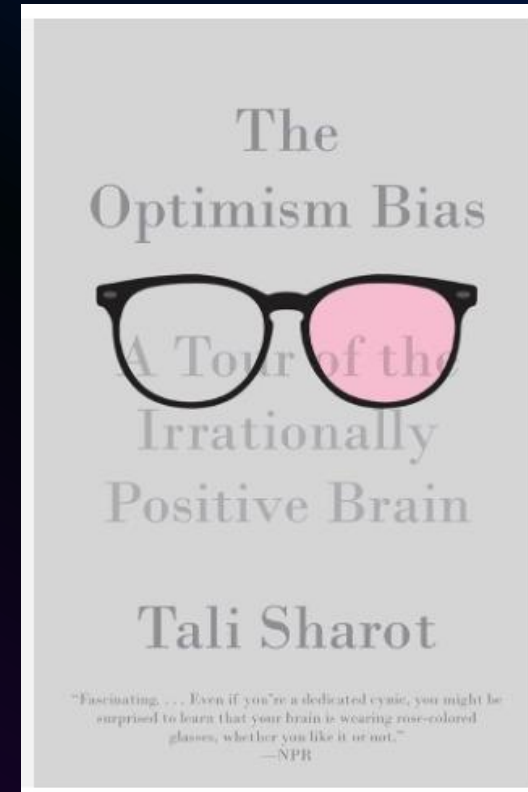
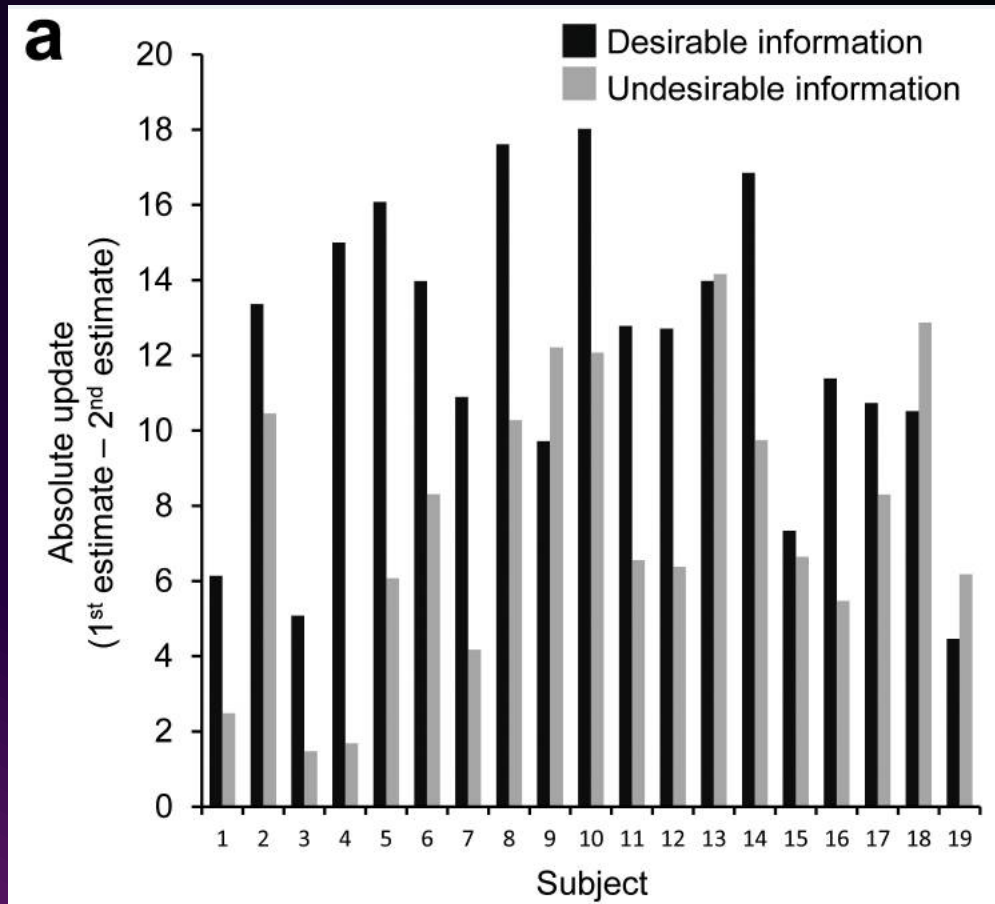
For some individuals, the pain from losing \$1,000 could only be compensated by the pleasure of earning \$2,000.

Have you ever found yourself only reading news stories that further support your opinion?

# Optimism bias



# Optimism bias

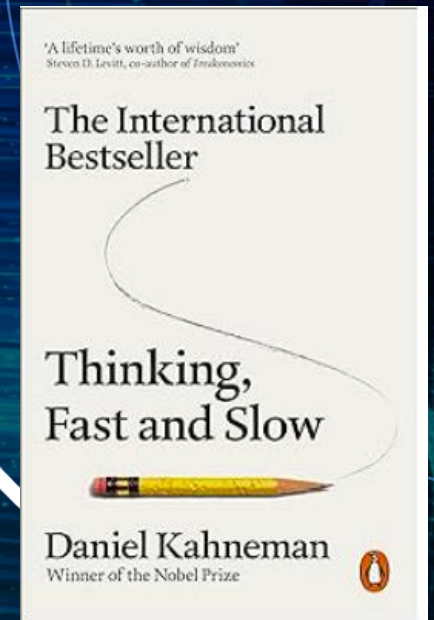
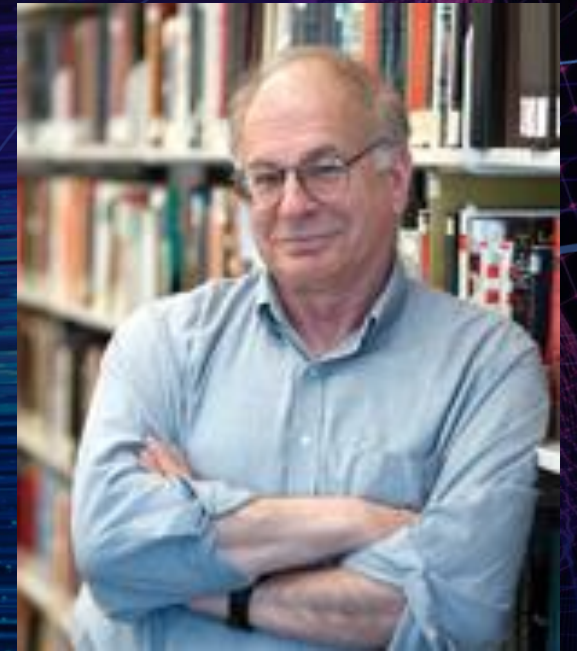


# Daniel Kahneman (1934-2024)

## The Nobel Memorial Prize in Economic Sciences, 2002

“challenge the assumption of human rationality prevailing in modern economic theory”

Wikipedia





# Dual system

contributing to decision



System 2

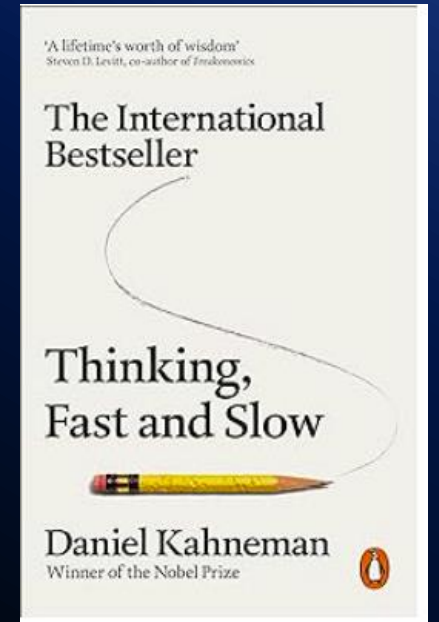


**Slow**, conscious, requiring intentional effort.  
Complex problem-solving and analytical tasks  
where more thought and consideration are necessary.

