

SQS – the world's leading specialist in software quality



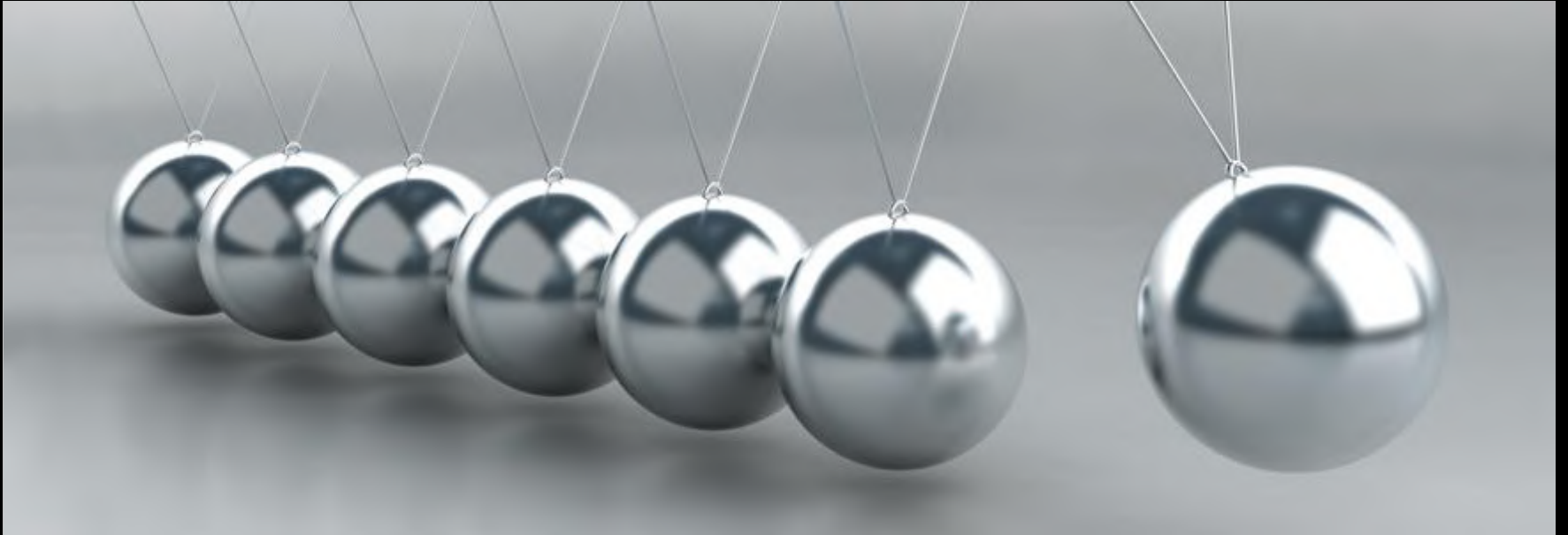
sqs.com

How could I miss that defect? Inattentional blindness

Dr Andrew Brown SQS, AssystemsTechnologies

Warning!

Flashing Images



How many basketball passes?

How many basketball passes?

Web

Local

THE

Copyrighted Material

Christopher Chabris
& Daniel Simons

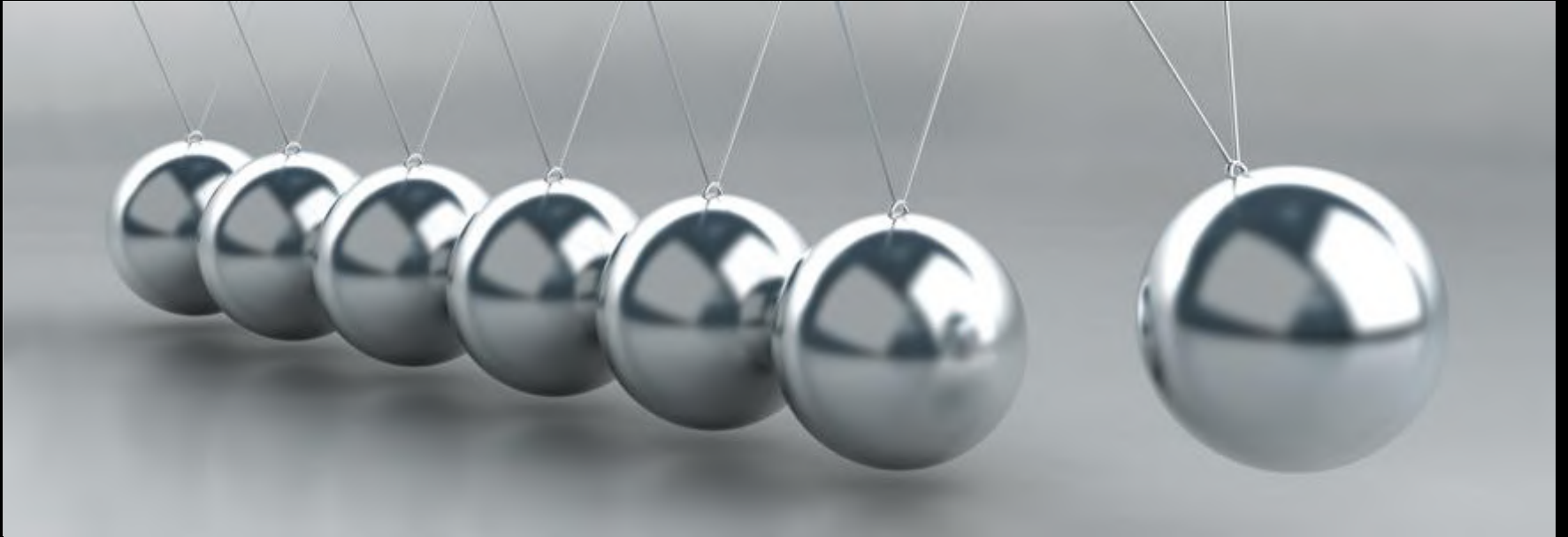
INVISIBLE

GORILLA

AND OTHER WAYS OUR INTUITION DECEIVES US

'Breathtaking and exciting' Richard Wiseman





Spotting the unexpected

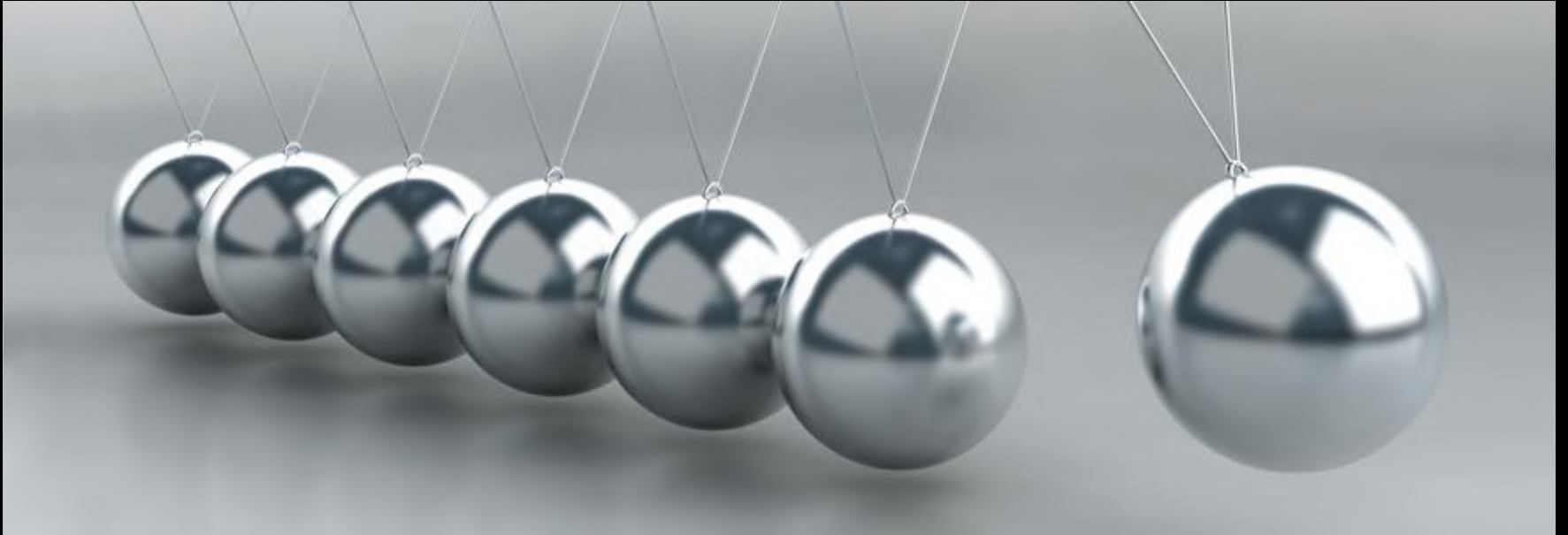
Spotting the unexpected



- **Testing**
- **Airport security**
- **Immigration officers**
- **Customs officials**
- **Aviation**

Spotting the unexpected

How good are we?

