

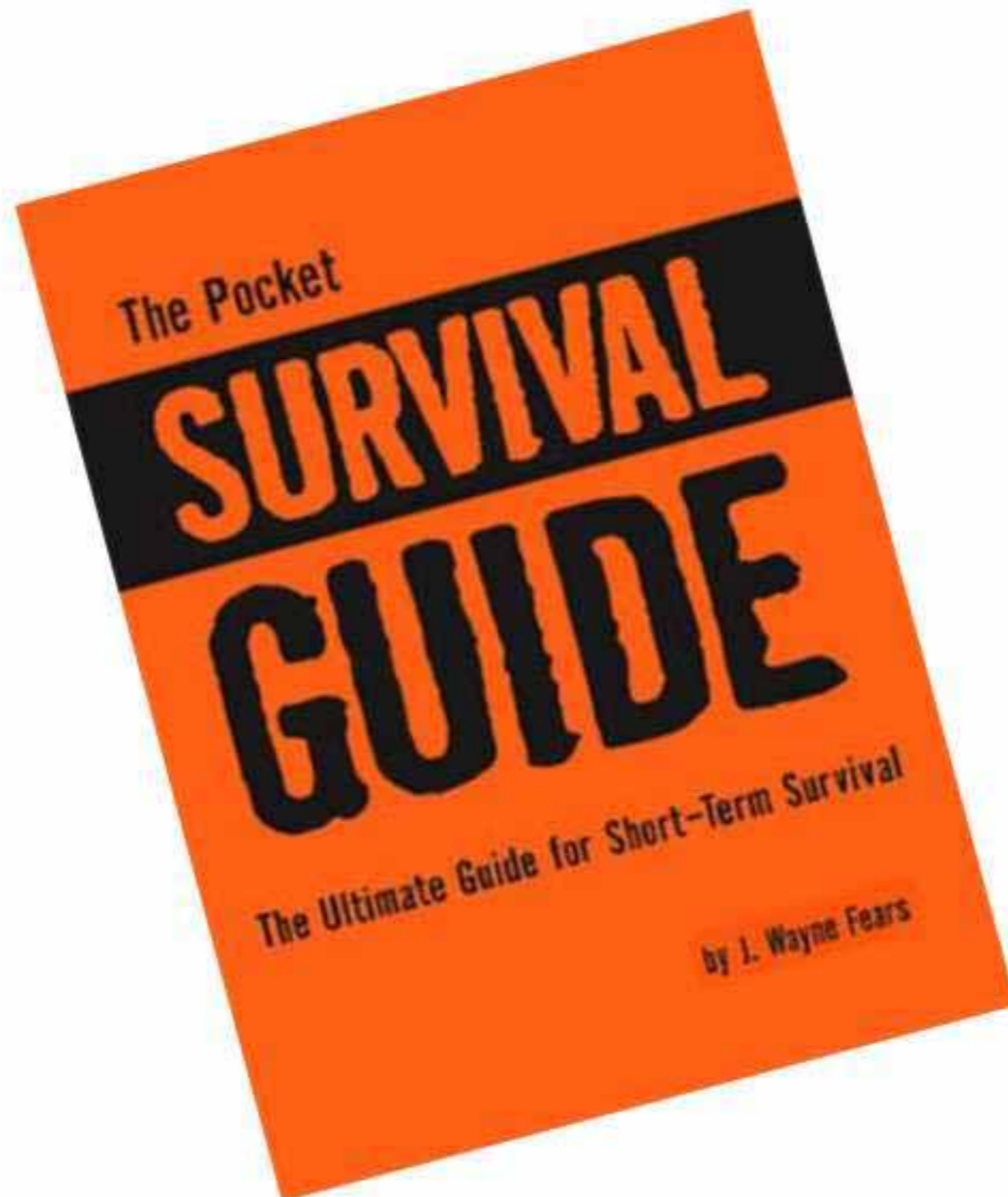
Why do we gamble and take needless risks?

Professor Keith Kendrick



Why take risks?

All species need to take risks in order to survive

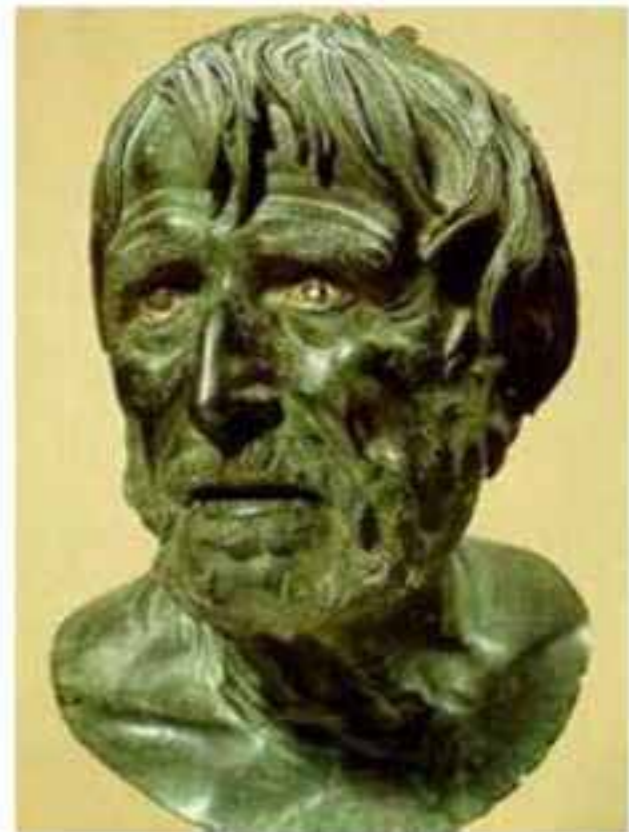


Why take risks?

All species need to take risks in order to survive

"It is not because things are difficult that we do not dare, it is because we do not dare that they are difficult"

Seneca



Why take risks?

All species need to take risks in order to survive

"It is not because things are difficult that we do not dare, it is because we do not dare that they are difficult"

Seneca

"Only those who risk going too far can possibly find out how far they can go"

T.S. Elliot



Why take risks?

All species need to take risks in order to survive

"It is not because things are difficult that we do not dare, it is because we do not dare that they are difficult"

Seneca

"Only those who risk going too far can possibly find out how far they can go"

T.S. Elliot

"Behold the turtle. He makes progress only when he sticks his neck out"

James Bryant Conant



Why take risks?

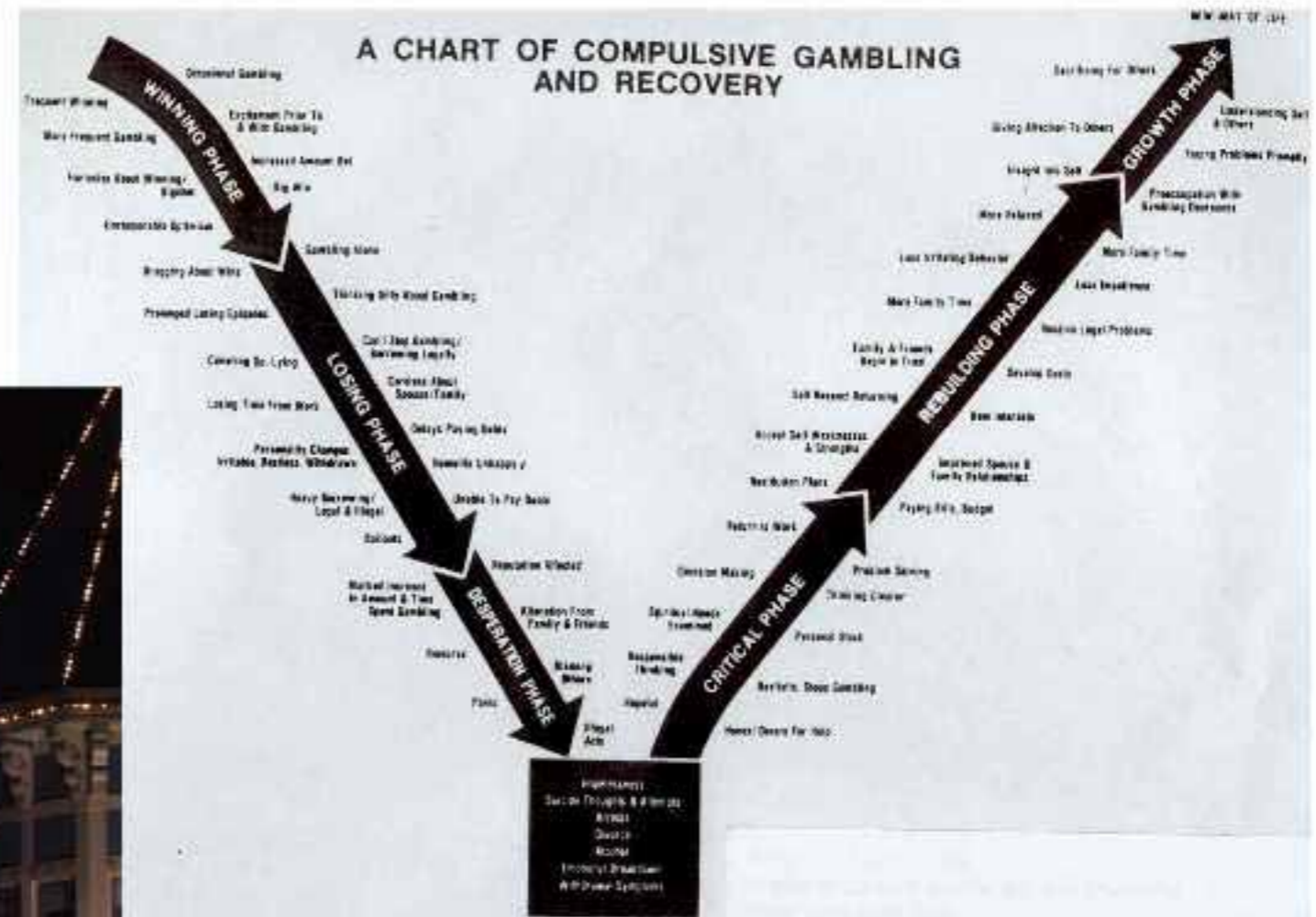
80% of us gamble for financial gain



Why take risks?

80% of us gamble for financial gain

In the US 1.6% of population are pathological gamblers



Why take risks?