System 1

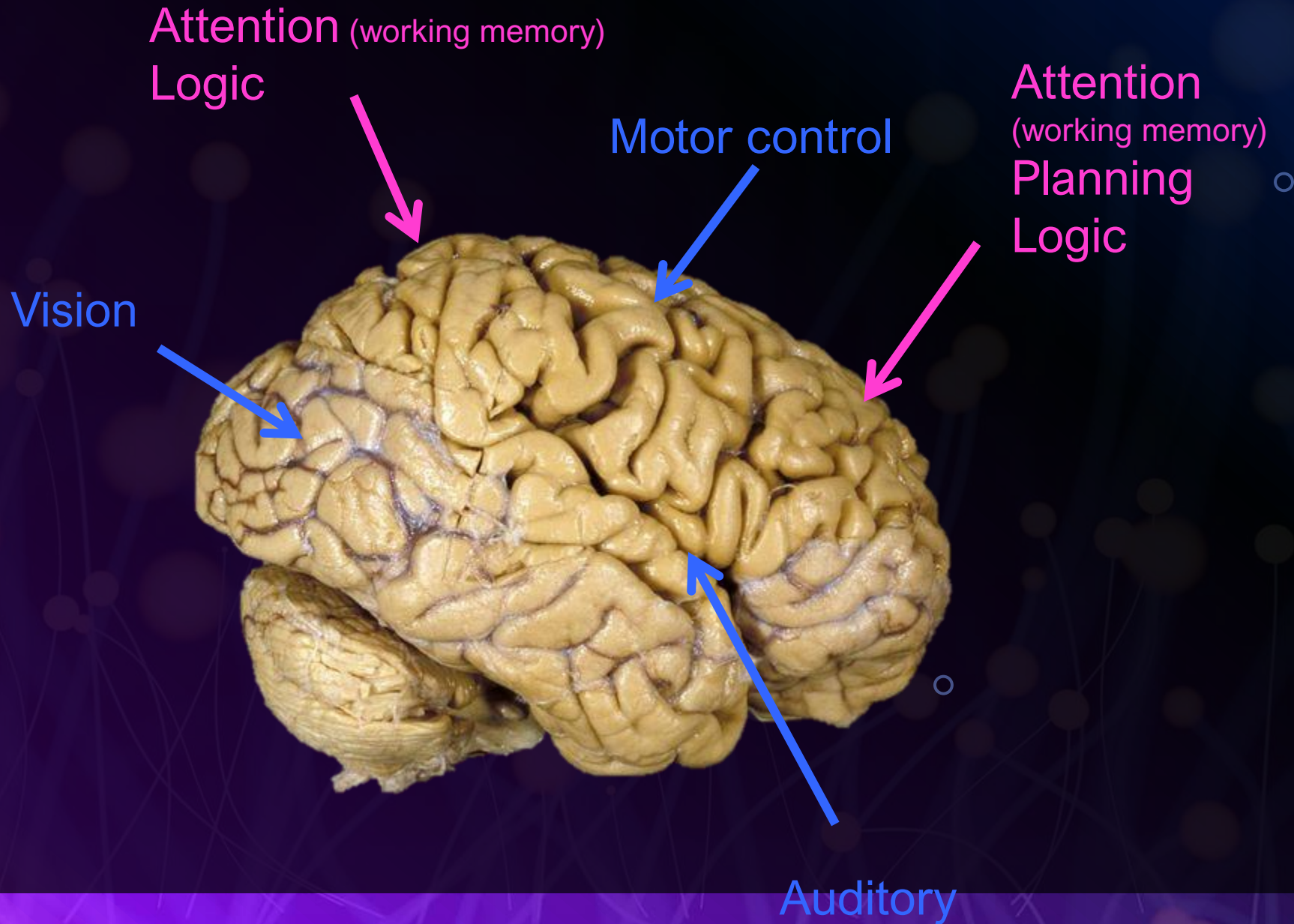


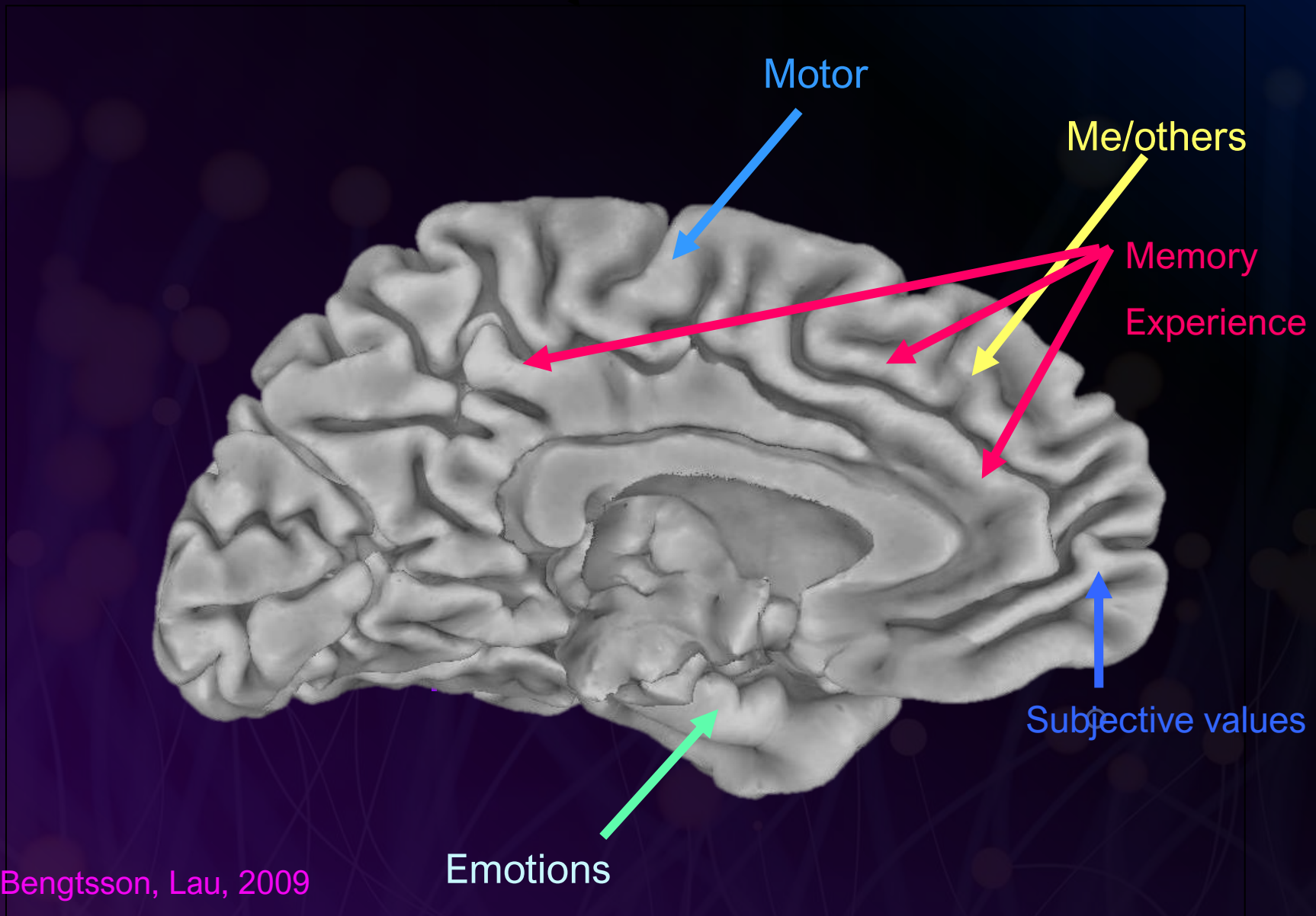
**Fast**, automatic, and intuitive.  
Quick decisions and judgments based on patterns and experiences.



## Experience of Pain and Loss

For some individuals, the pain from losing \$1,000 could only be compensated by the pleasure of earning \$2,000.