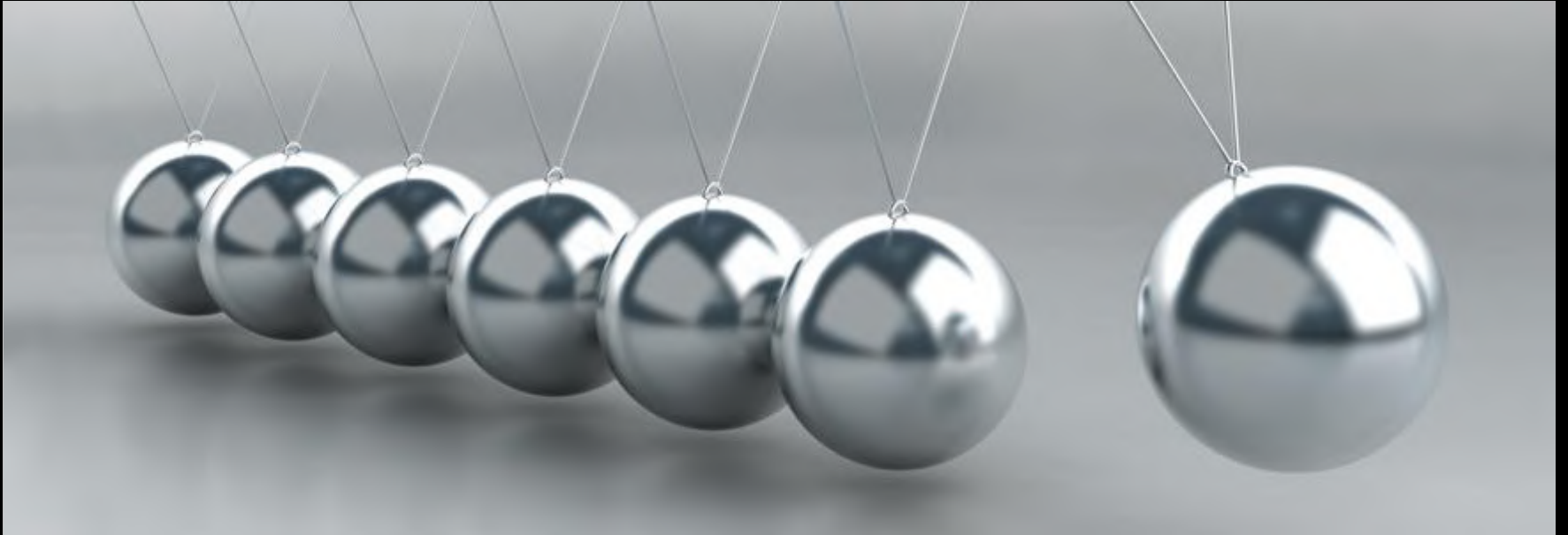


How big is the problem?

**Sensory
Input
10 million
Bits/second**

■
**Conscious processing
~ 8 – 40 Bits/second**

The next second we do the same again



Why do we have perception & attention?

Why do we have perception & attention?

- **To take action**
- **Solve problem relevant to our evolutionary fitness**

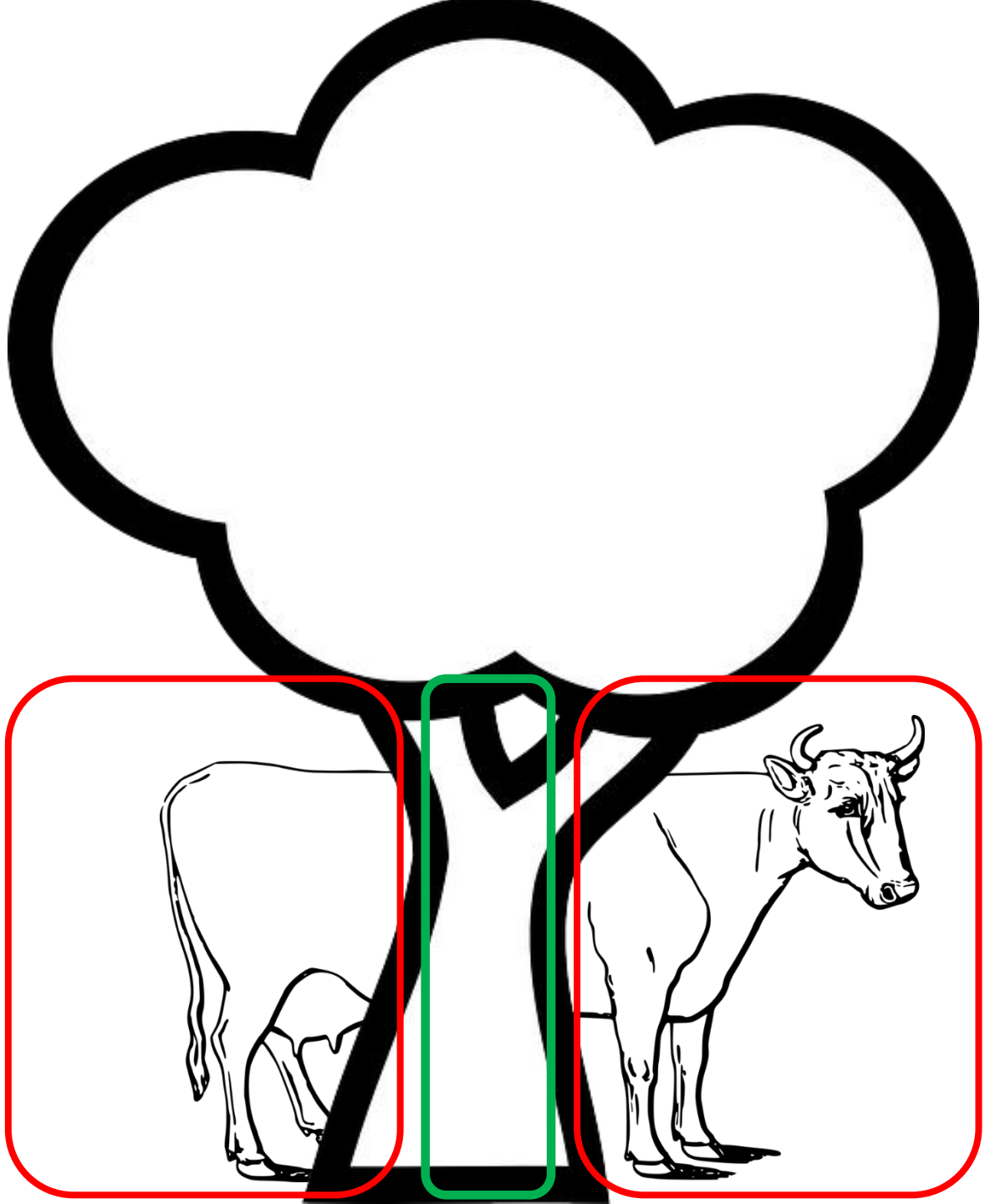




Why do we have perception & attention?

Problems are distinct

- **Is this a predator?**
 - Object classification
- **Is it coming towards me?**
 - Motion