80% of us gamble for financial gain

In the US 1.6% of population are pathological gamblers

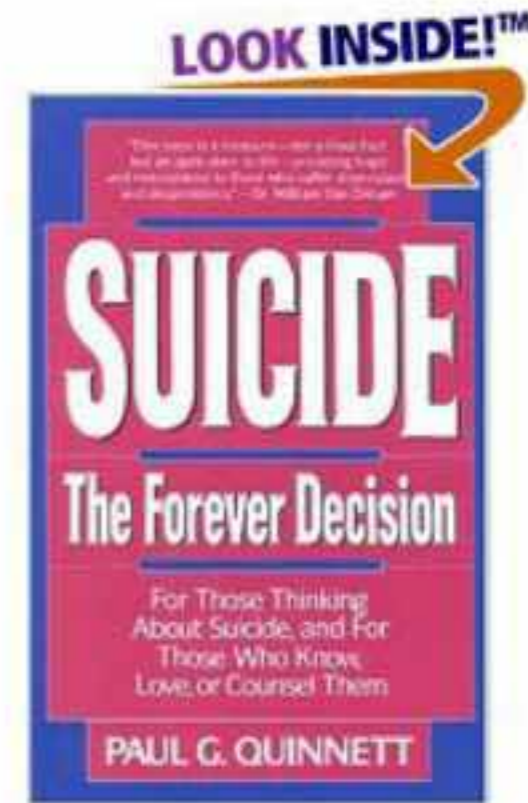
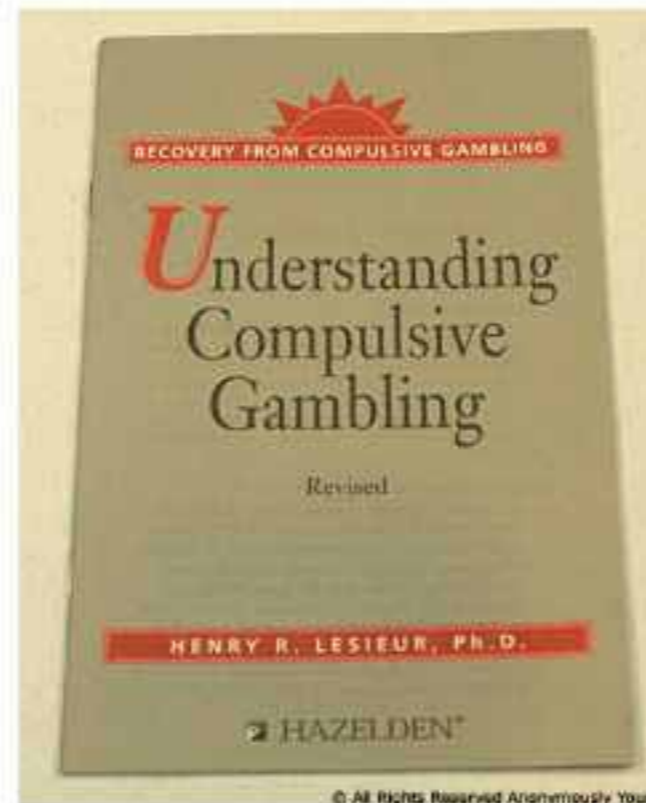
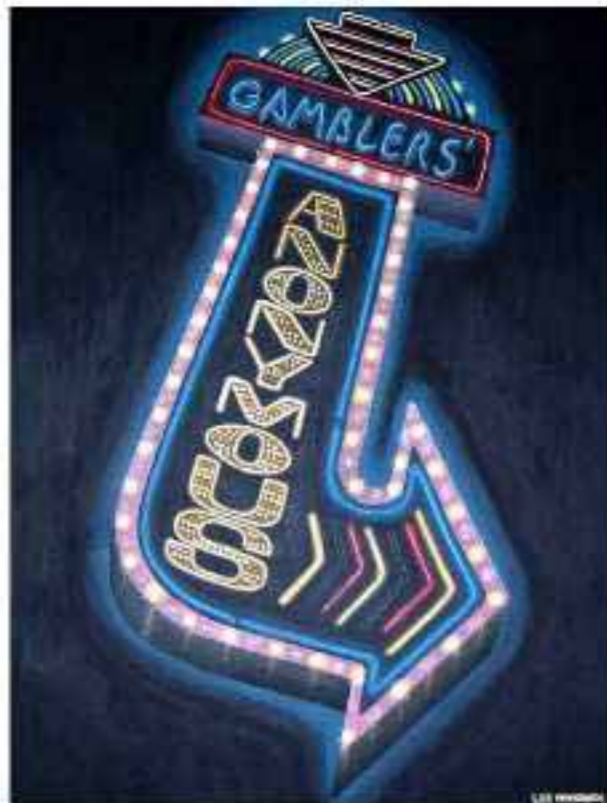


Why take risks?

80% of us gamble for financial gain

In the US 1.6% of population are pathological gamblers

Gamblers contribute to nearly 20% of suicides



What is risk?

Conscious perception of the chance that something could happen to us which is both unwanted and represents a potential loss



What is risk?

Conscious perception of the chance that something could happen to us which is both unwanted and represents a potential loss

Some would add it also involves the perception that there is a possible gain



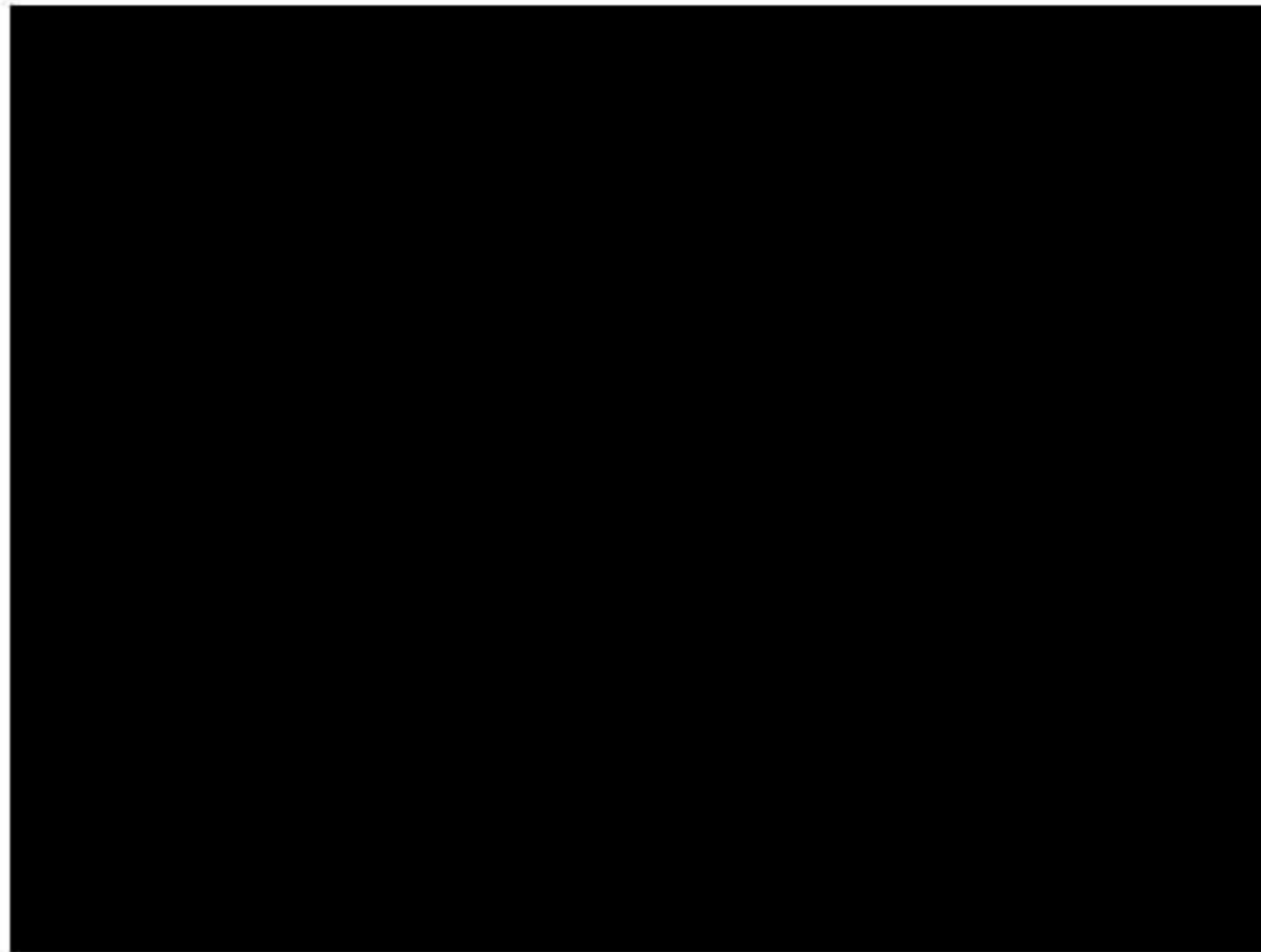
What does taking a risk feel like?

Fear regions of the brain are activated



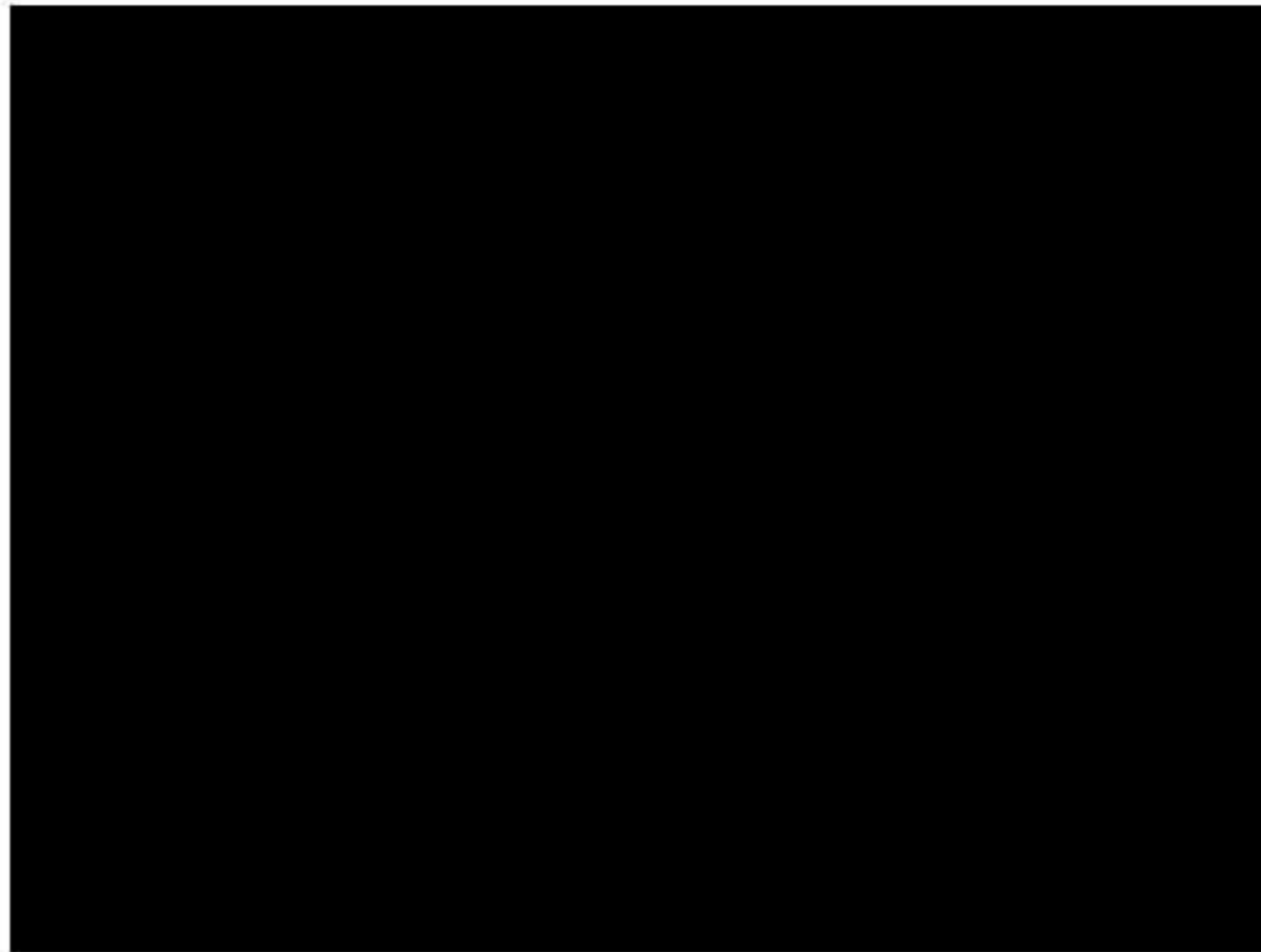
What does taking a risk feel like?