# Situations

Attention to:  
certain food/eating  
Self-image  
Risk taking  
Social interactions

# How behaviour becomes implicit

A neural model

# Drive/motivation

The wish to satisfy a need

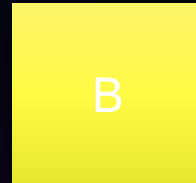
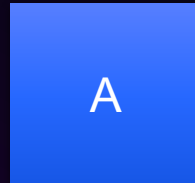
# Reward – (reinforcers, motivators)

○ ★  
Avoid making mistakes

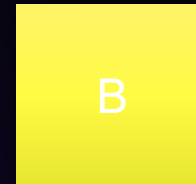
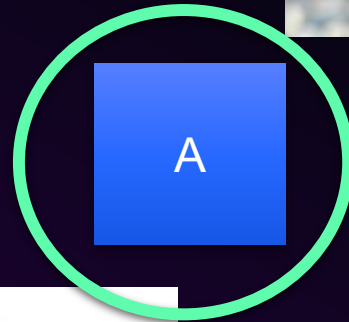




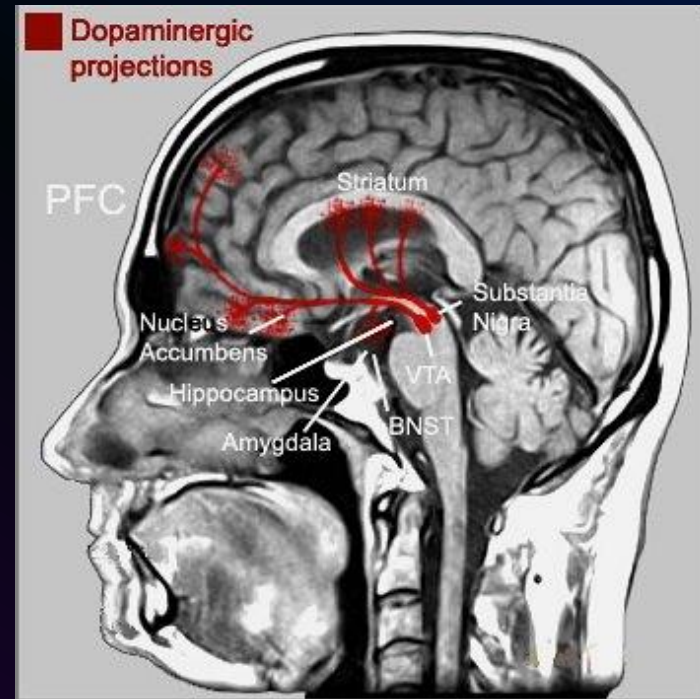
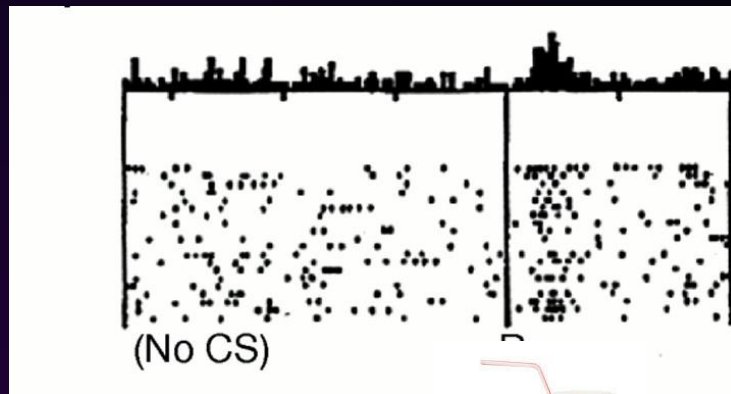
# Choices based on rewards