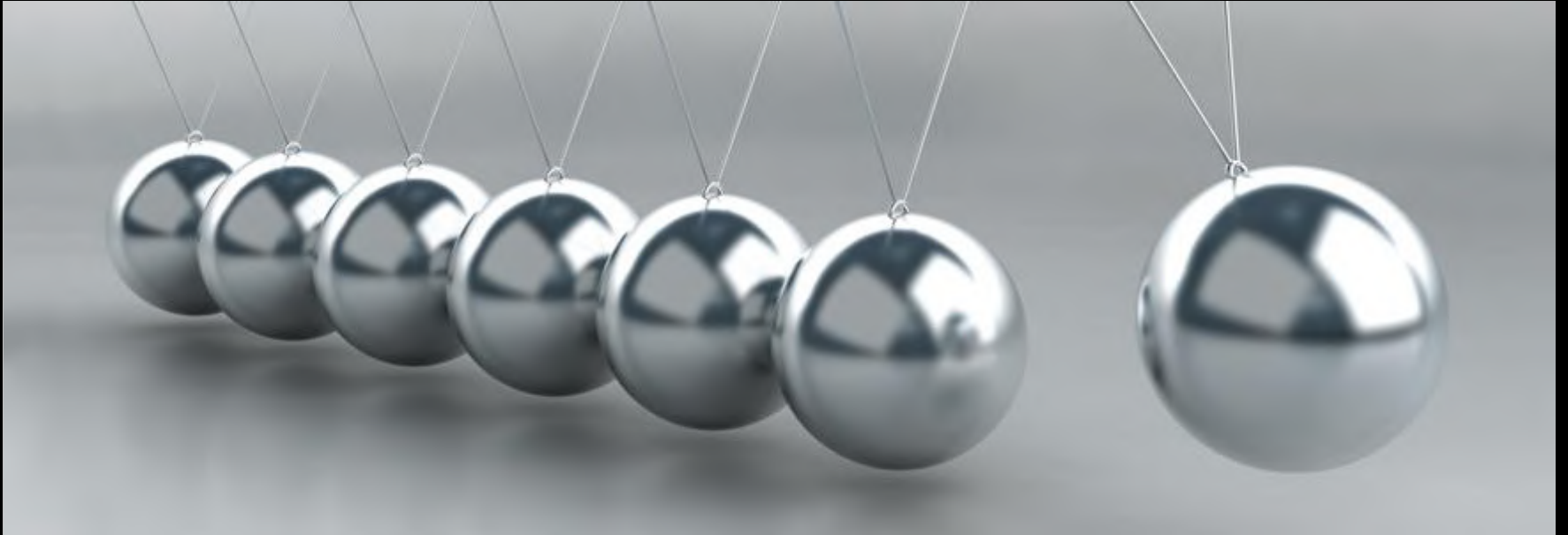




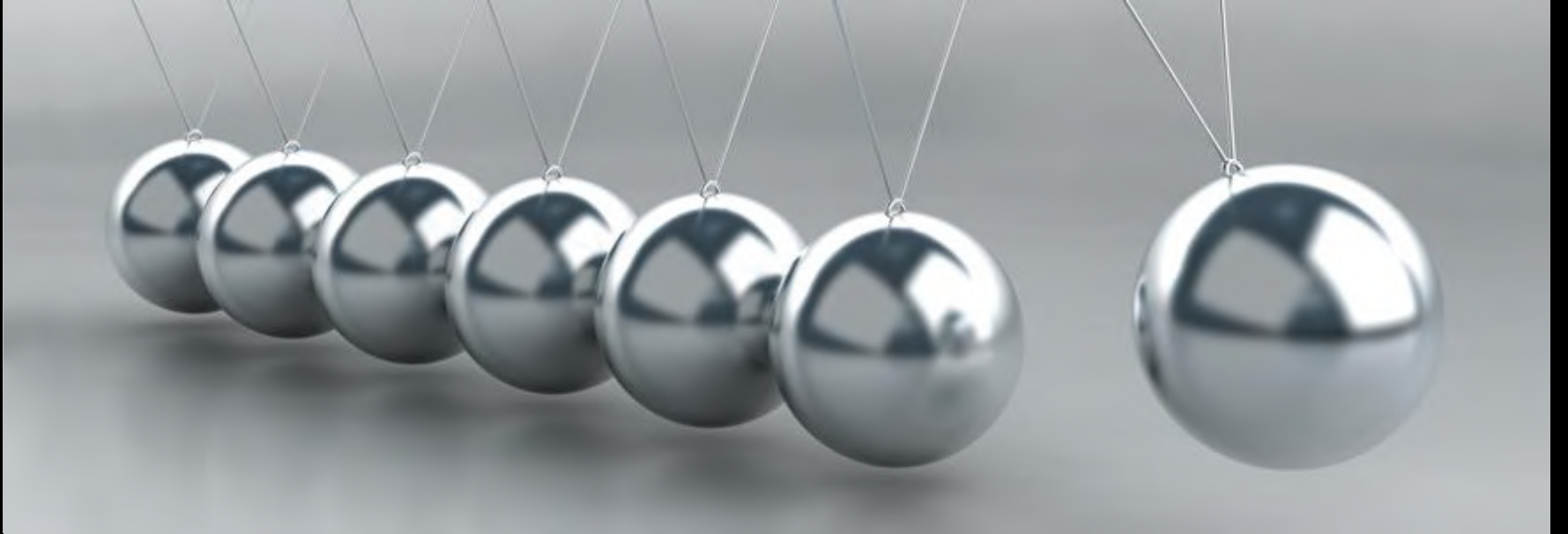
Why do we have perception & attention?

Adaptation & exaptation

- **Feature acquires a function for which it was not originally adapted**



Some aspects of perception



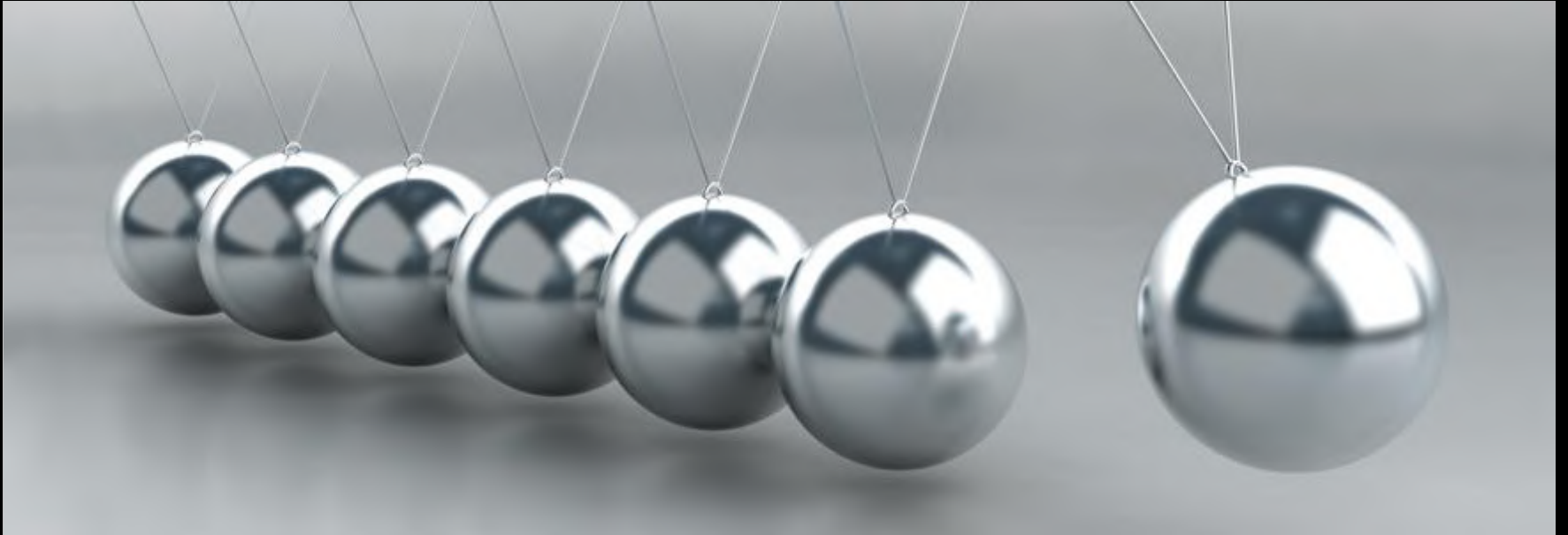
Mack & Rock

Warning!

Flashing Images

Mack & Rock

Simulation of Mack & Rock



Rensink and Clarke

Warning!

Flashing Images

Rensink and Clarke

Simulations of Rensink & Clarke

Simulations 2

Rensink and Clarke

Implications:

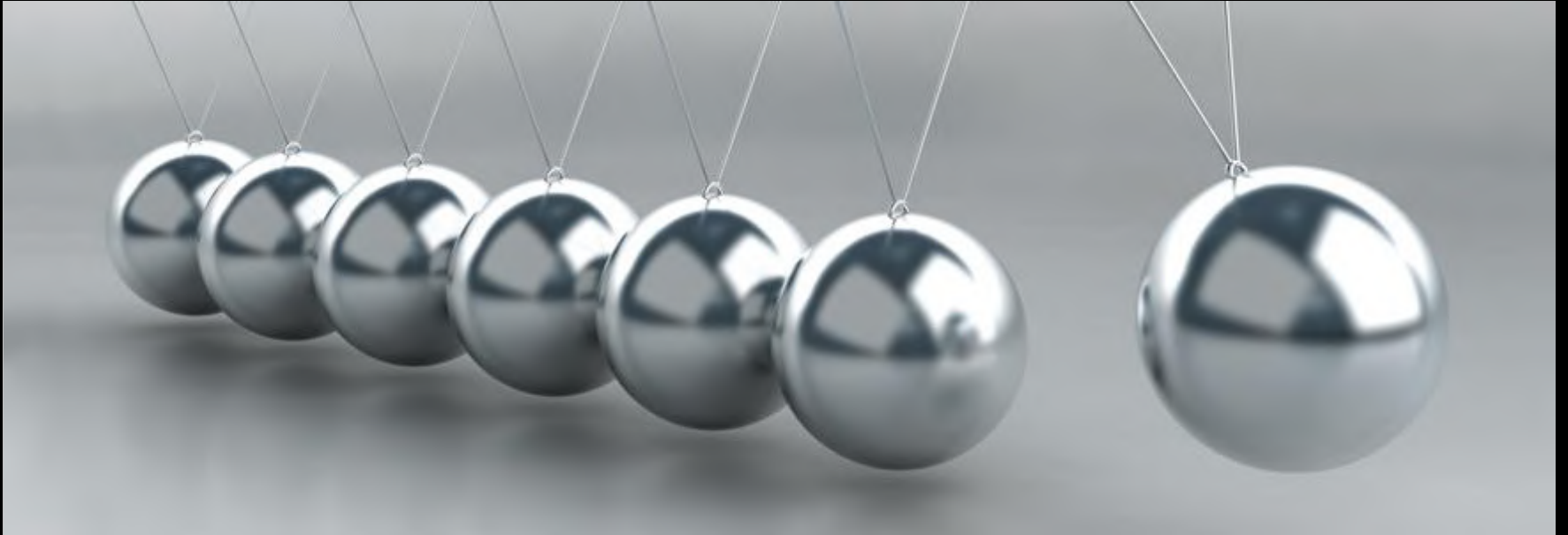
- 1. Dual screen PCs are AN ABSOLUTE BARGAIN**
- 2. Head Up displays?**