Heart begins to beat wildly (up to 3 times faster)



What does taking a risk feel like?

Blood pressure increases



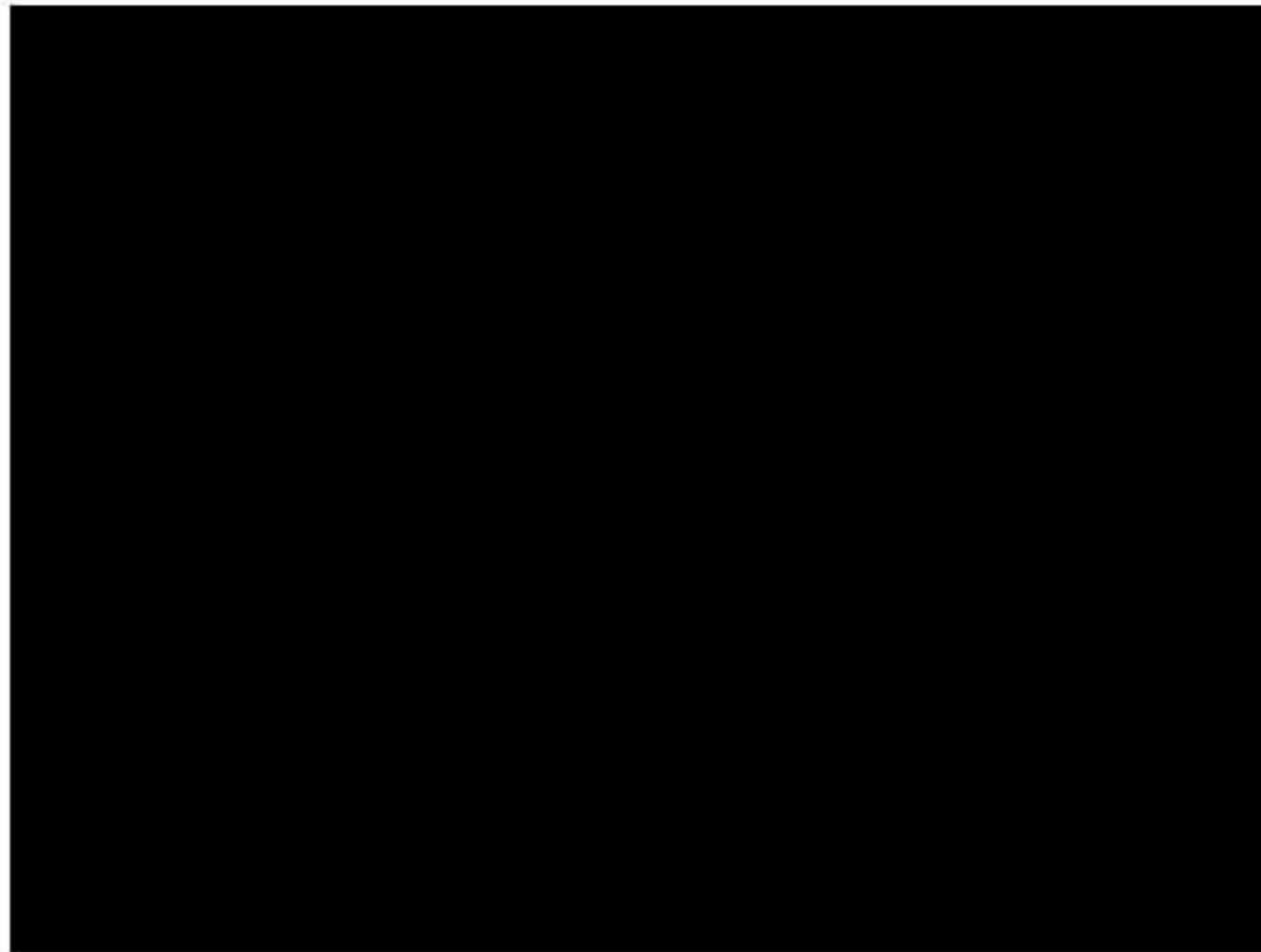
What does taking a risk feel like?

Mouth becomes uncomfortably dry



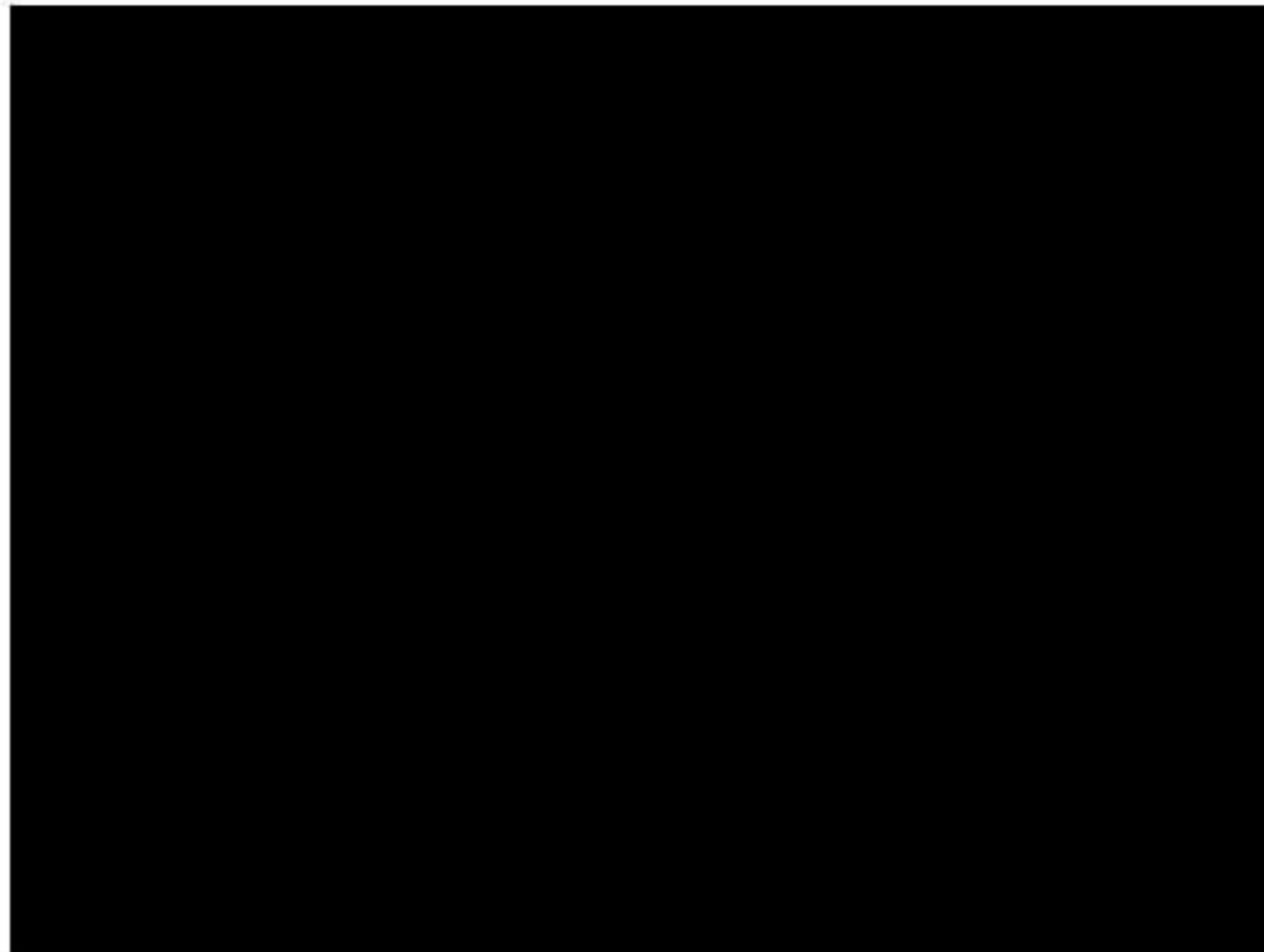
What does taking a risk feel like?

Feel irresistible urge to avoid what is about to happen



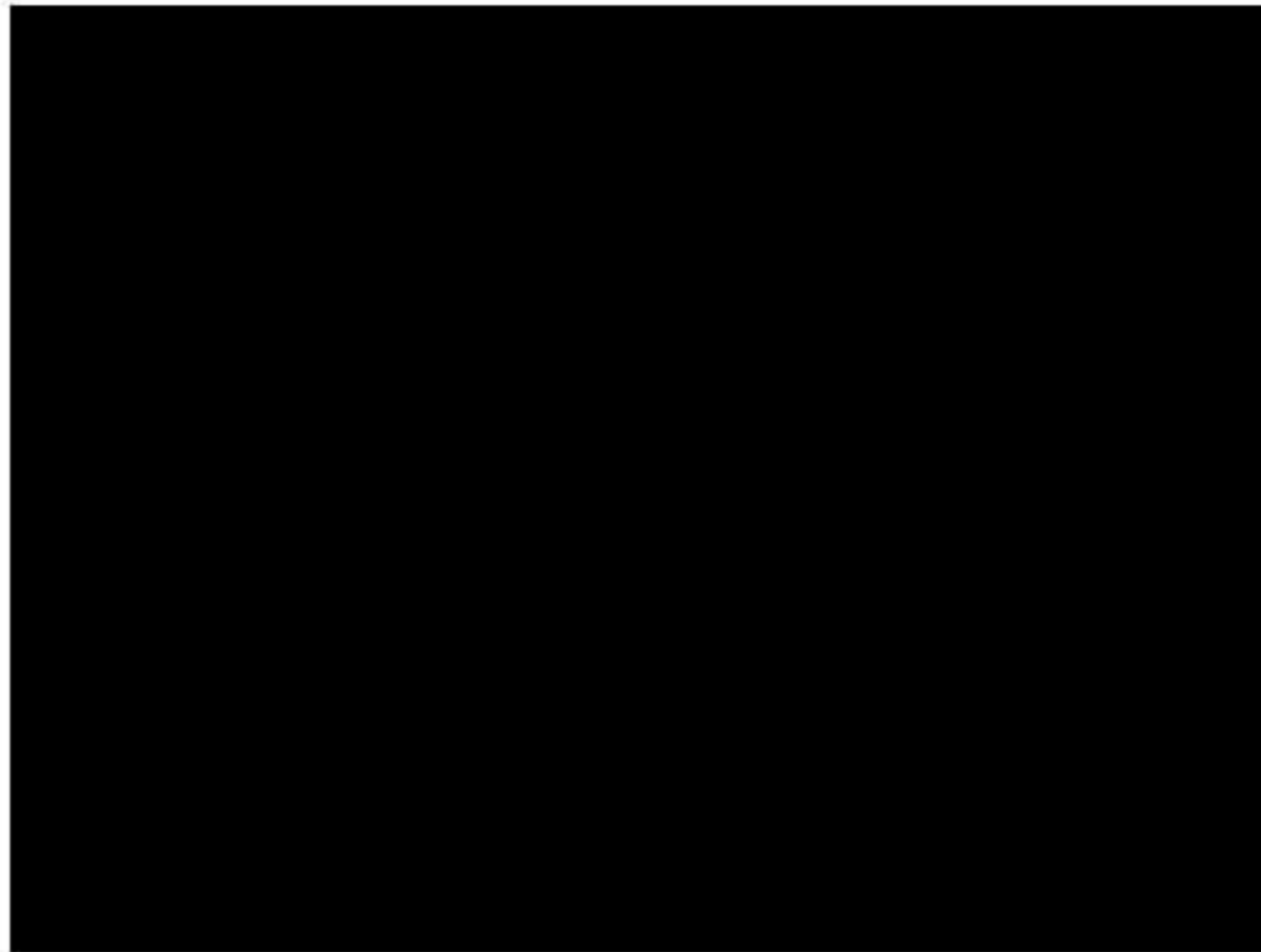
What does taking a risk feel like?