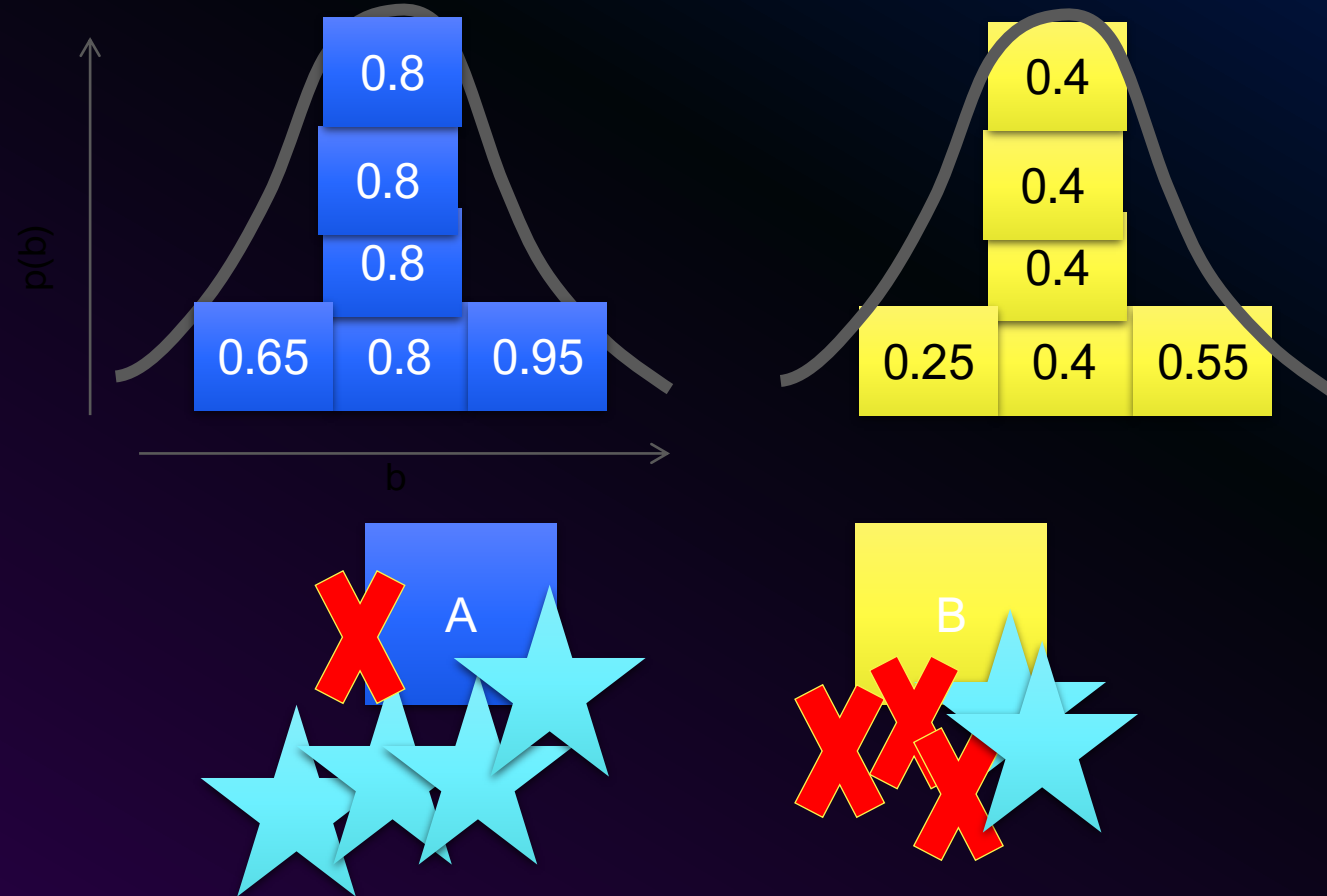
# Dopamine



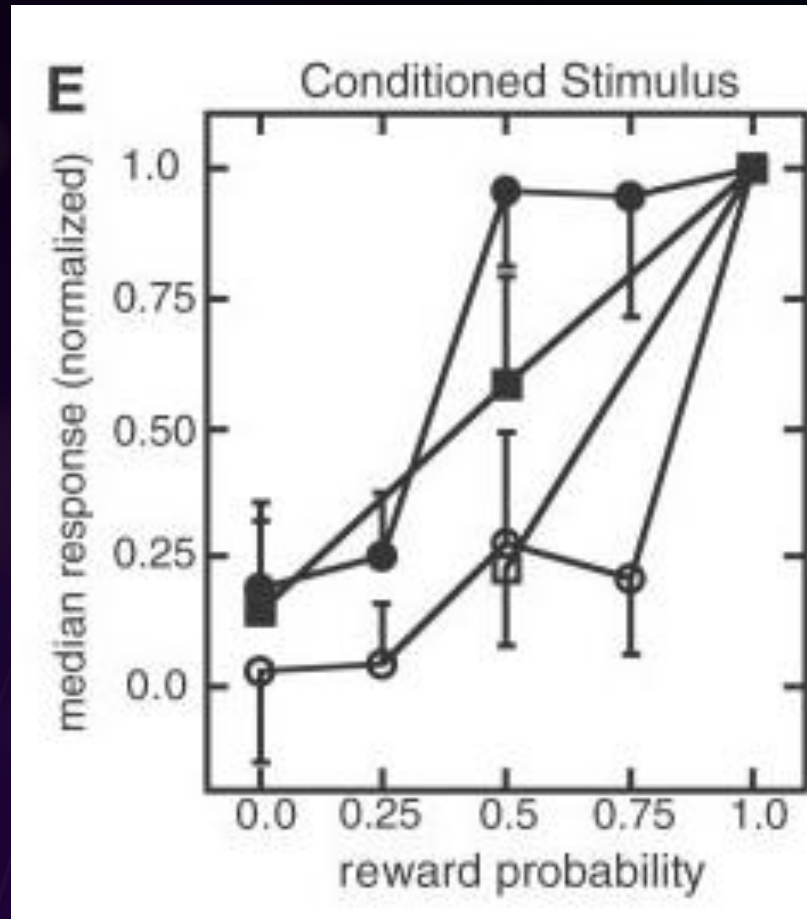
# Dopamine is signalling reward



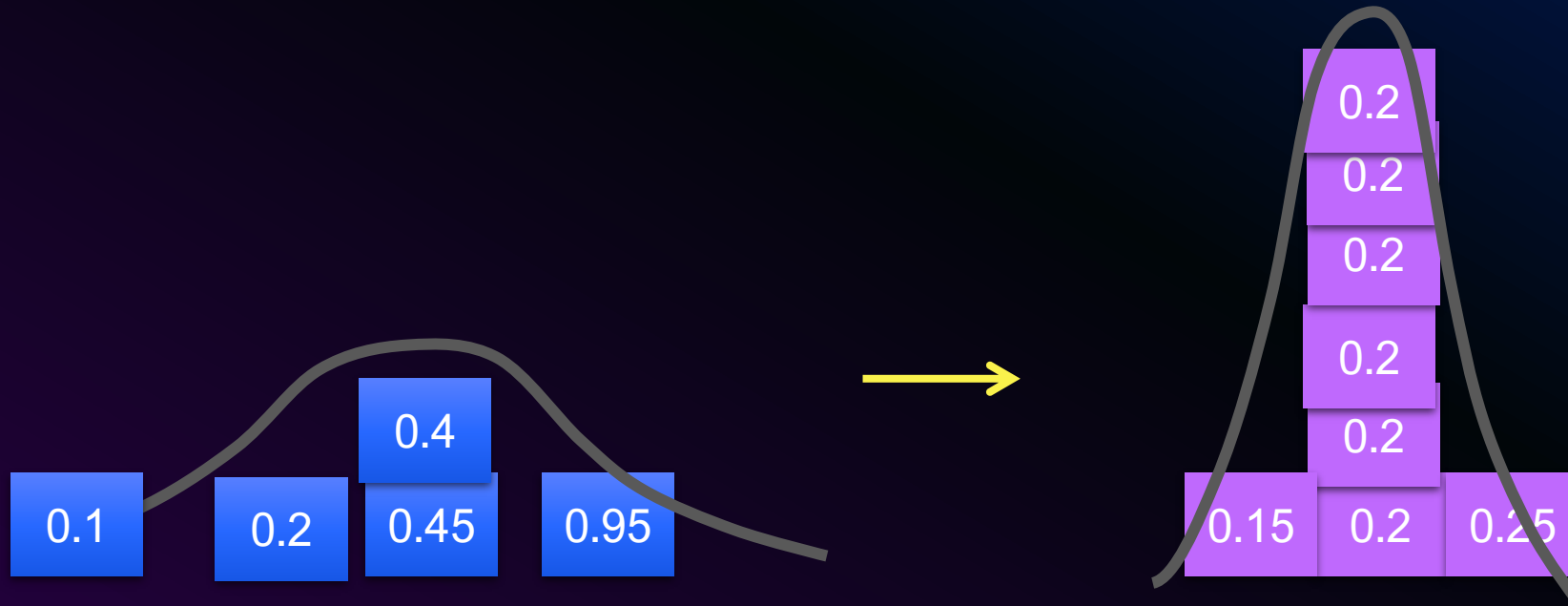
# Learning



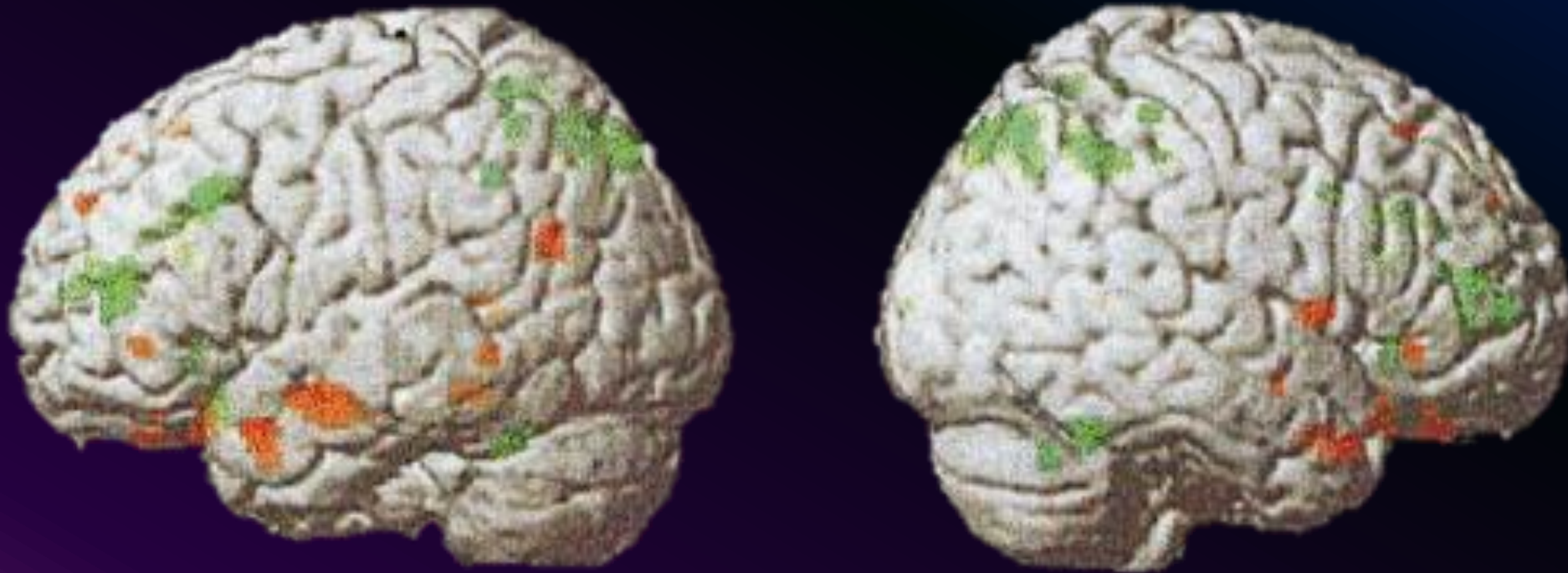
# Neuronal activity - probabilities



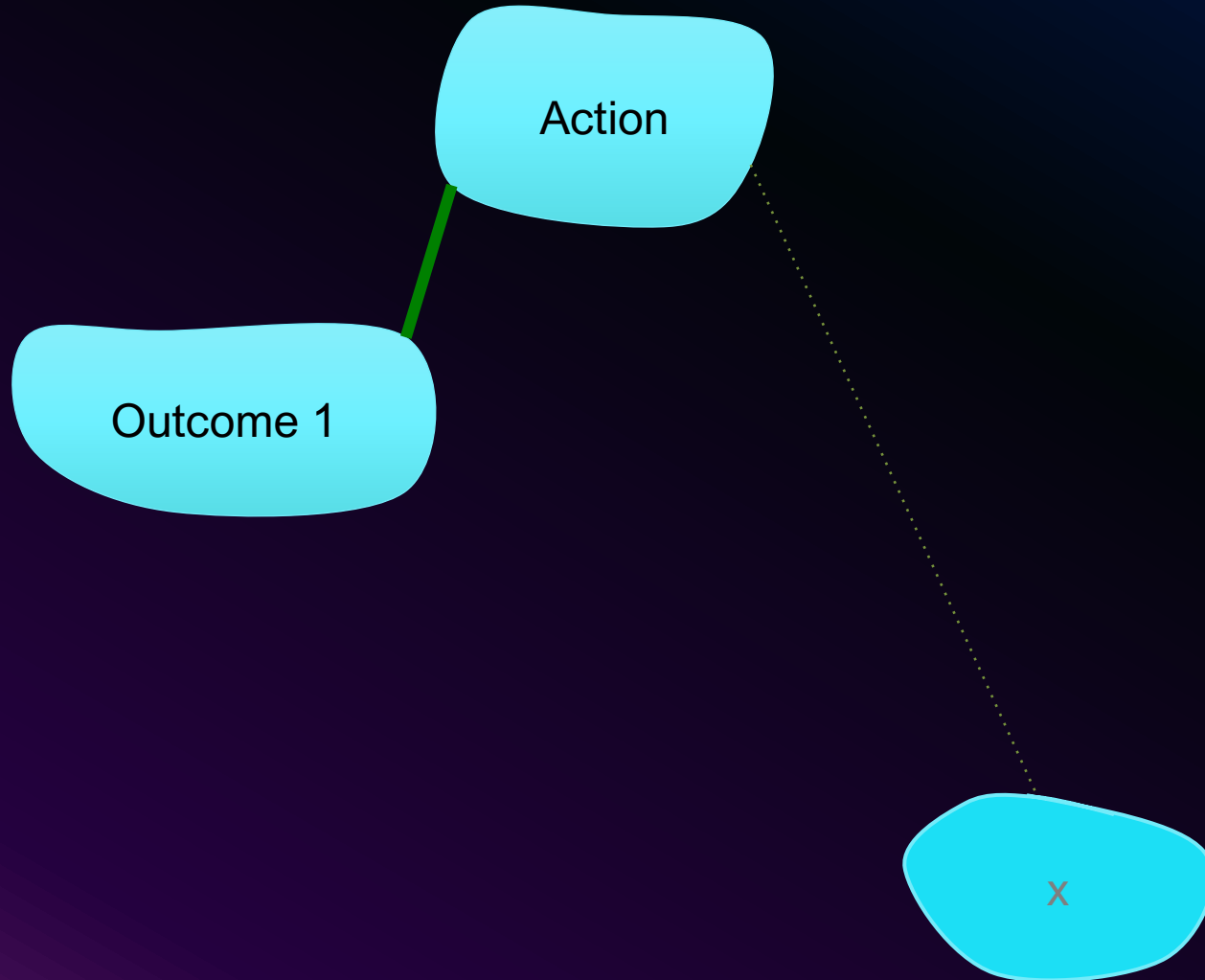
# Learning – tighter distribution



# Learning – Brain activation change



# Tighter, faster associations





# Priming

Doctor

Nurse

Doctor

Bread

# Priming

An implicit memory process where exposure to a stimulus impacts on the response on another stimulus