Perceptual load

Perceptual load

**Increased perceptual load
leads to reduced ability to
spot unexpected events**



Effect of sound

Effect of sound

Instructions:

1. Take an input A
2. Multiply by...



T-Mobile 1:49

← Megan

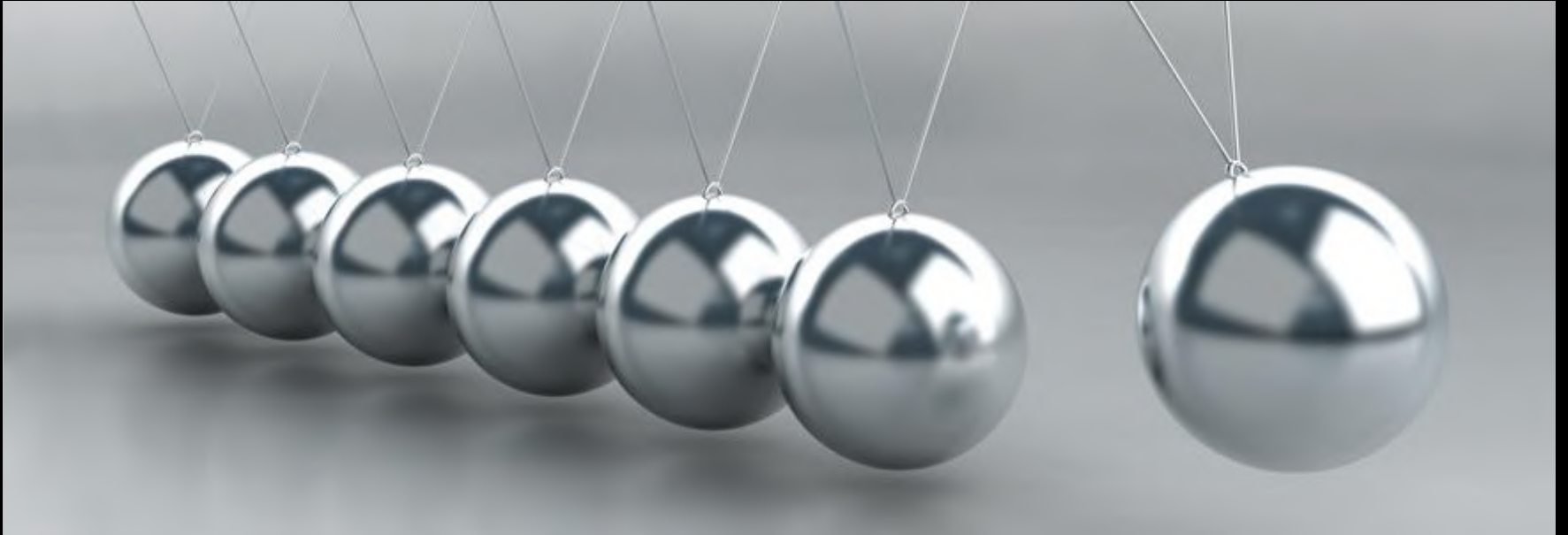
Fri 2:20PM

Hope you guys made it back safe. Thanks for helping Iza and me relax tonight!

2:08 AM

Send message

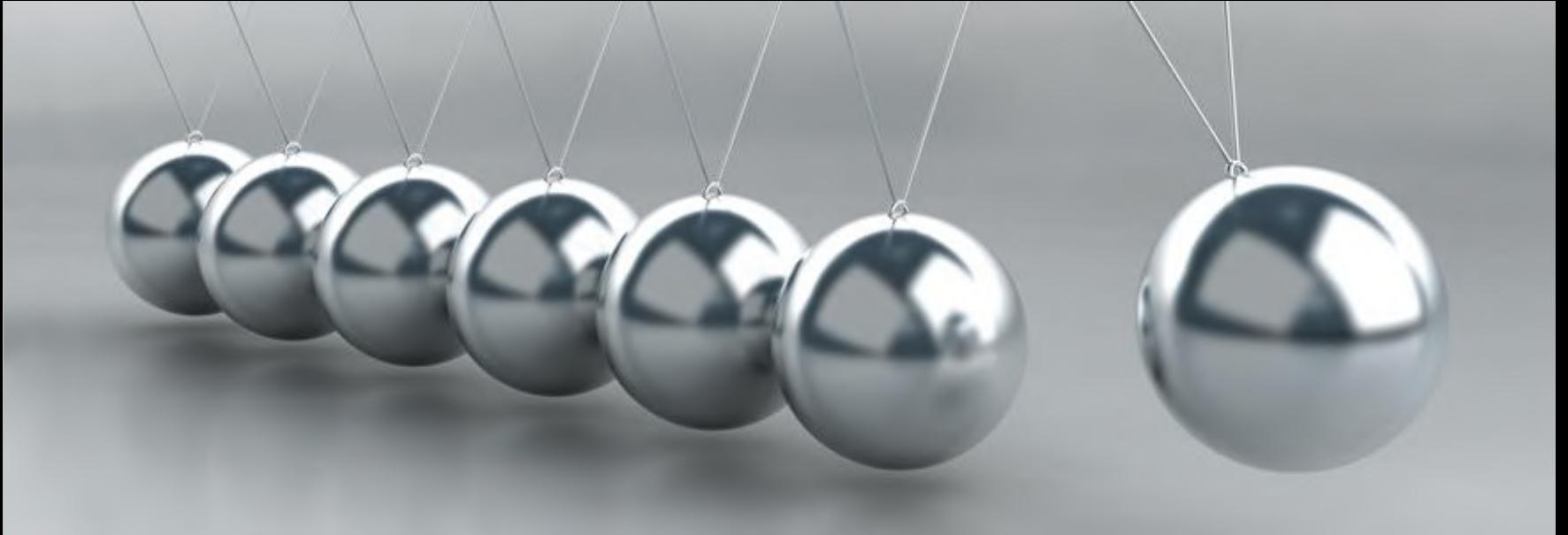
If | | The
Q W E R T
A S
Z X C V B N
7123



External factors

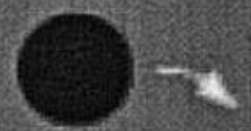
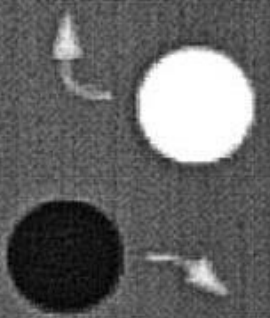
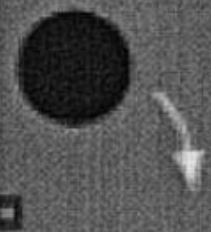
External factors

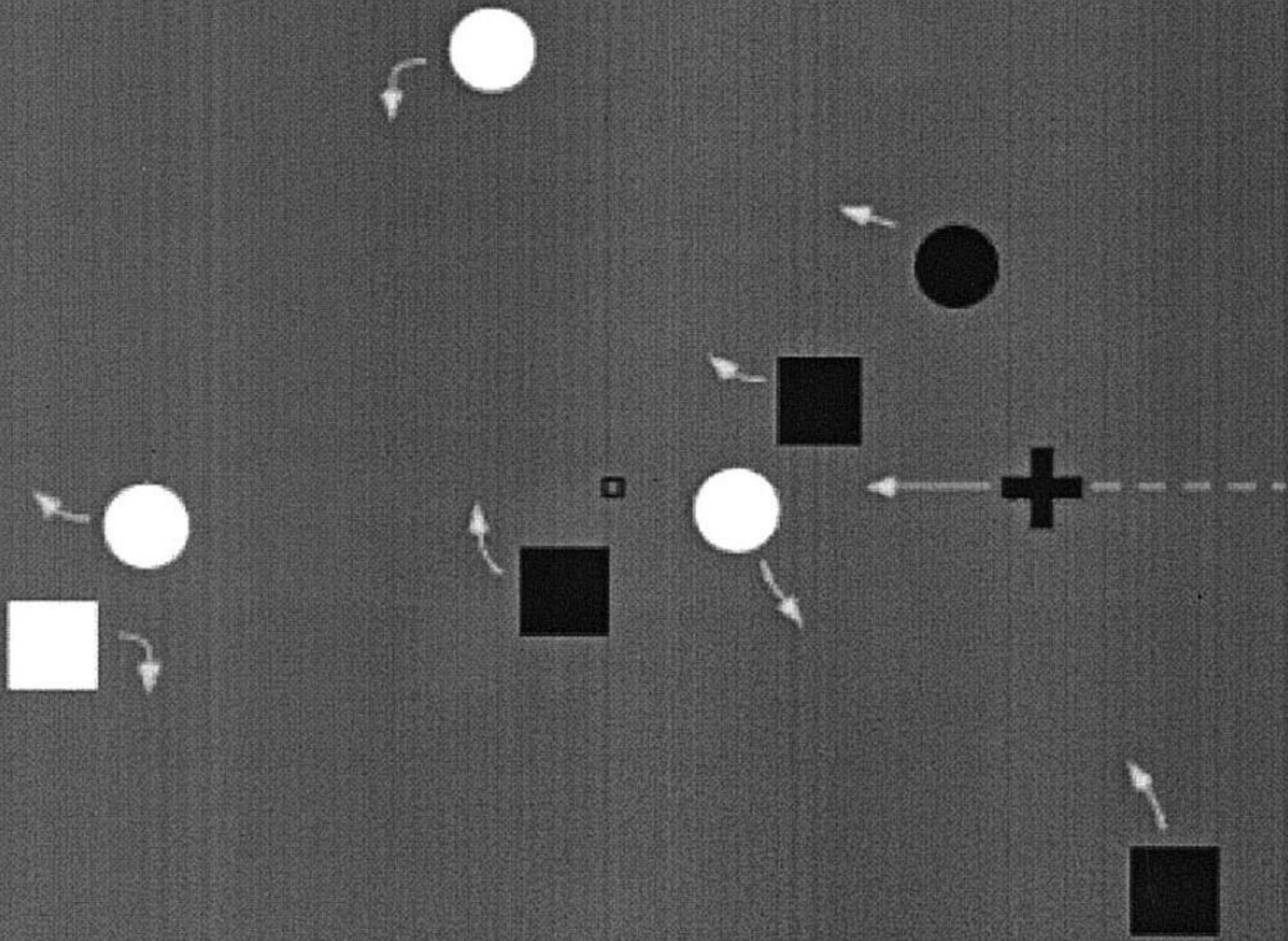
- **Wakefulness**
- **Ego depletion**
- **Practise**