Feel fear and possibly elation



What does taking a risk feel like?

Your body pumps out adrenalin, noradrenalin and growth hormone



What does taking a risk feel like?

Brain releases corticotrophin-releasing hormone



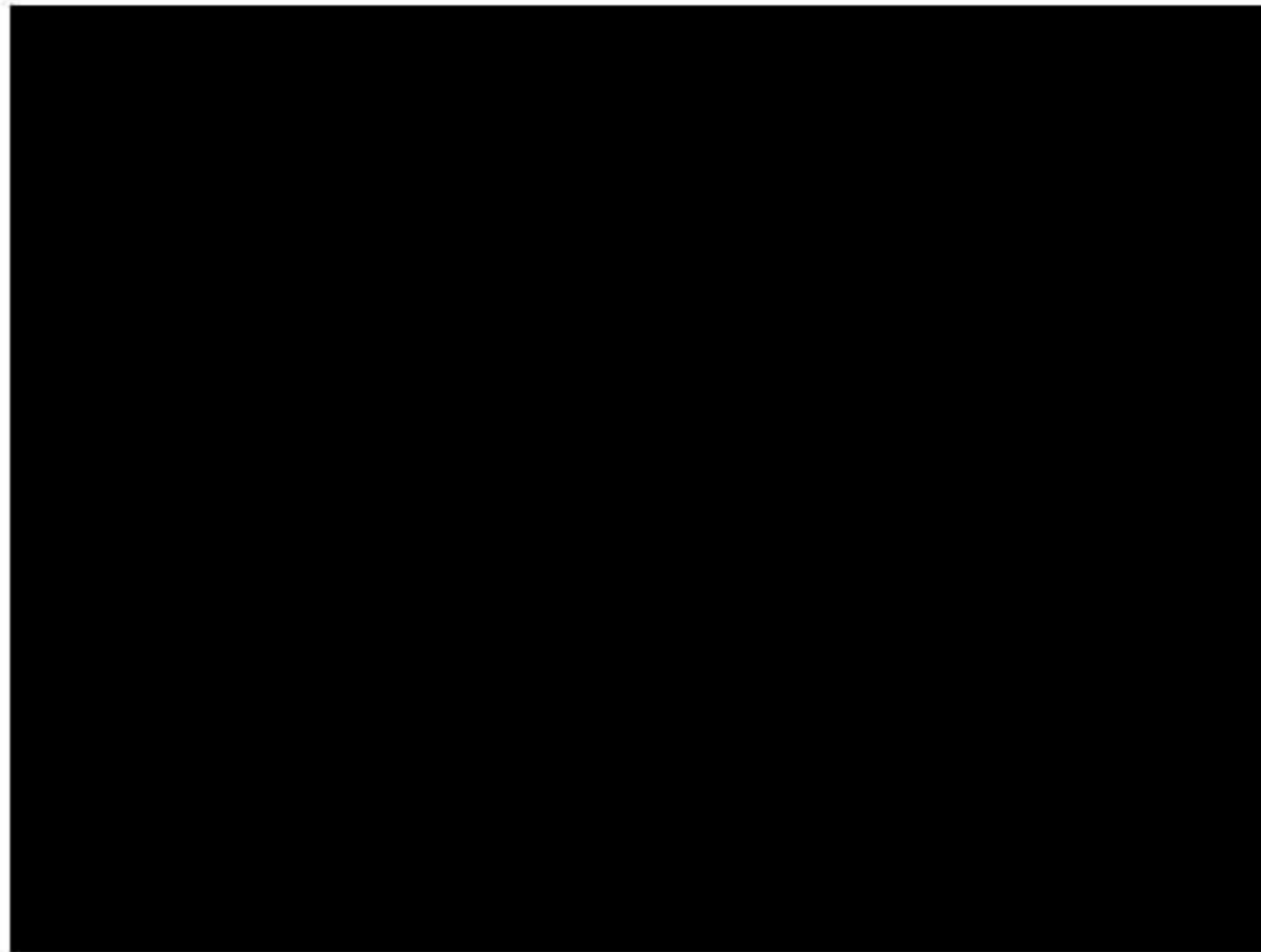
What does taking a risk feel like?

Pituitary releases adrenocorticotropin



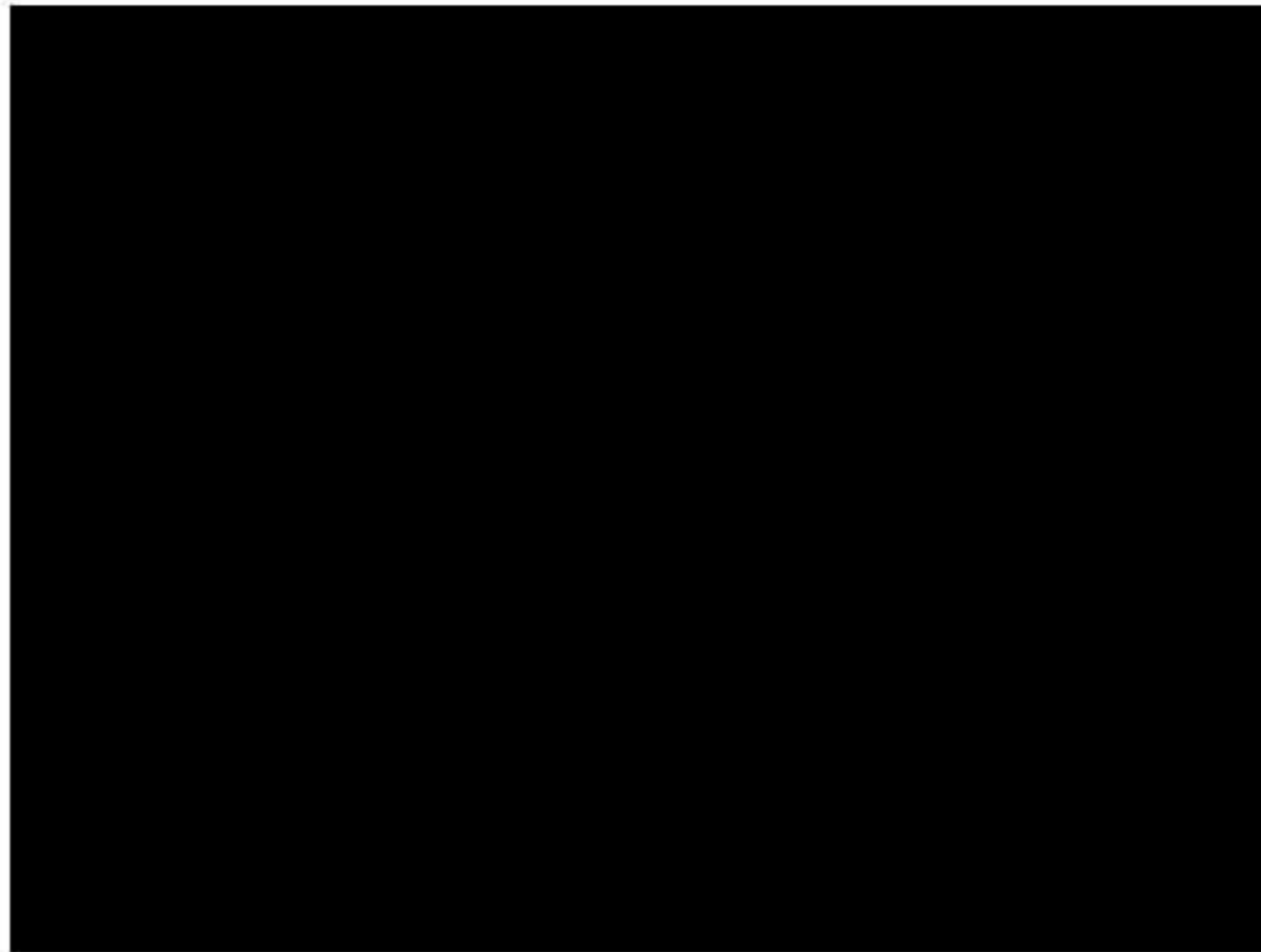
What does taking a risk feel like?

Adrenal glands produce cortisol



What does taking a risk feel like?