Marketing and adverts

# Verbal and written information



Last time I failed

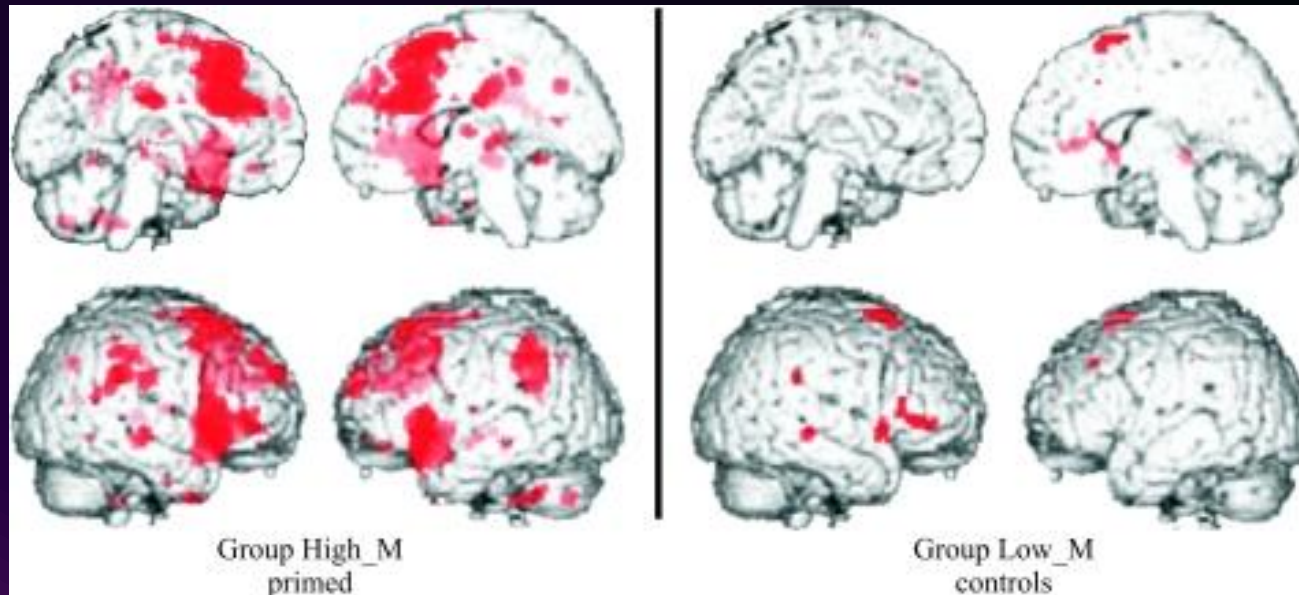
This measures your IQ

I'm the best

# Verbal instructions

We're interested in processes related to intelligence

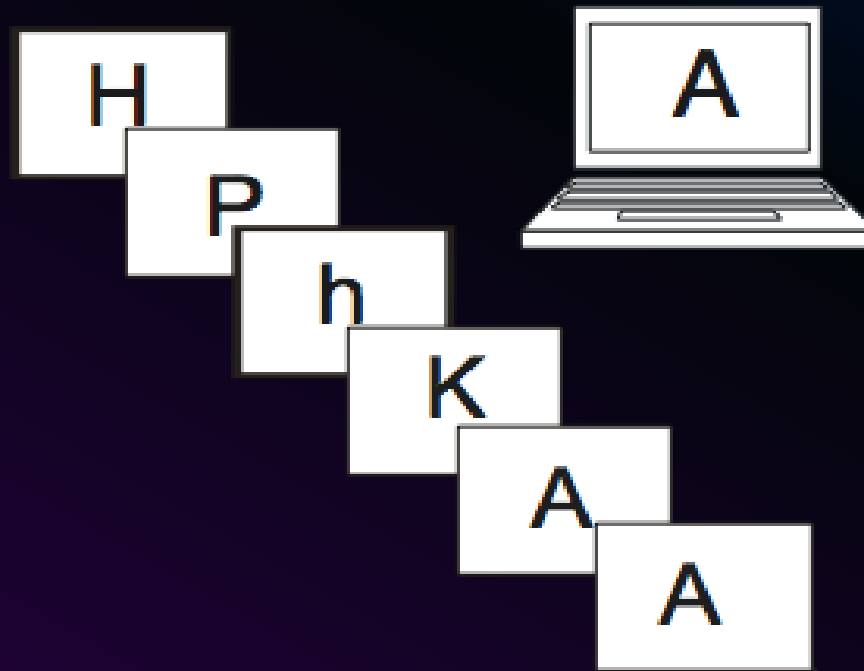
We're piloting the task



# Reading words

*student bright Mary a is cake*

Priming



a

H

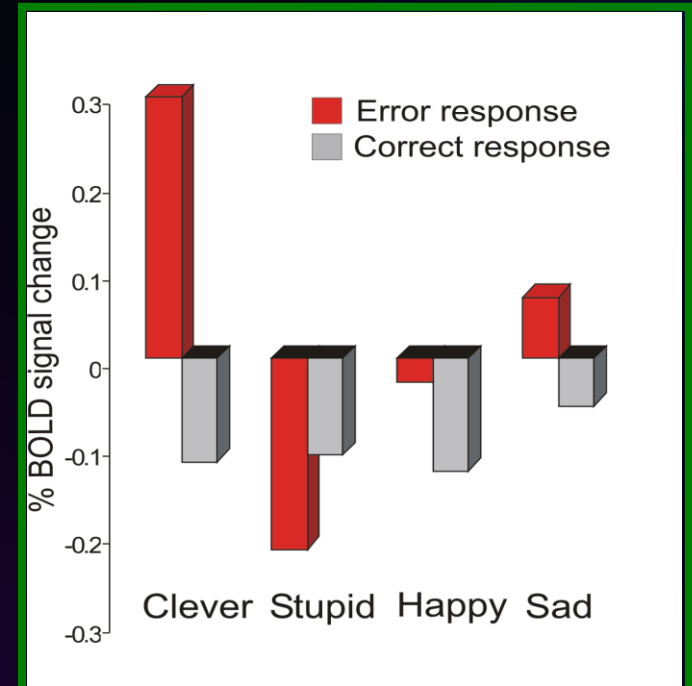
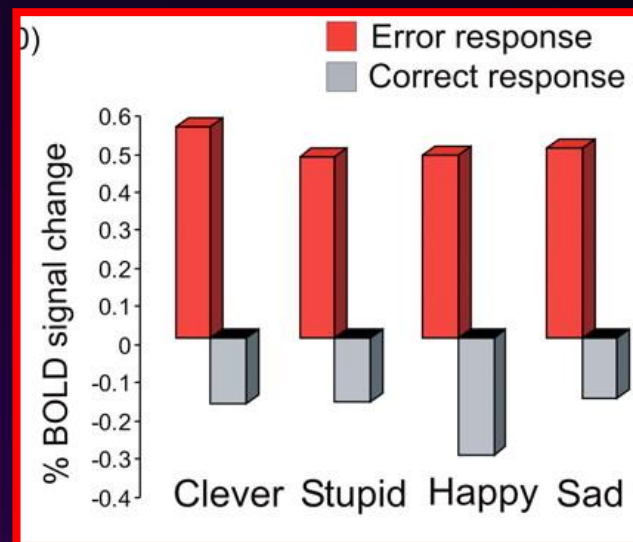
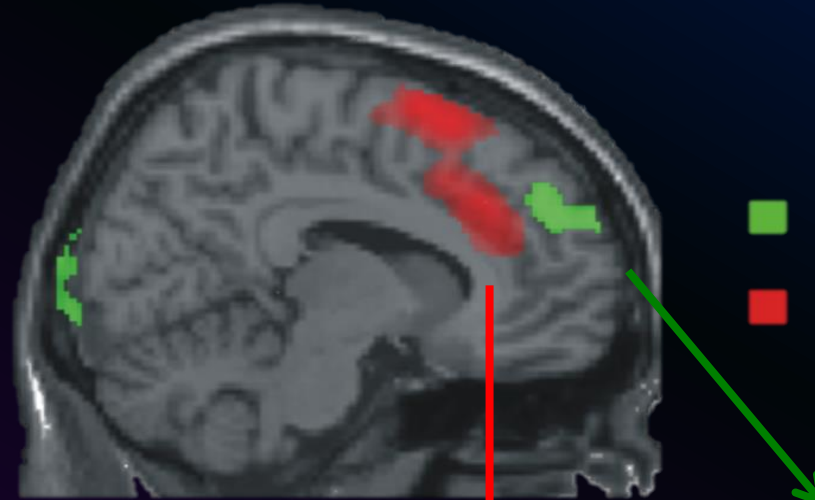
m