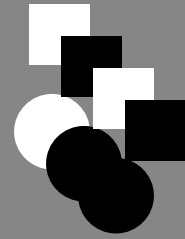


Attentional set

Most et al

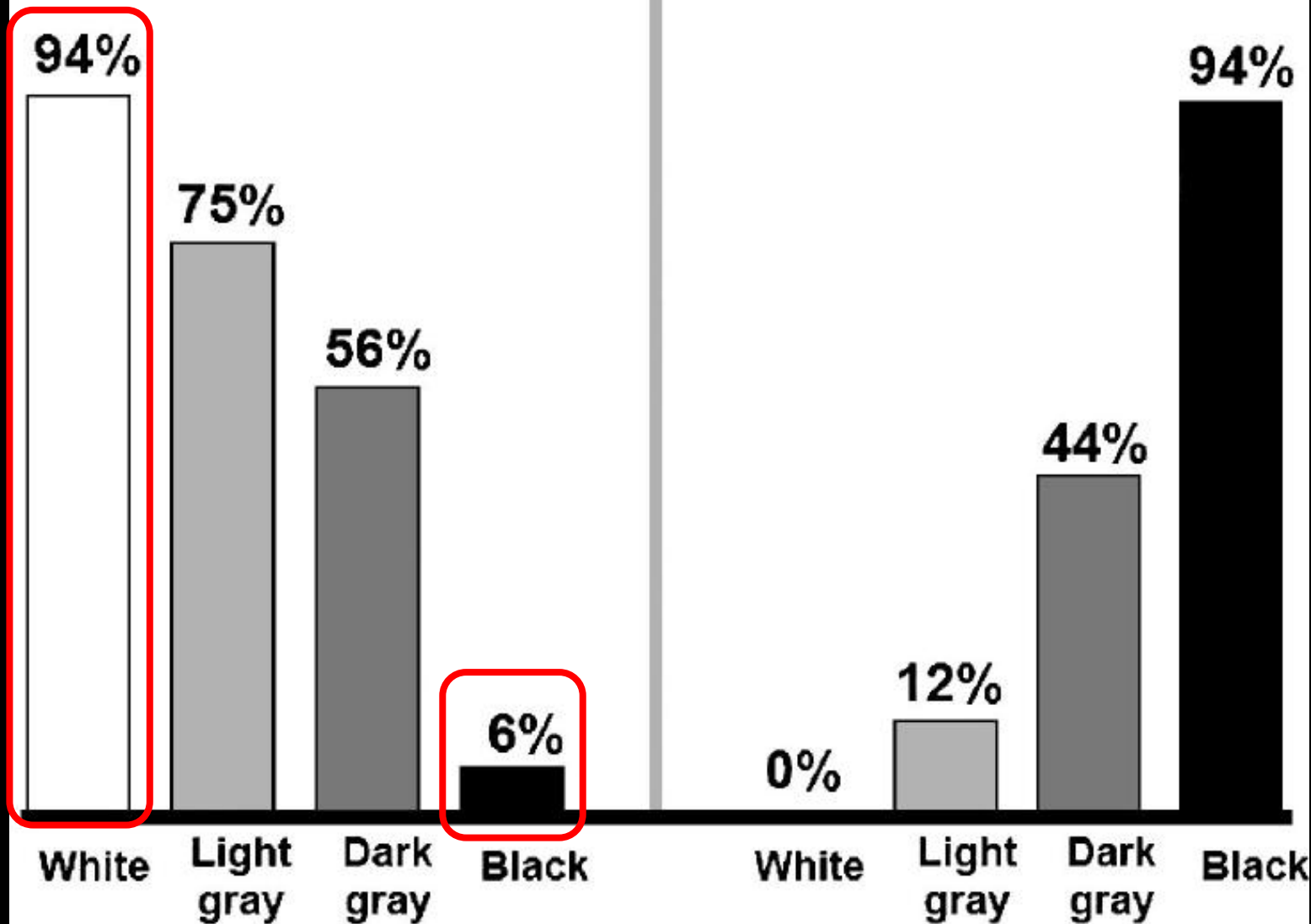






Attend White

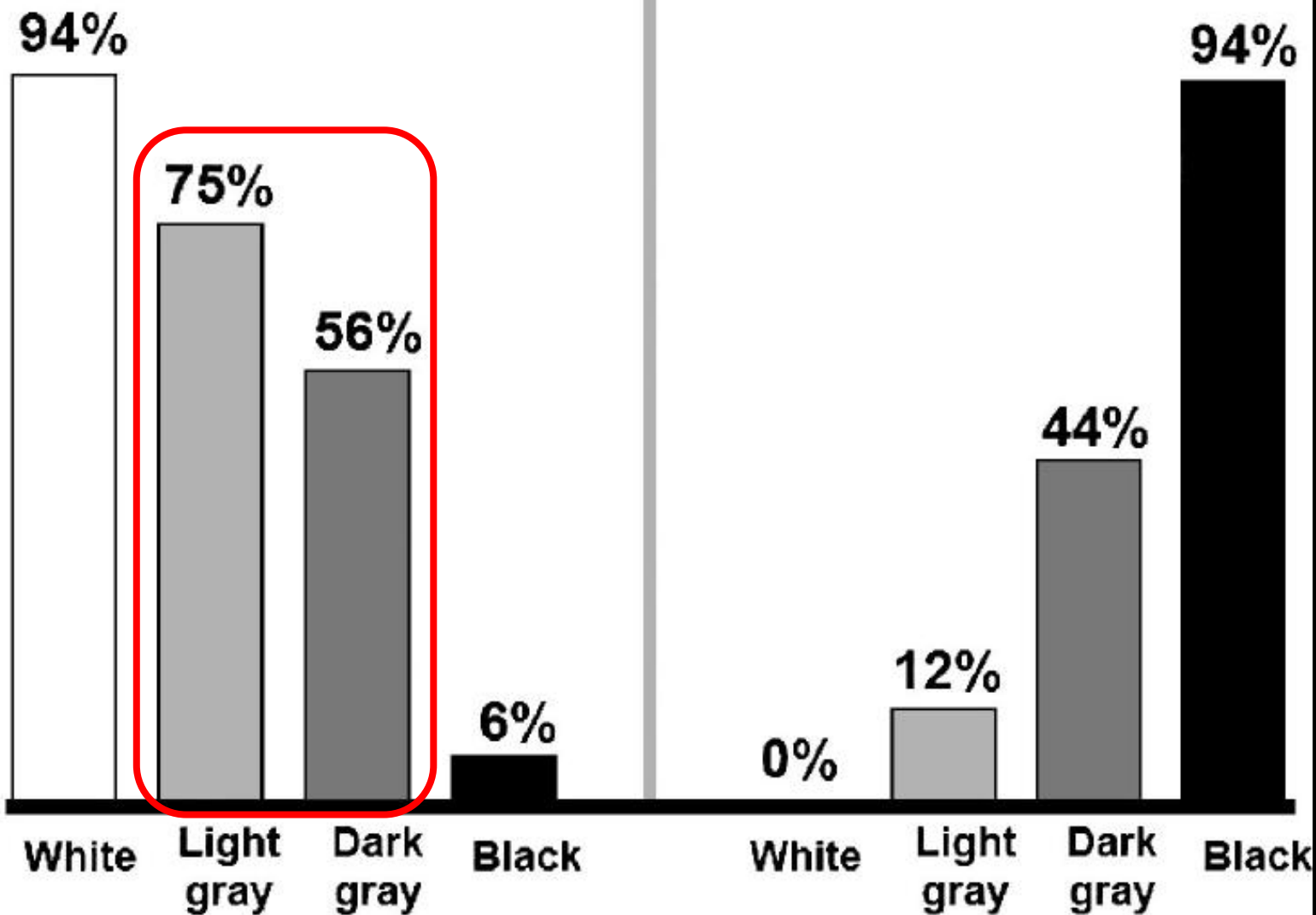
Attend Black



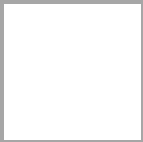
Luminance of Unexpected Object

Attend White

Attend Black



Luminance of Unexpected Object



Attend White

Attend Black

94%



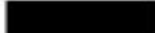
75%



56%



6%



0%

12%



44%



94%

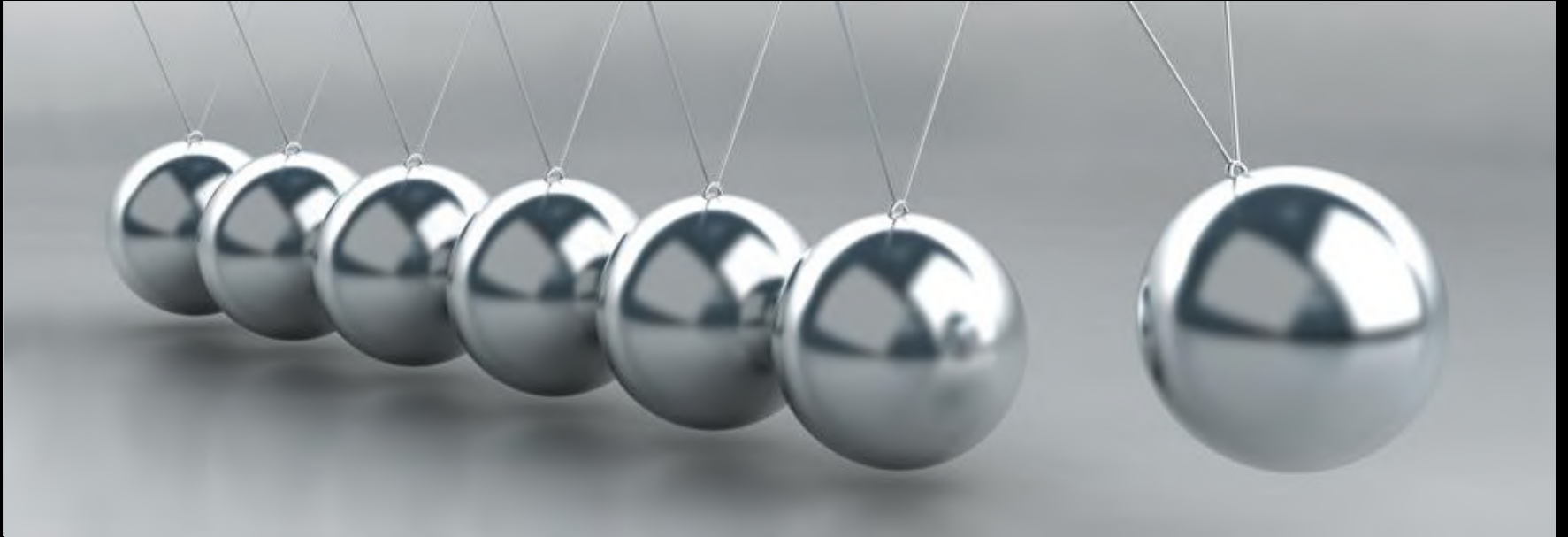












The invisible gorilla revisited

What is the attentionally demanding task?