Your blood is diverted to your muscles



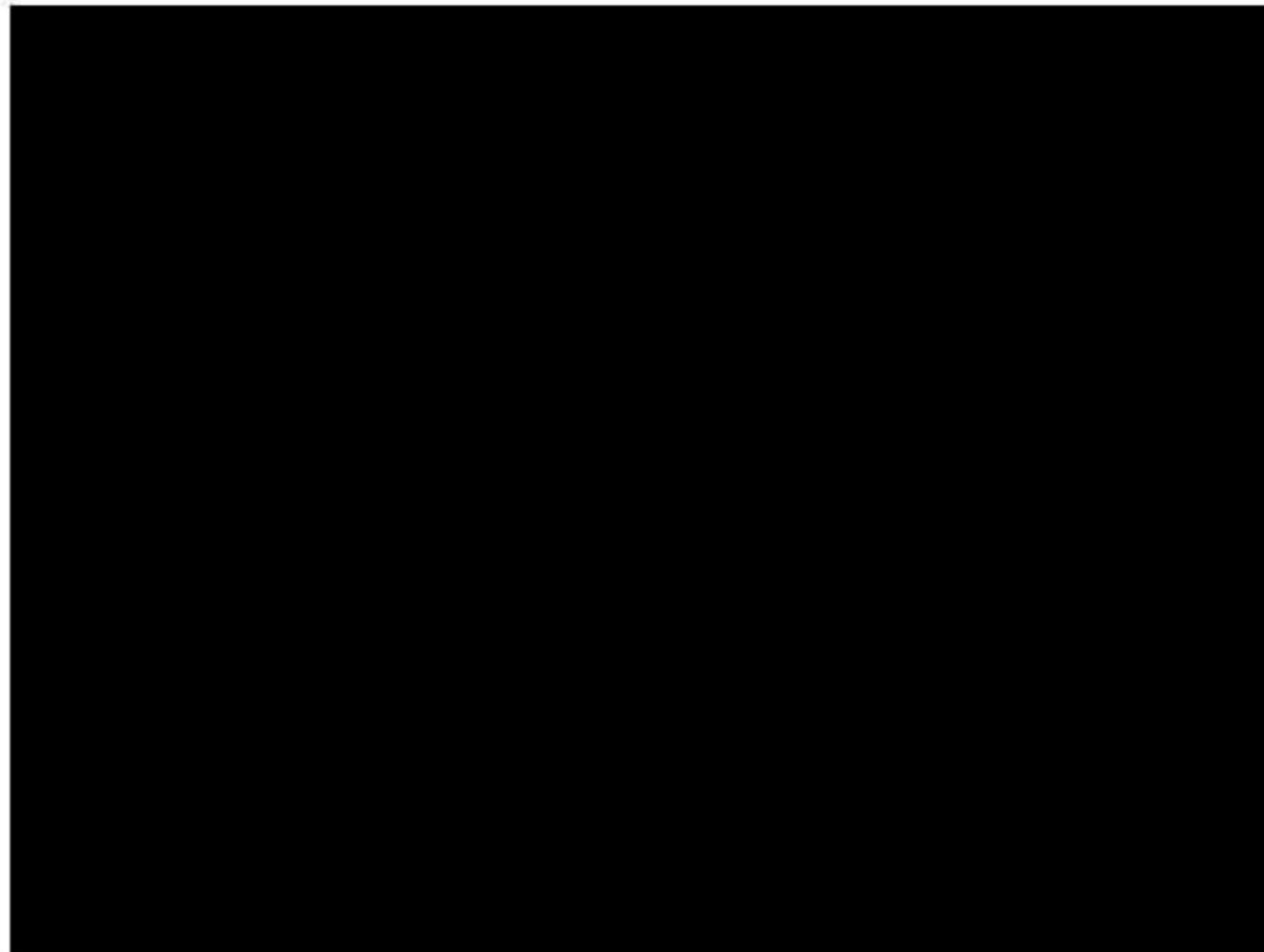
What does taking a risk feel like?

You feel butterflies in your stomach and perhaps nausea



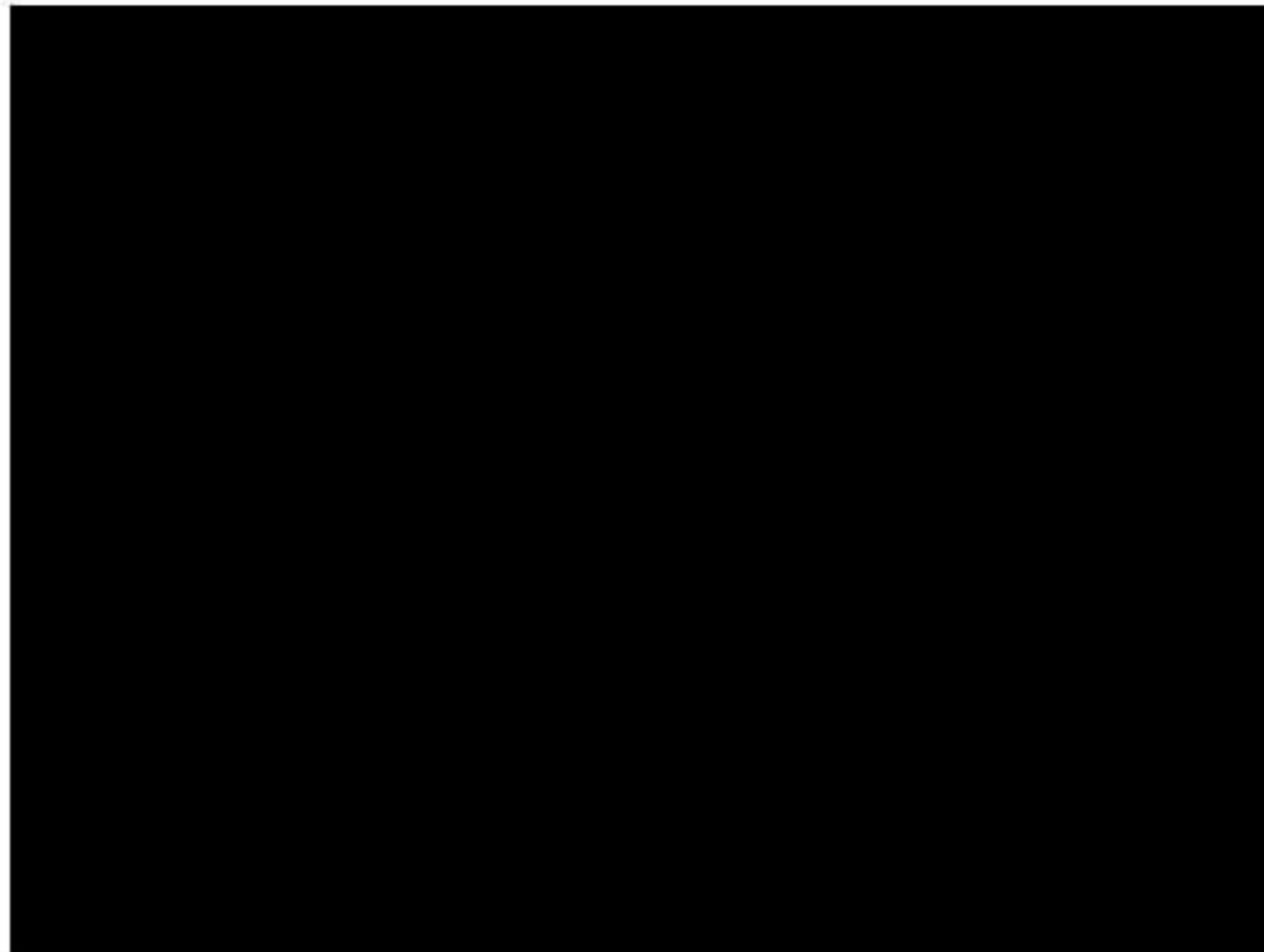
What does taking a risk feel like?

Your pupils dilate allowing you to detect movement better



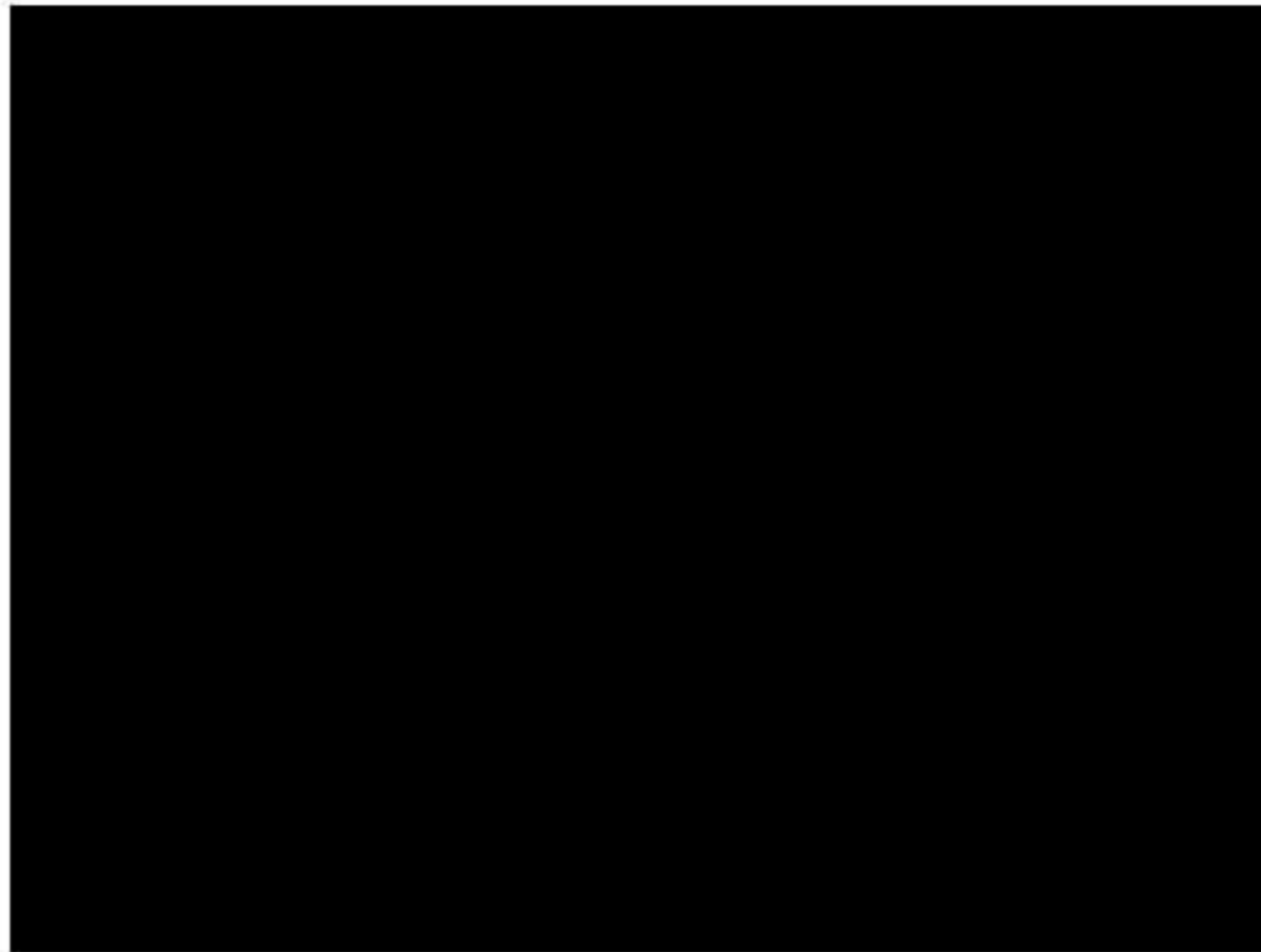
What does taking a risk feel like?

Your immune system fires up in preparation for injury



What does taking a risk feel like?