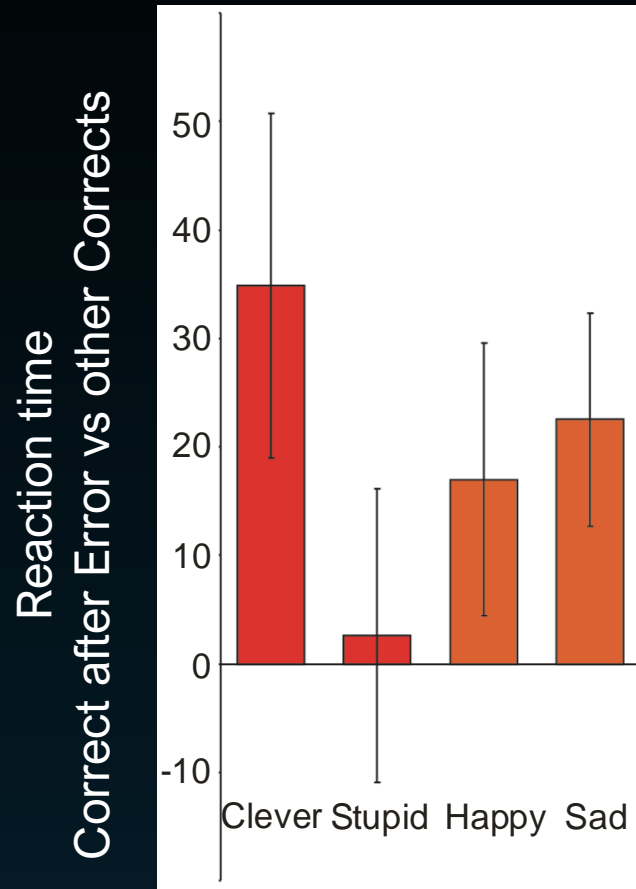
M

h

# Reading words



# Errors are given different meanings



Valence\*task-spec interaction  $p < 0.05$

Clever vs Stupid  $p < 0.005$

# Summary

We are not always rational.

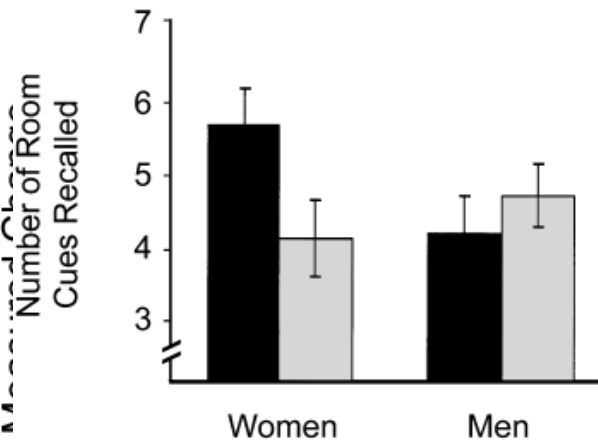
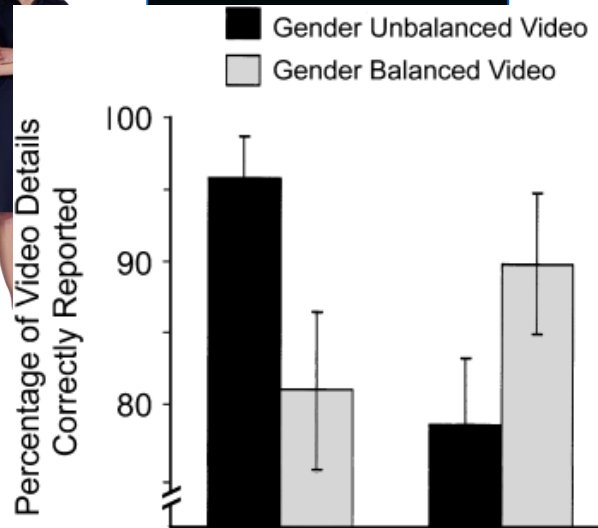
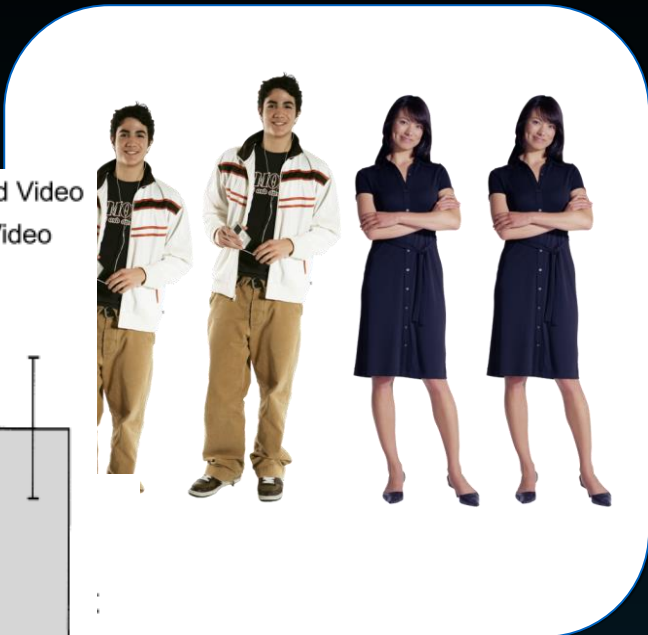
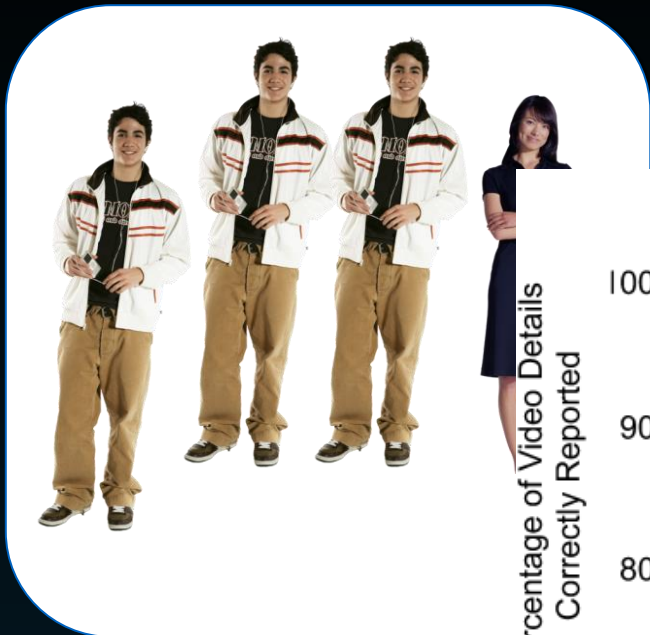
We make necessary short cuts by using less demanding neural processes.