Counting the number of passes of white team

What is the attentional set?

White shirted players

What is the irrelevant set?

Black shirted players

What is the salient object?

Gorilla

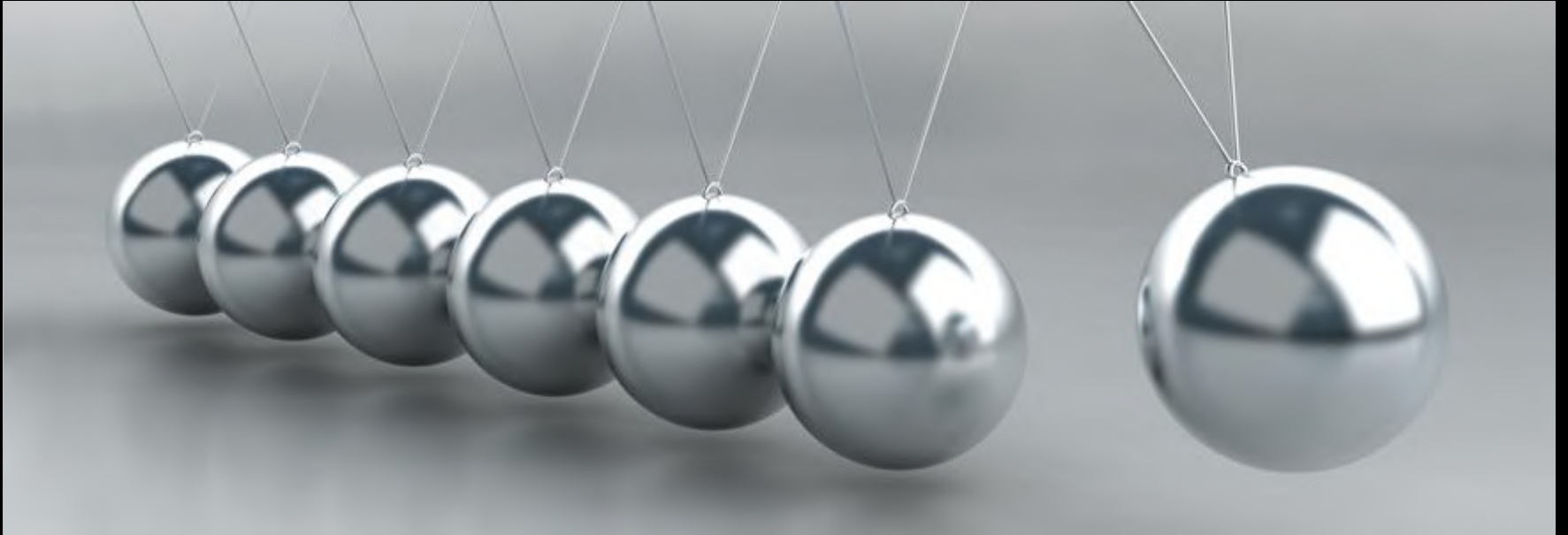
- **What if**
- **No attentional task?**

- **What if**
- **Attentional set – black clothed athlete?**

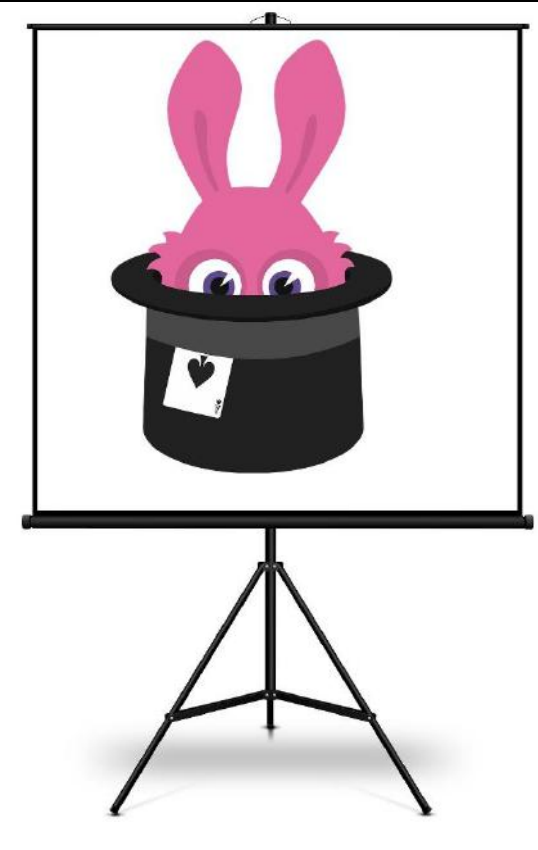
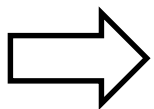
- **What if**
- **Salient event – polar bear?**

The invisible gorilla revisited

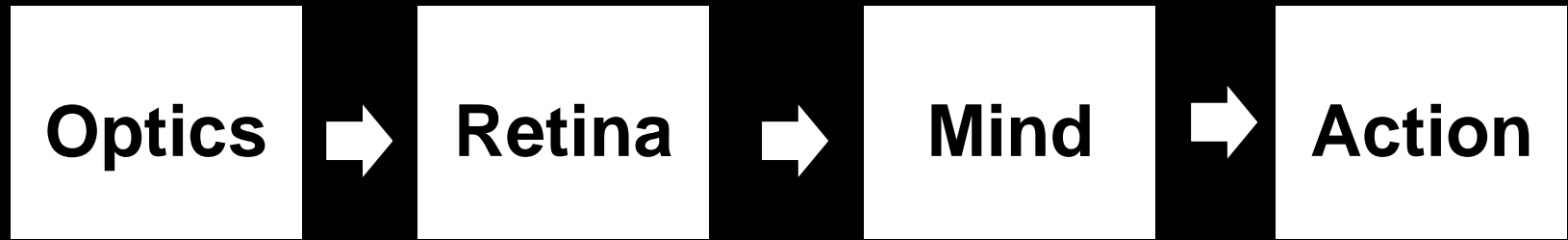
Invisible gorilla viewed by basketball stars