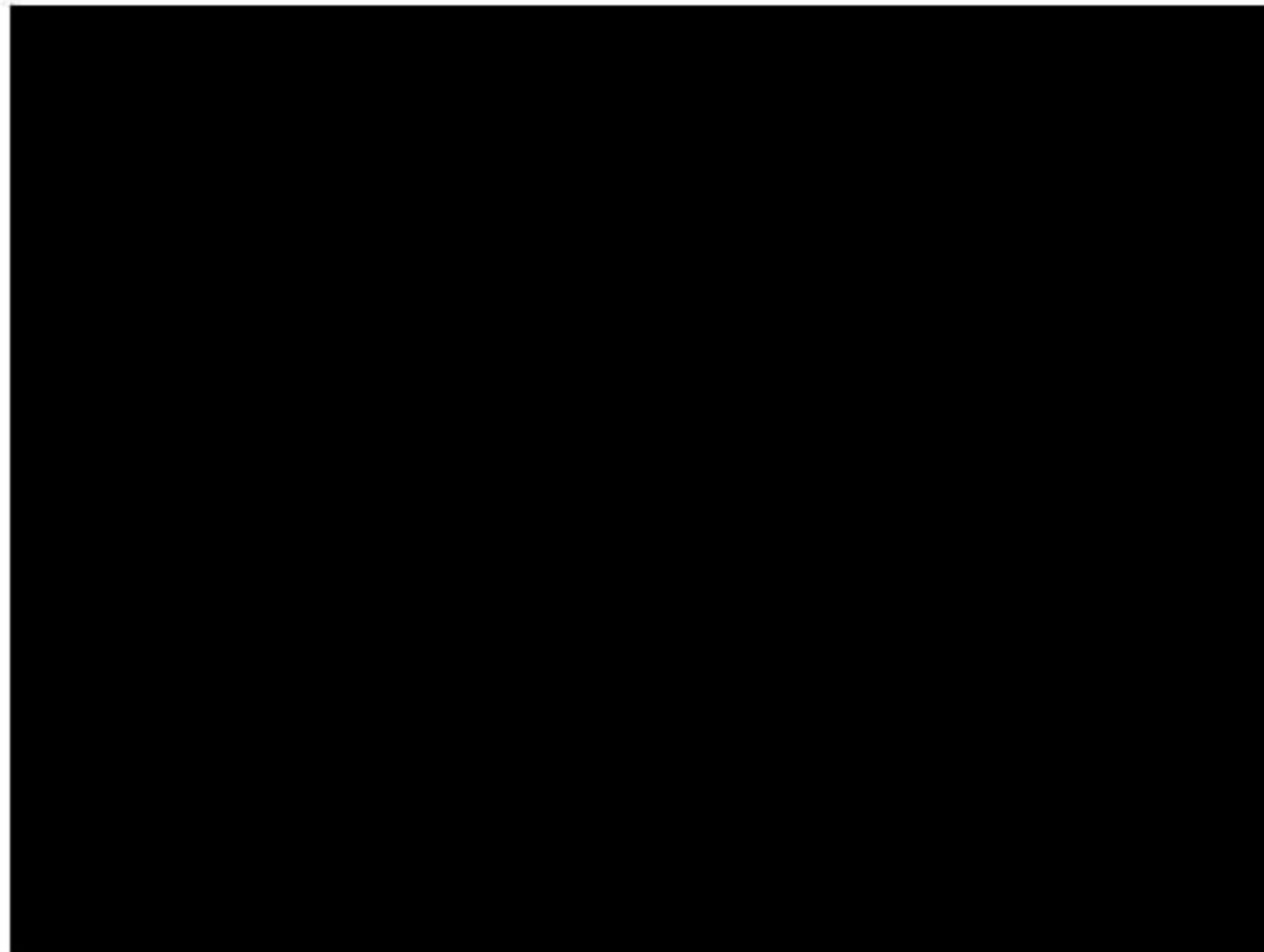
...and you jump shouting with elation...



What does taking a risk feel like?

...and you jump shouting with elation...

...or you don't, and feel anxious and sick



What does taking a risk feel like?

So why do we put ourselves through this at all?

The biology of risk is similar to that for stress, anxiety and fear

The difference is that we choose to do it

What does taking a risk feel like?

We can find it both novel and enjoyable...

...or at least many of us do!