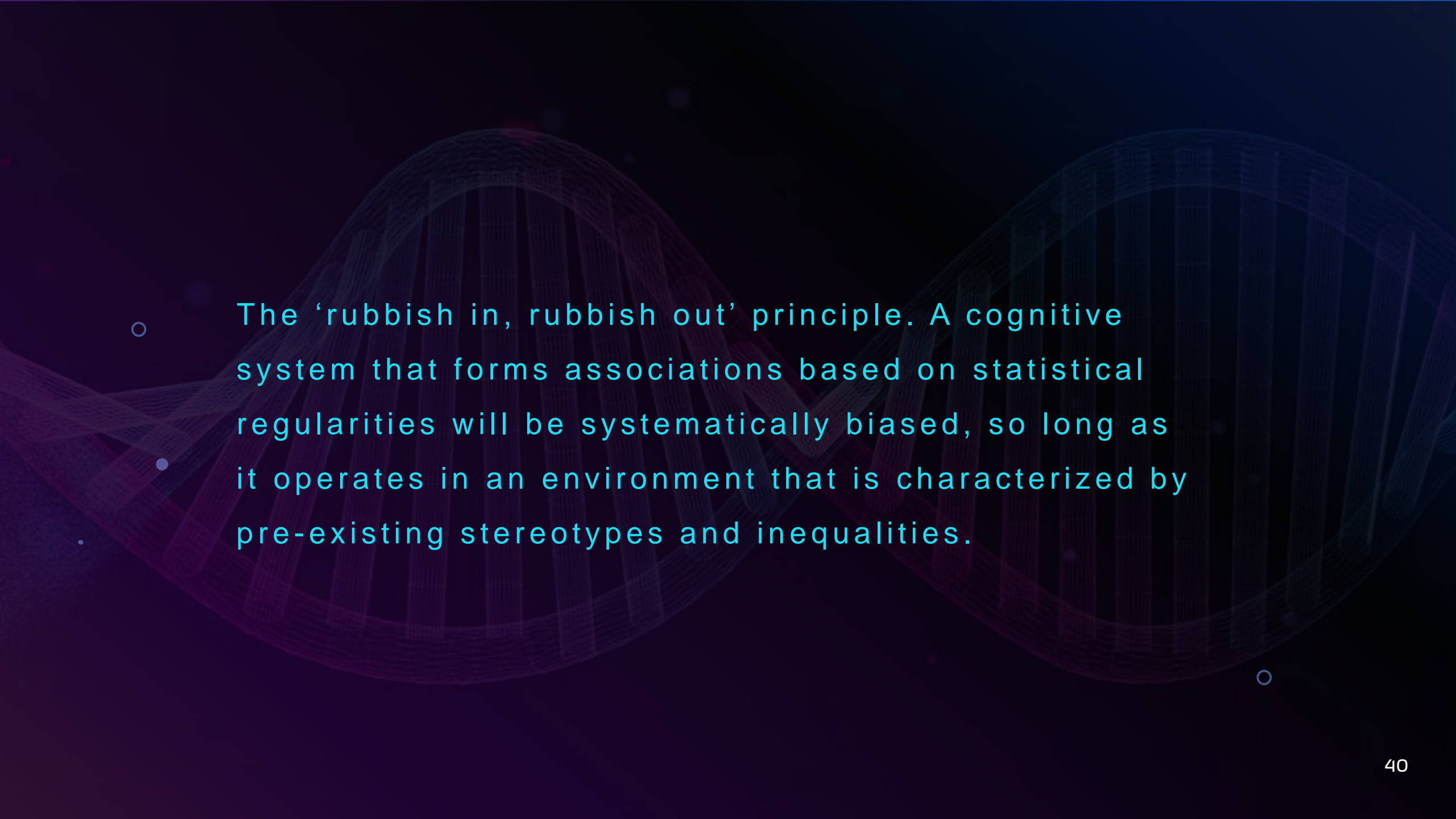
These are associations based on experiences (data points, probabilities).

Verbal and written information can activate such associations and influence behavior.

# What can we do to reduce bias?

Versatile experience (probabilities)





○ The ‘rubbish in, rubbish out’ principle. A cognitive system that forms associations based on statistical regularities will be systematically biased, so long as it operates in an environment that is characterized by pre-existing stereotypes and inequalities.

○



# What can we do to reduce bias?

Manipulate attention (new associations)

+

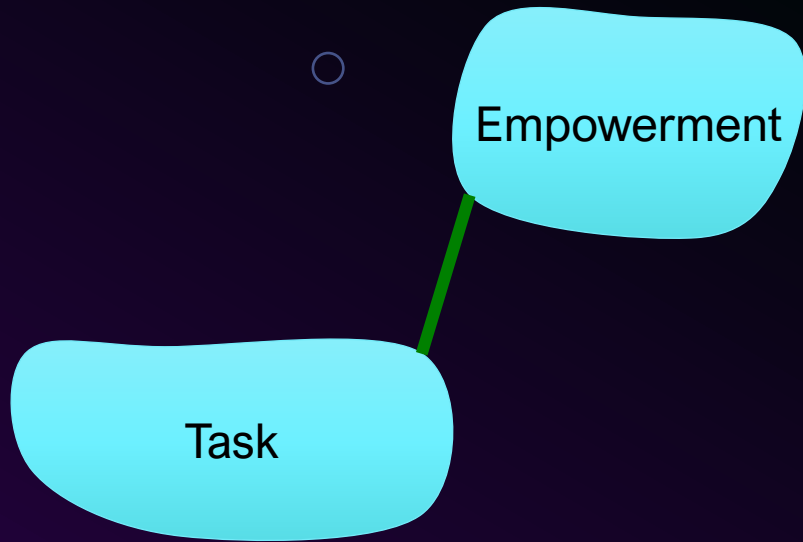






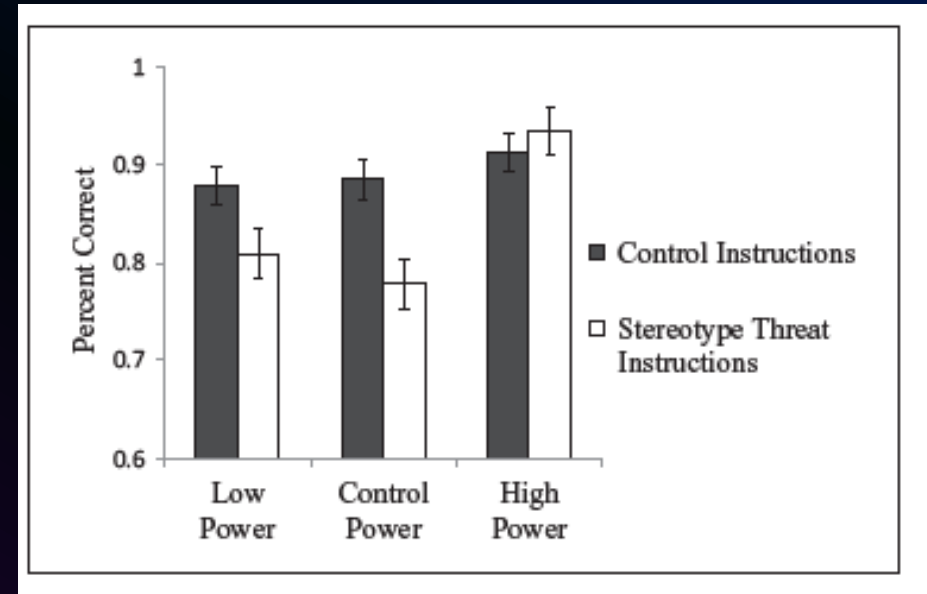
The Dot-Probe task: Participants learn to avoid allocating attention to threat

# Empowerment



*Empowerment – tankefrihet och kontroll*

For this task, please recall a particular incident in which you had power over another individual or individuals. By power, we mean a situation in which you controlled the ability of another person or persons to get something they wanted, or you were in a position to evaluate those individuals. Please describe this situation in which you had power—what happened, how you felt, etc.



# What can we do to reduce bias?

Awareness, cognitive restructuring



# The cognitive interview (Geiselman & Fisher, 1997)

In 1991, a Miami woman walking through the lobby of an office building casually noticed two men standing together.

Several minutes after her departure, the men murdered a person working in the building. Police investigators determined that the woman was the only person who had observed the two suspects and could possibly describe them. In an initial standard interview with police, her memory of the men proved disappointingly sketchy.

Police brought in psychologist Ronald Fisher to help the witness remember more detail. Fisher's interview consisted of a series of memory-enhancing strategies which produced a breakthrough in the case:

The woman reported a clear image of one of the suspects as he brushed the hair from in front of his eyes. She then recalled several details about his profile, including his having worn a silver earring.

## The cognitive interview involves a number of techniques:

The interviewer tries to mentally **reinstate the environmental and personal context** of the crime for the witnesses, perhaps by asking them about their general activities and feelings on the day. This could include sights, sounds, feelings and emotions, the weather etc.