The visual process

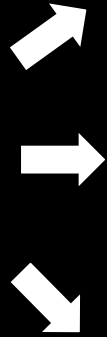


The visual process



The visual process

Mind



Colour

Motion

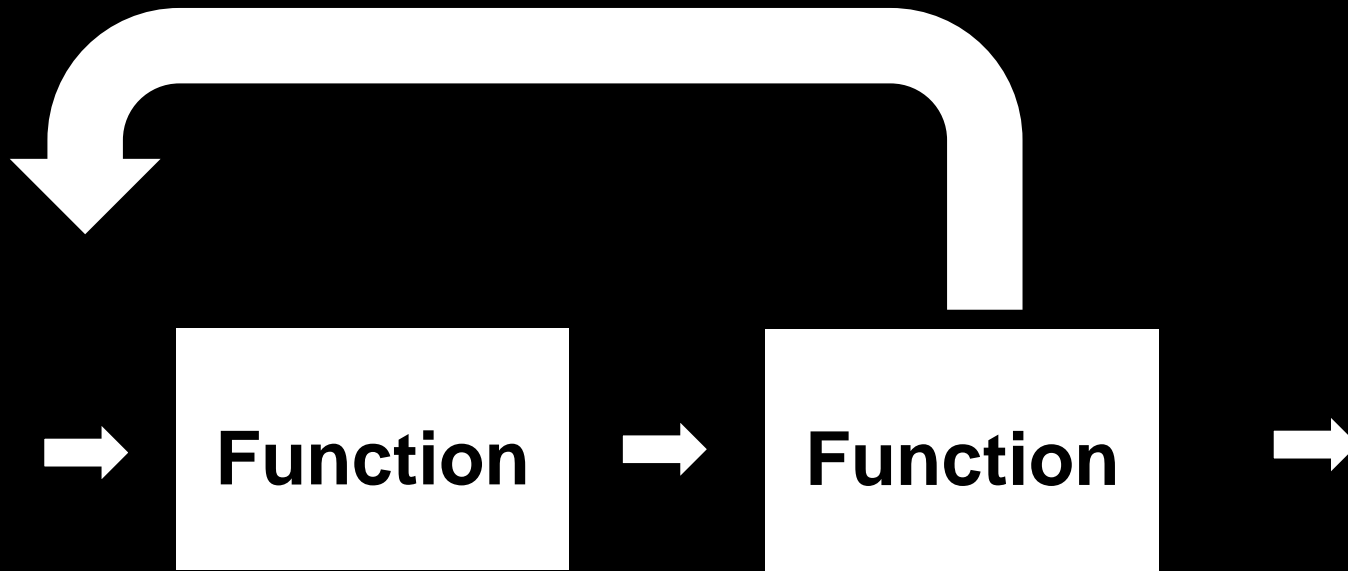
Classification

Facial recognition

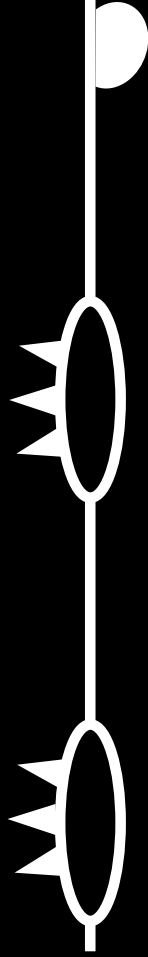
Identify mood

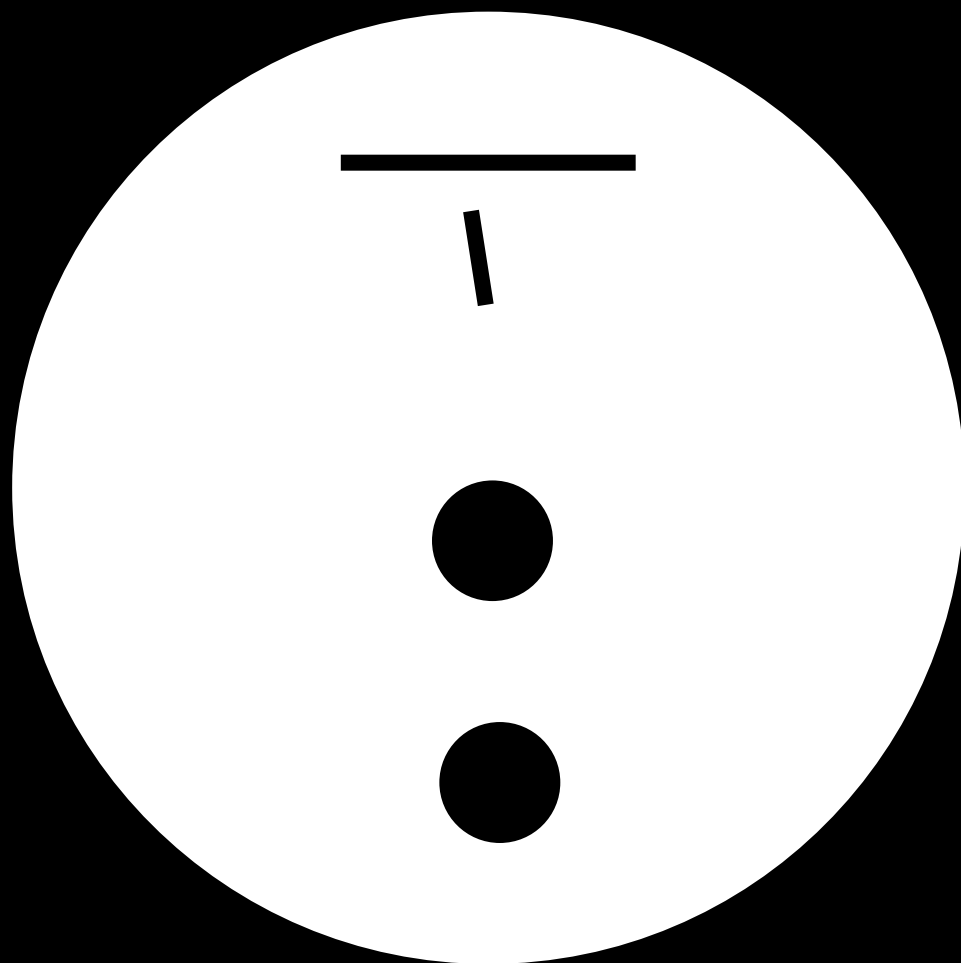
So what?