The evolution of risk taking

Our ancestors were big risk takers



The evolution of risk taking

Our ancestors were big risk takers

Hunting had to become a thrill



The evolution of risk taking

Our ancestors were big risk takers

Hunting had to become a thrill

Exploration essential



The evolution of risk taking

Our ancestors were big risk takers

Hunting had to become a thrill

Exploration essential

Ability to dominate by waging war



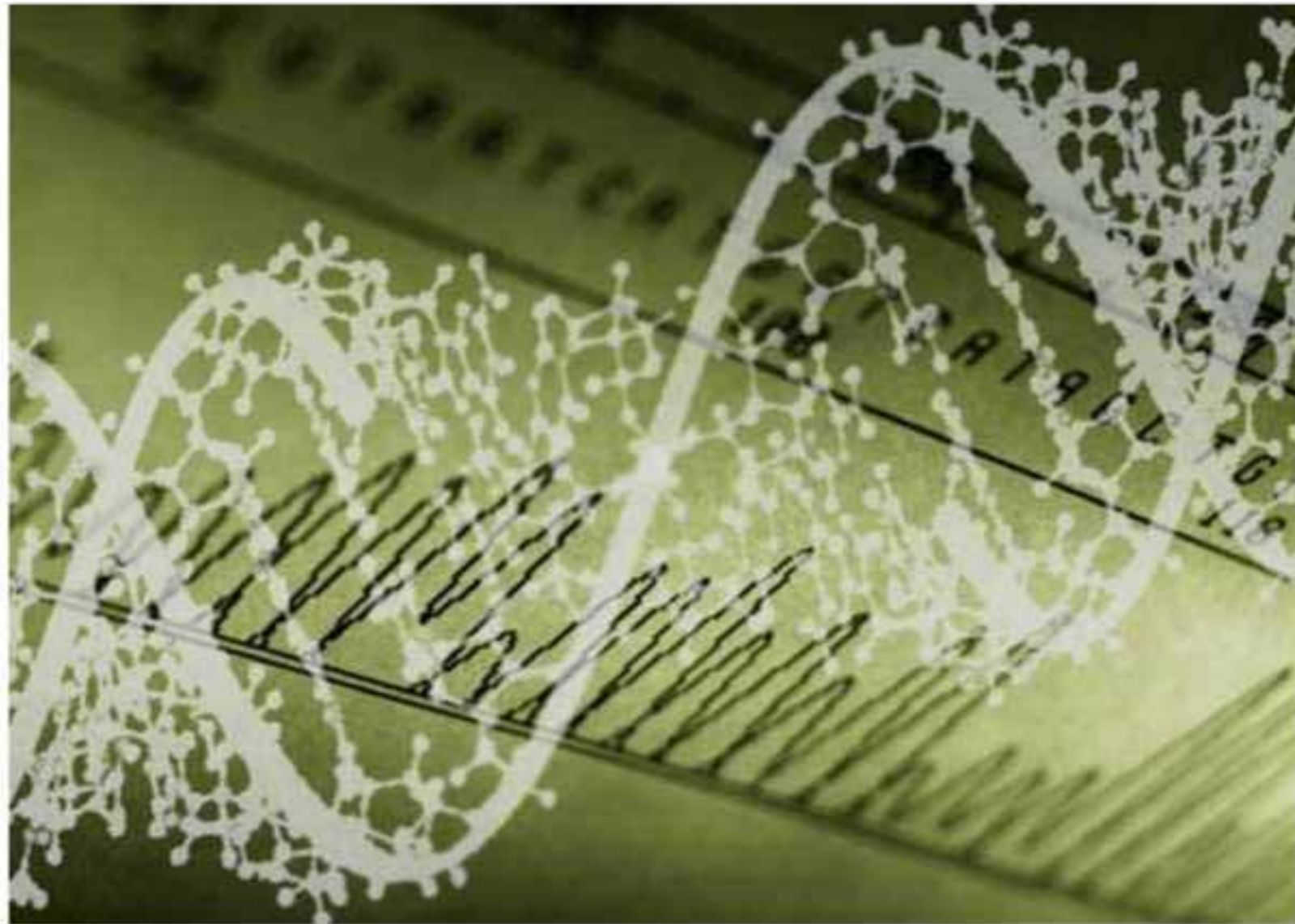
The evolution of risk taking

Humans are greatest risk takers on the planet



The evolution of risk taking

There has to be a strong genetic basis



The evolution of risk taking

There has to be a strong genetic basis

When life has no risks we create them



The evolution of risk taking

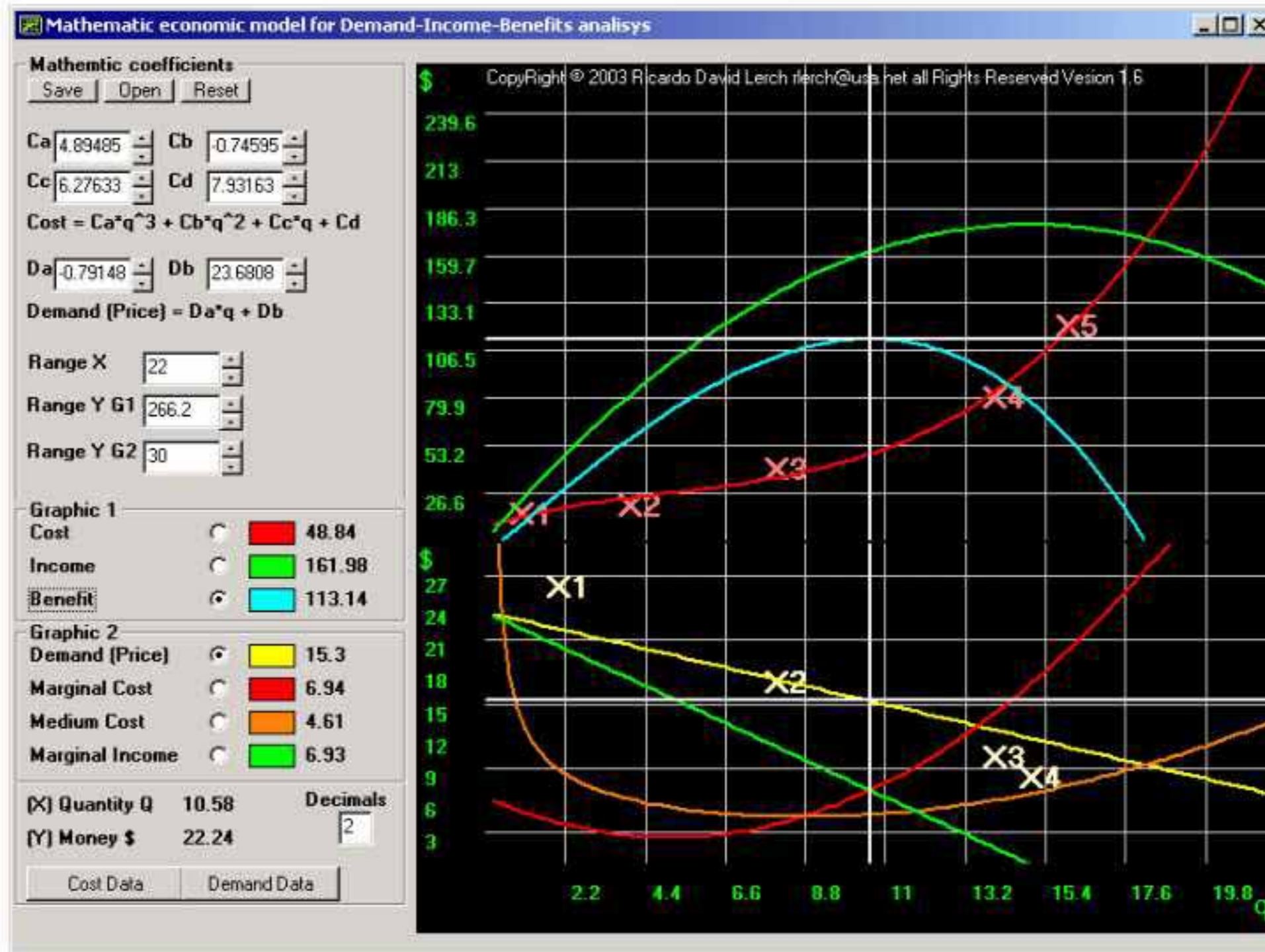
There has to be a strong genetic basis

When life has no risks we create them



The evolution of risk taking

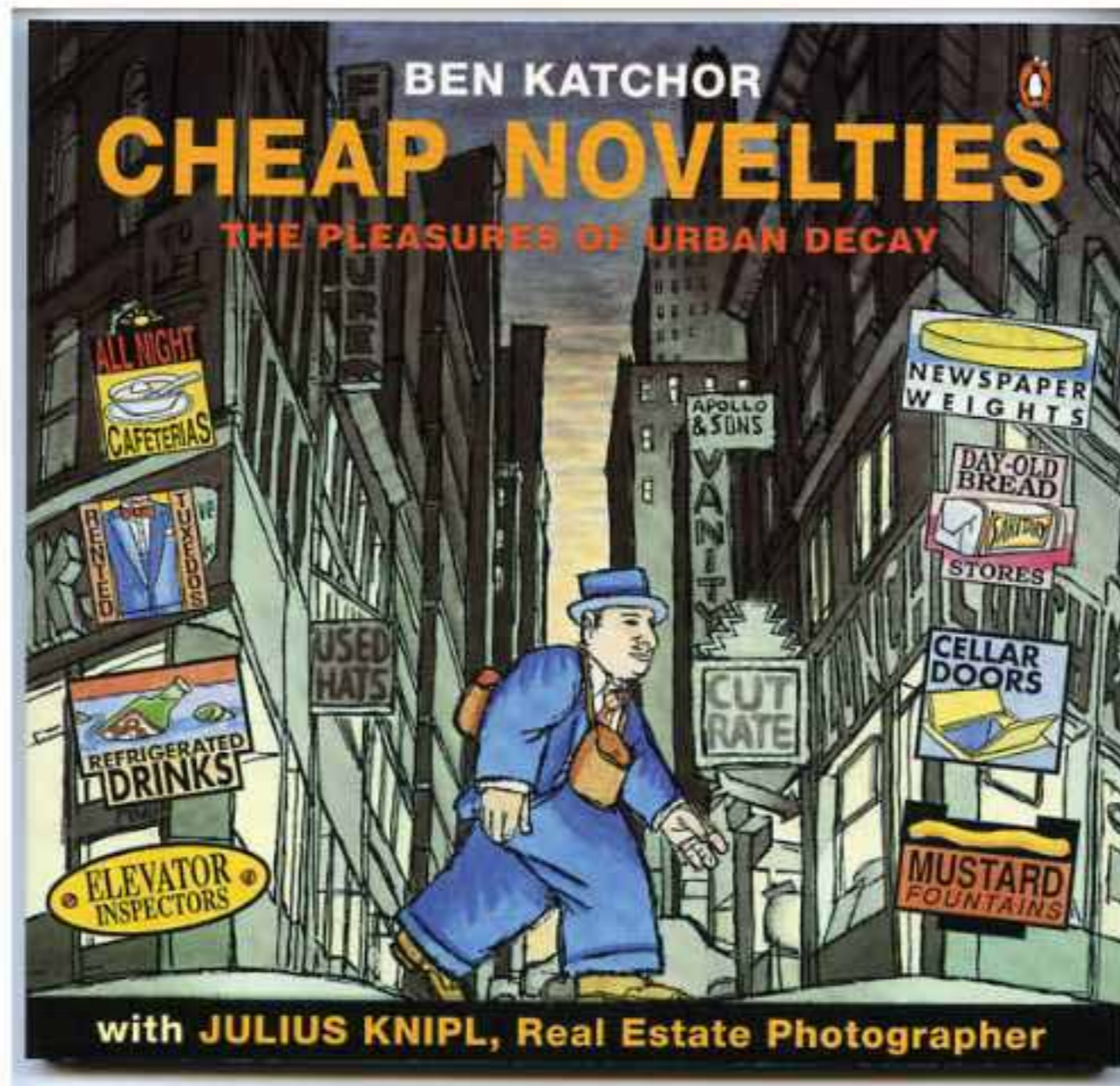
We are experts are cost-benefit analysis



The evolution of risk taking

We are experts are cost-benefit analysis

We are motivated to seek novelty and take risks

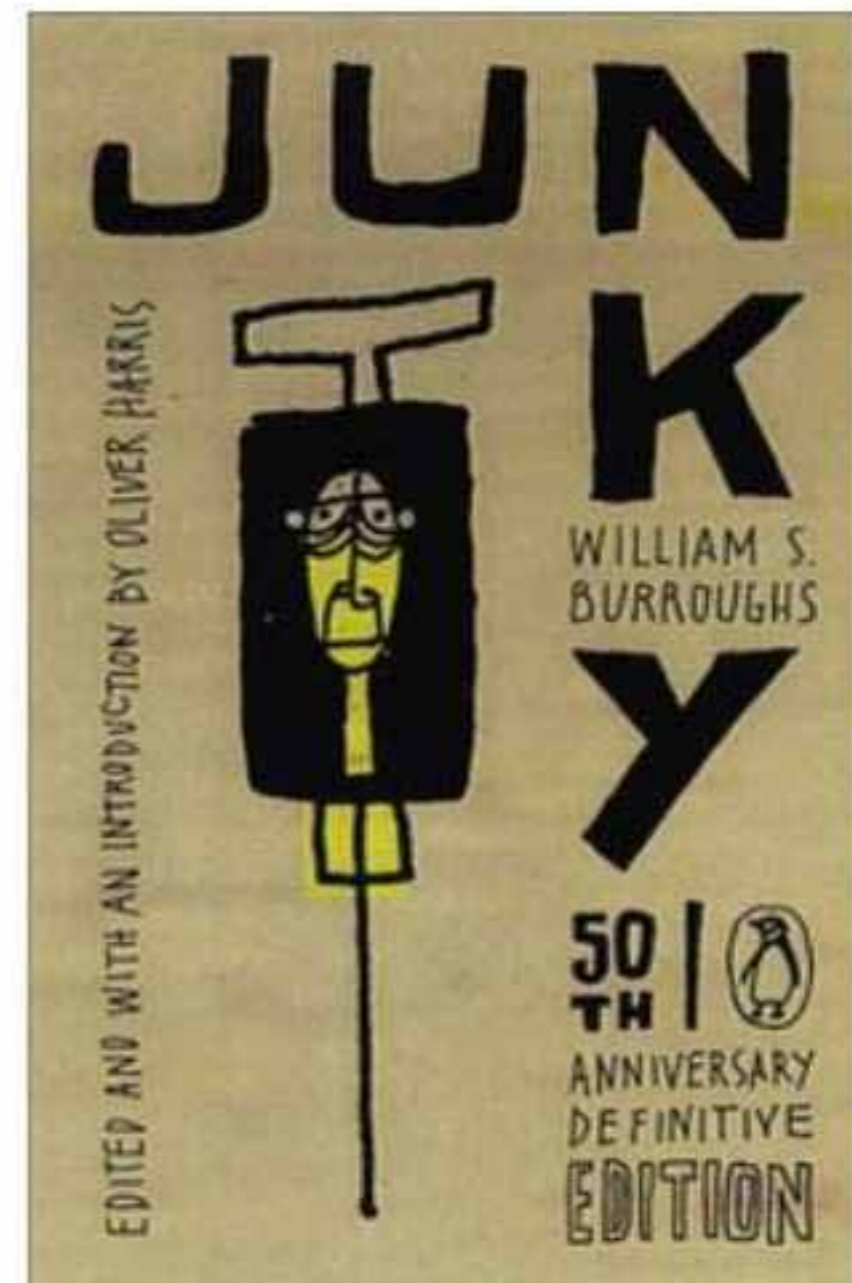


The evolution of risk taking

We are experts are cost-benefit analysis

We are motivated to seek novelty and take risks

But this can lead to addiction



The evolution of risk taking

Risk taking is to help obtain knowledge



[HOME](#)

[ABOUT US](#)

[LECTURES & EVENTS](#)

[PROFESSORS](#)

[MAILING LISTS](#)

[PRESS](#)

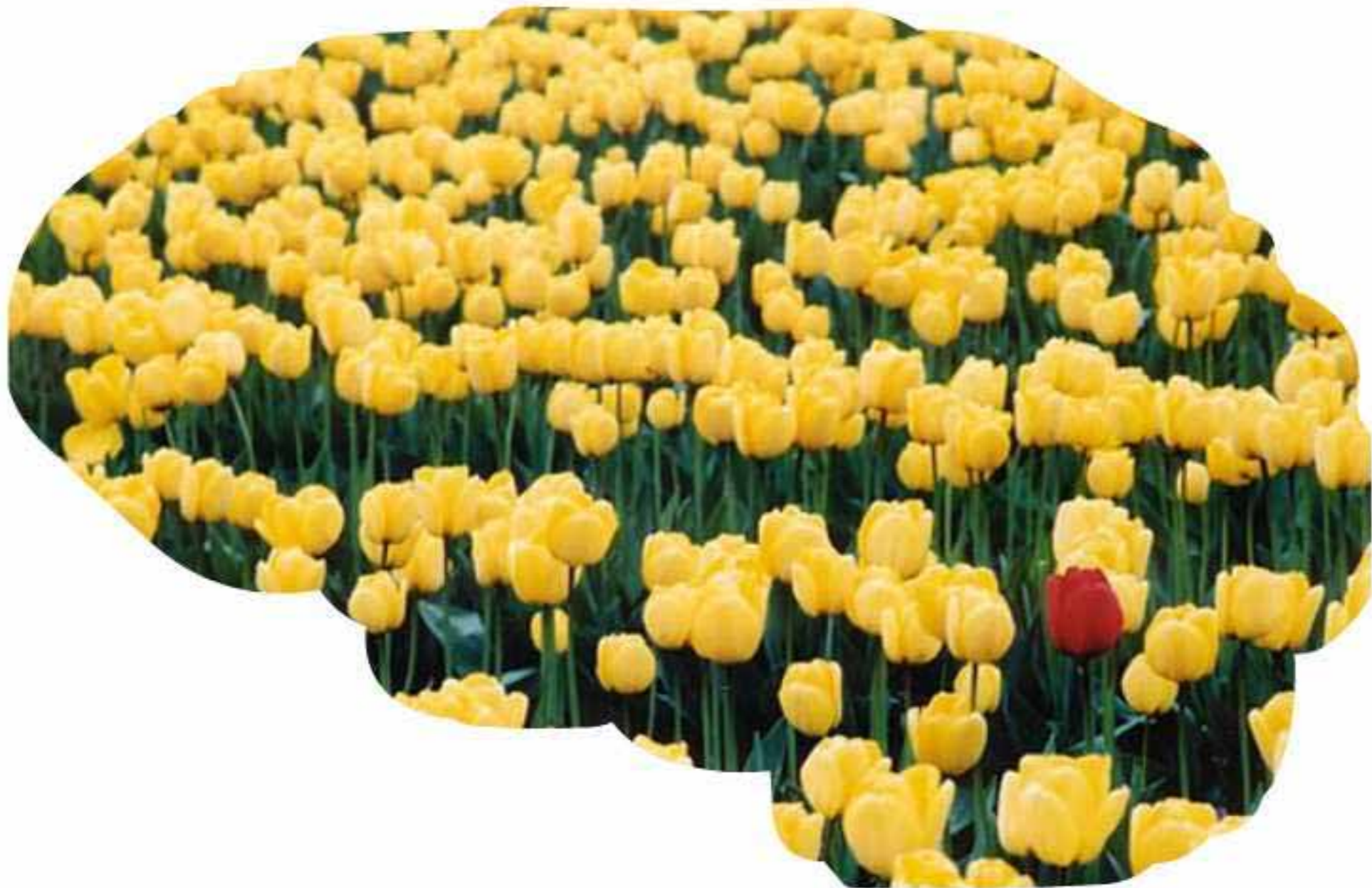
[CONTACT US](#)