Witnesses are asked to report the incident **from different perspective**, describing what they think other witnesses (or even the criminals themselves) might have seen.

Recounting the incident in **a different narrative order**. Geiselman & Fisher proposed that due to the recency effect, people tend to recall more recent events more clearly than others. Witnesses should be encouraged to work backwards from the end to the beginning.

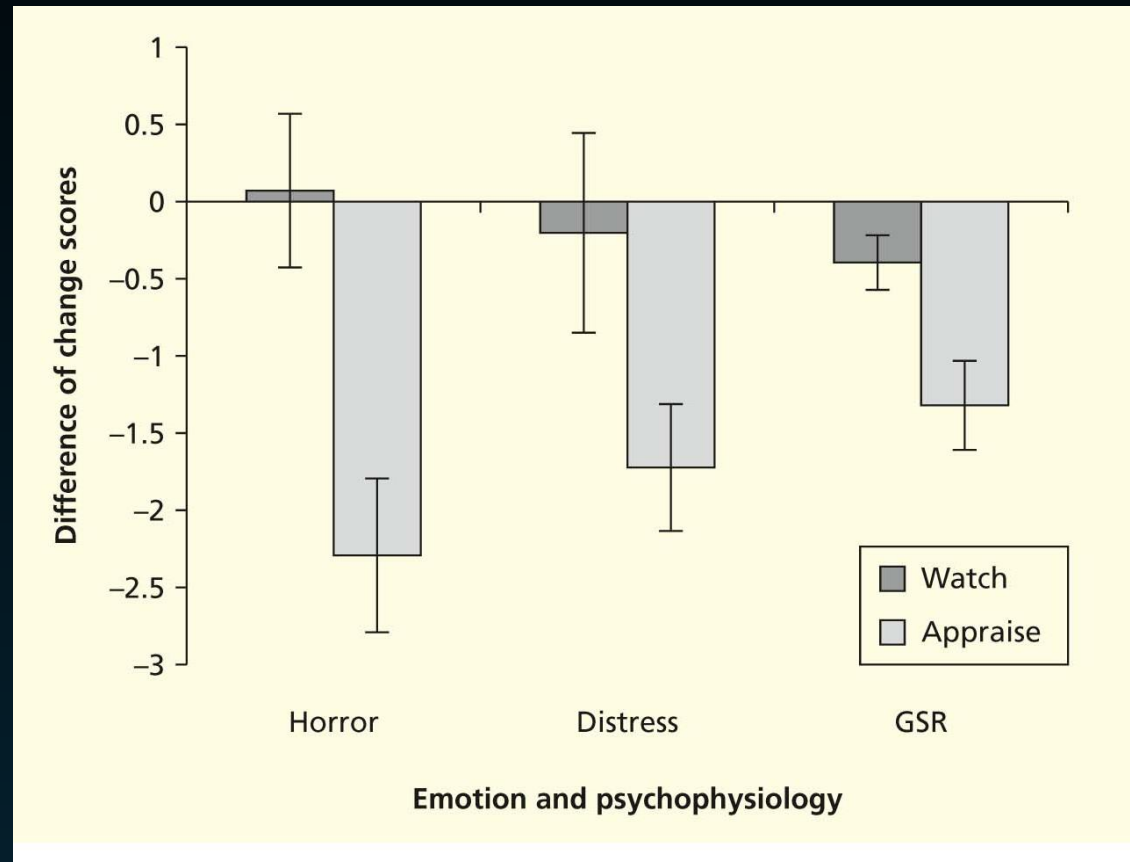
Witnesses are asked to report **every detail**, even if they think that detail is trivial. In this way, apparently unimportant detail might act as a trigger for key information about the event.

# Positive cognitive appraisal

*"there are usually some good aspects to every situation"*

Participants viewed films of human and animals experiencing marked distress.

Some participants received training in positive cognitive appraisal



# What can we do to reduce bias?

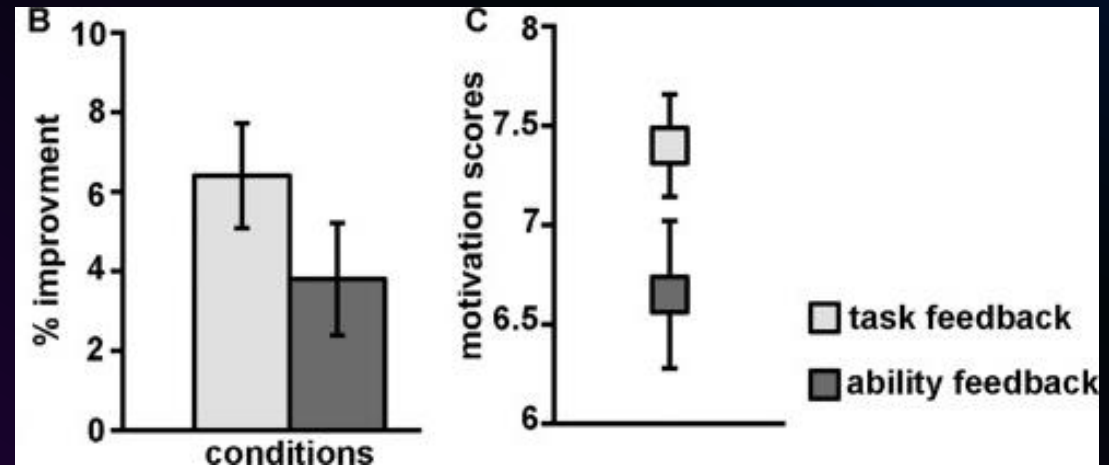
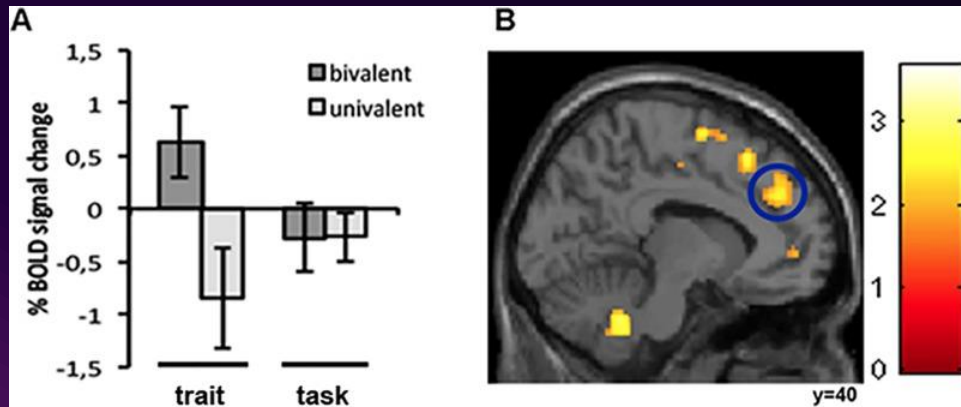
Task focus rather than ego focus

# Task vs Self feedback

You are clever

S

You chose correct



# Ego involvement

Task involvement – goal to demonstrate ability through learning

- Growth mindset
- Typically measures learning in relation to one's own previous achievements

Ego involvement – goal to demonstrate superior ability to outperforming others (Nicholls, 1984)

- “fixed mindset” (Dweck, 1986)
- Typically measures learning in relation to others

Many people make mistakes on these puzzles in the beginning but get better as they go along. When people see the puzzles as a challenge, it makes them try harder and have more fun along the way. The next activity is a lot like this one. So, if you just concentrate on the task, try to see it as a challenge and enjoy mastering it, you will probably get better as you go along.

From how you did on the puzzles, I have a pretty good idea of how good you are at this type of puzzle-solving compared to other kids your age. The next activity is a lot like this one in that people are either good at these activities compared to other kids their age or they are not. So how you do will tell me something about how good you are at this kind of task.

Poorer deeper learning

# Biases are not stable

- They change with age (optimism, loneliness)
- They change with mood and mental health
- They change with environment (e.g. social context)
- They change with “generations”



	<b>Anxiety</b>	<b>Sadness</b>	<b>Anger</b>	<b>Positive mood</b>
<b>Judgement</b>	Pessimistic	Pessimistic	Optimistic	Optimistic?
<b>Attitude to risk</b>	Risk averse	Risk taking	Risk taking	Risk averse
<b>Processing</b>	Inefficient	Analytic	Heuristic	Heuristic

# Summary

Versatile environment/experience  
Manipulating attention away from negative  
associations  
Activate empowering associations  
Intentional reflections  
Focus on task rather than person



# Thank you

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