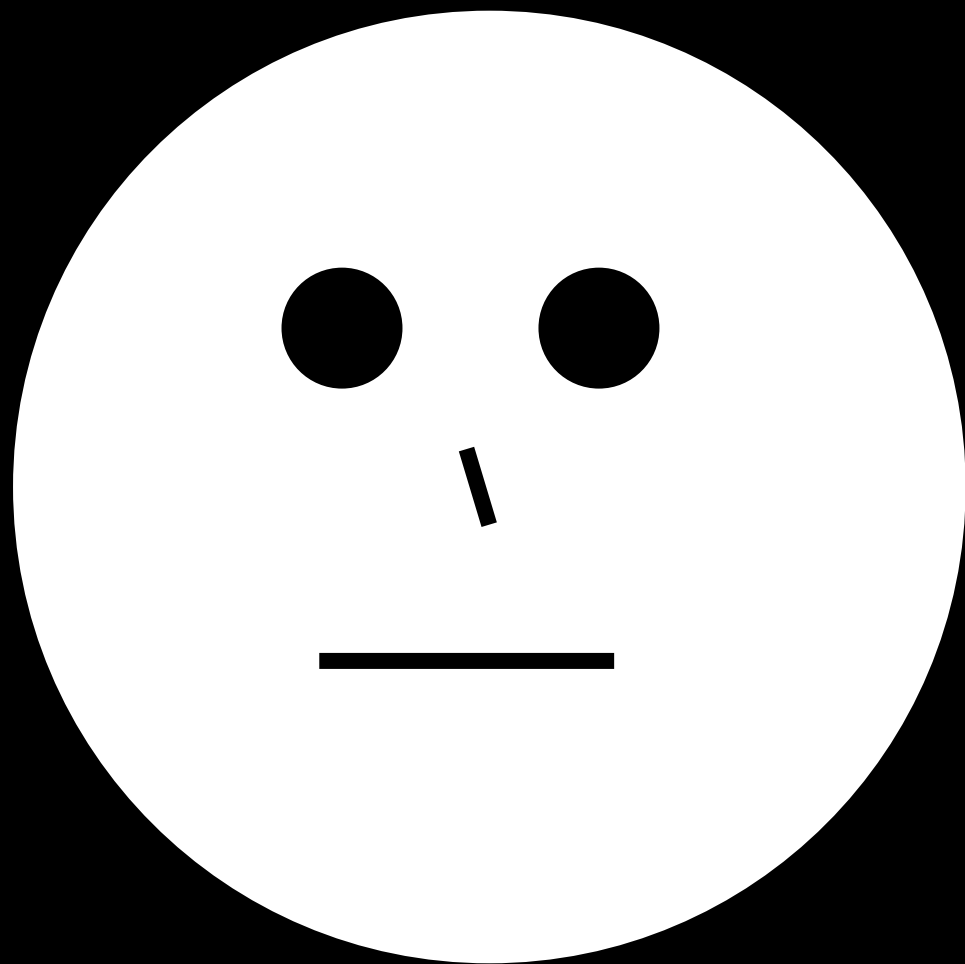
The visual process



Feedback circuits are often bigger than feed-forward









'Ramachandran is a latter-day Marco Polo' **RICHARD DAWKINS**

**THE
TELL-TALE
BRAIN**

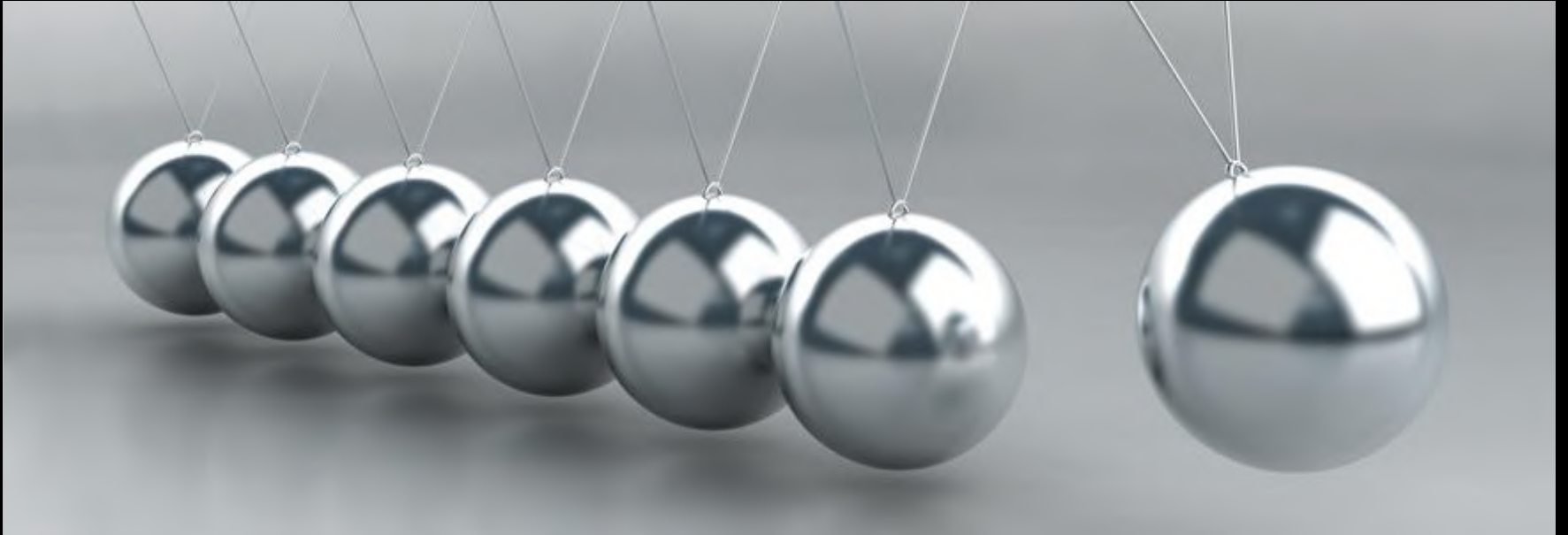
**Unlocking
the Mystery
of Human
Nature**

**'A profoundly
intriguing and
compelling guide
to the intricacies of
the human brain'**

OLIVER SACKS

**'Exceptionally
inventive'**

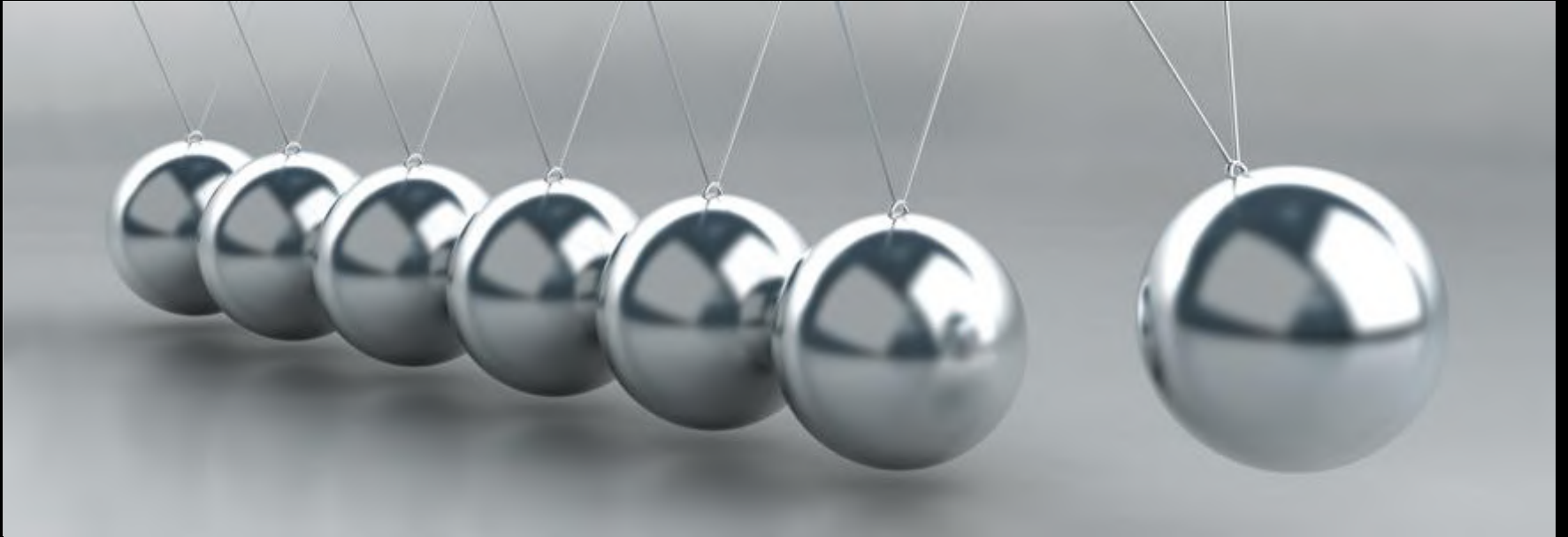
**NEW YORK TIMES
BOOK REVIEW**



Visual versus Attentional

Visual versus Attentional

- **So far, focussed on visual**
- **Attentional e.g.**
- **Document attend to meaning, or layout**



Mitigation

Mitigation



(Mostly) a trade-off



Dual screen monitors

Mitigation

**Pair testing
(Caution)**

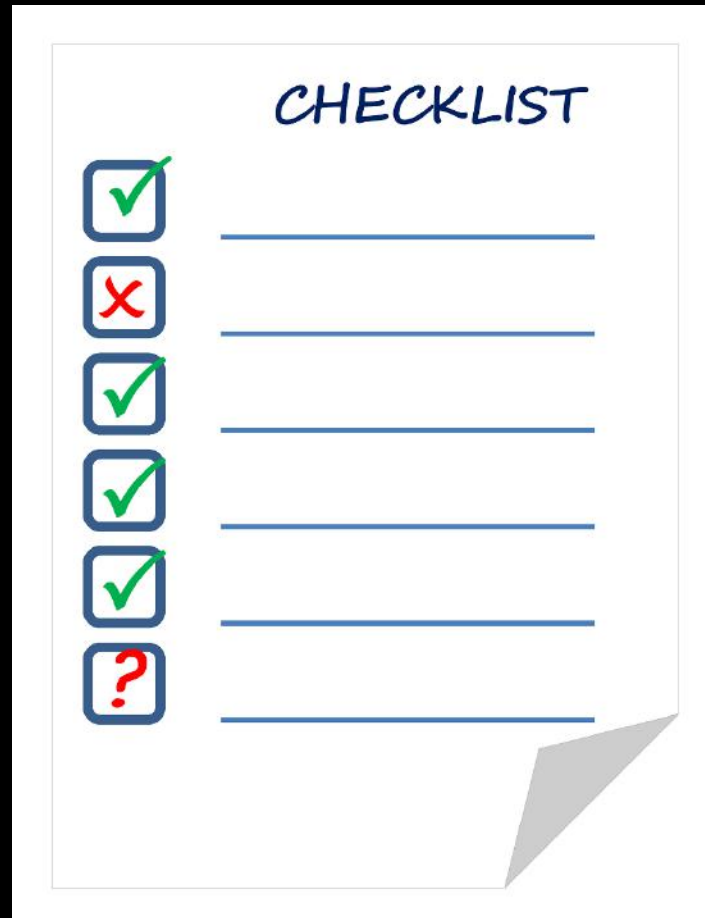
Mitigation

Automated replay

Mitigation

Task division
Compartmentalisation

Mitigation



Task aids
- Checklists



Reduce distractions

Mitigation

**Reduce ego depletion
(Ergonomics)**

Mitigation

Reduce perceptual load

Reduce mental load

Any Questions:

- **SLIDO.COM**
- **SLI.DO**

• **#test2018**



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Thank you for your attention.