Providing free public lectures

The evolution of risk taking

Risk taking is to help obtain knowledge

Our brains respond best to novelty

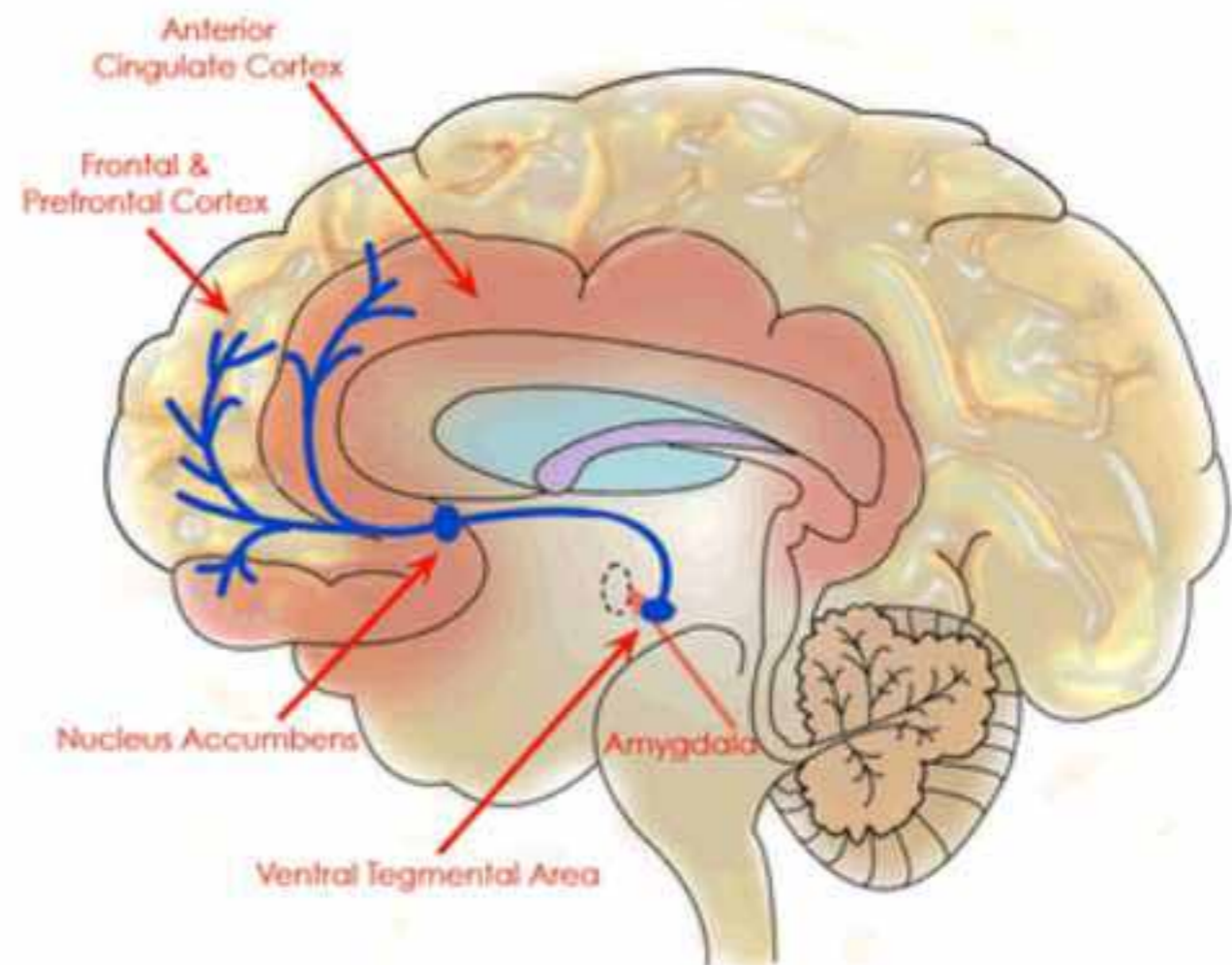


The evolution of risk taking

Risk taking is to help obtain knowledge

Our brains respond best to novelty

It motivates us by giving pleasure



The evolution of risk taking

The Coolidge effect



Revealing the controlling brain:

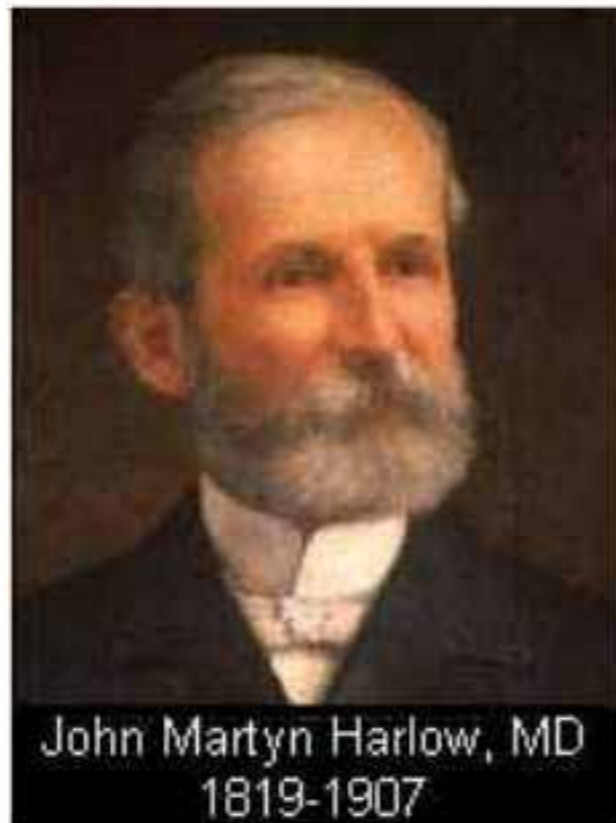
The case of Phineas Gage:



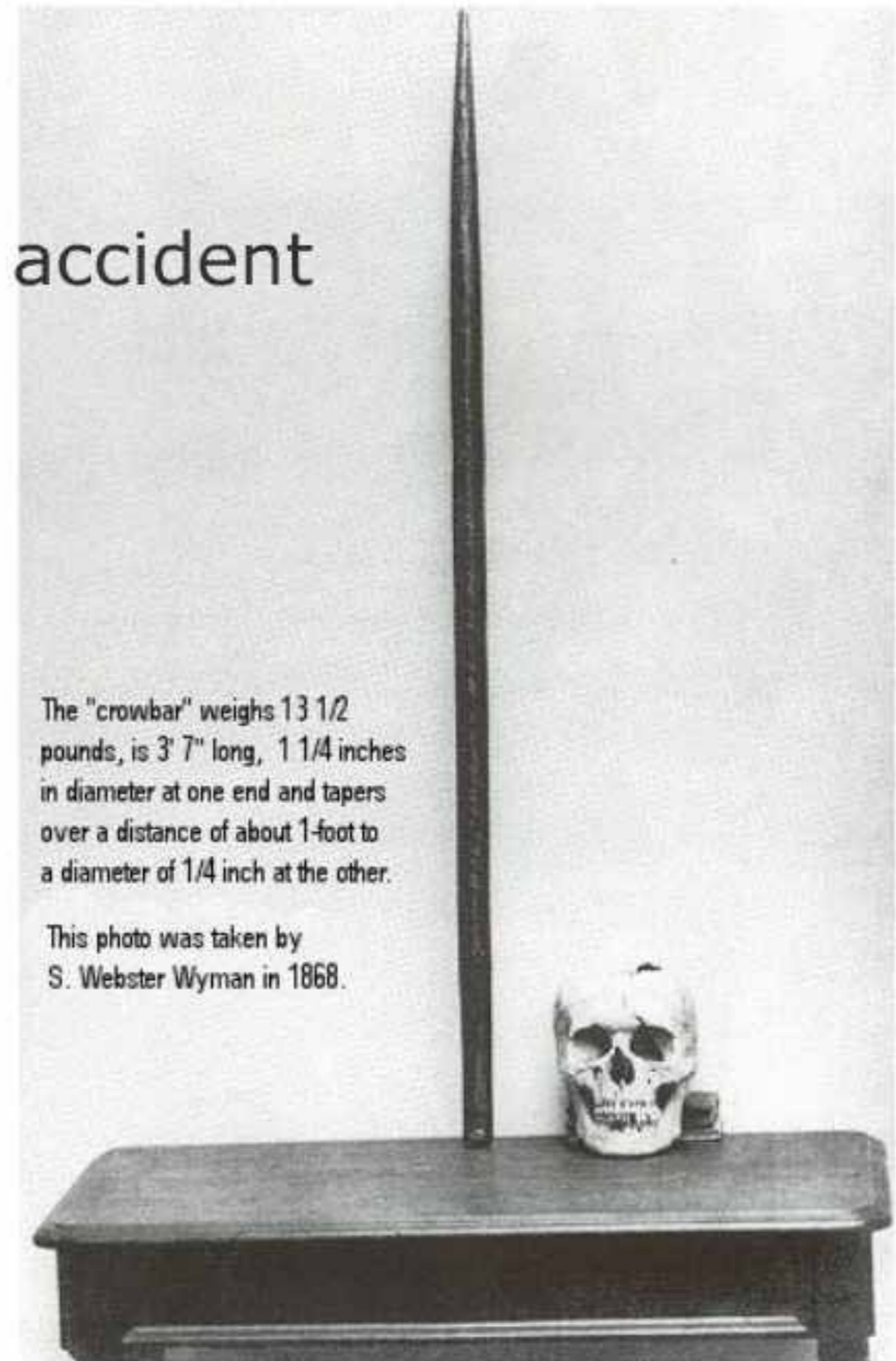
Revealing the controlling brain:

The case of Phineas Gage:

On 13th September 1848 an accident advanced Neuroscience



John Martyn Harlow, MD
1819-1907



The "crowbar" weighs 13 1/2 pounds, is 3' 7" long, 1 1/4 inches in diameter at one end and tapers over a distance of about 1-foot to a diameter of 1/4 inch at the other.

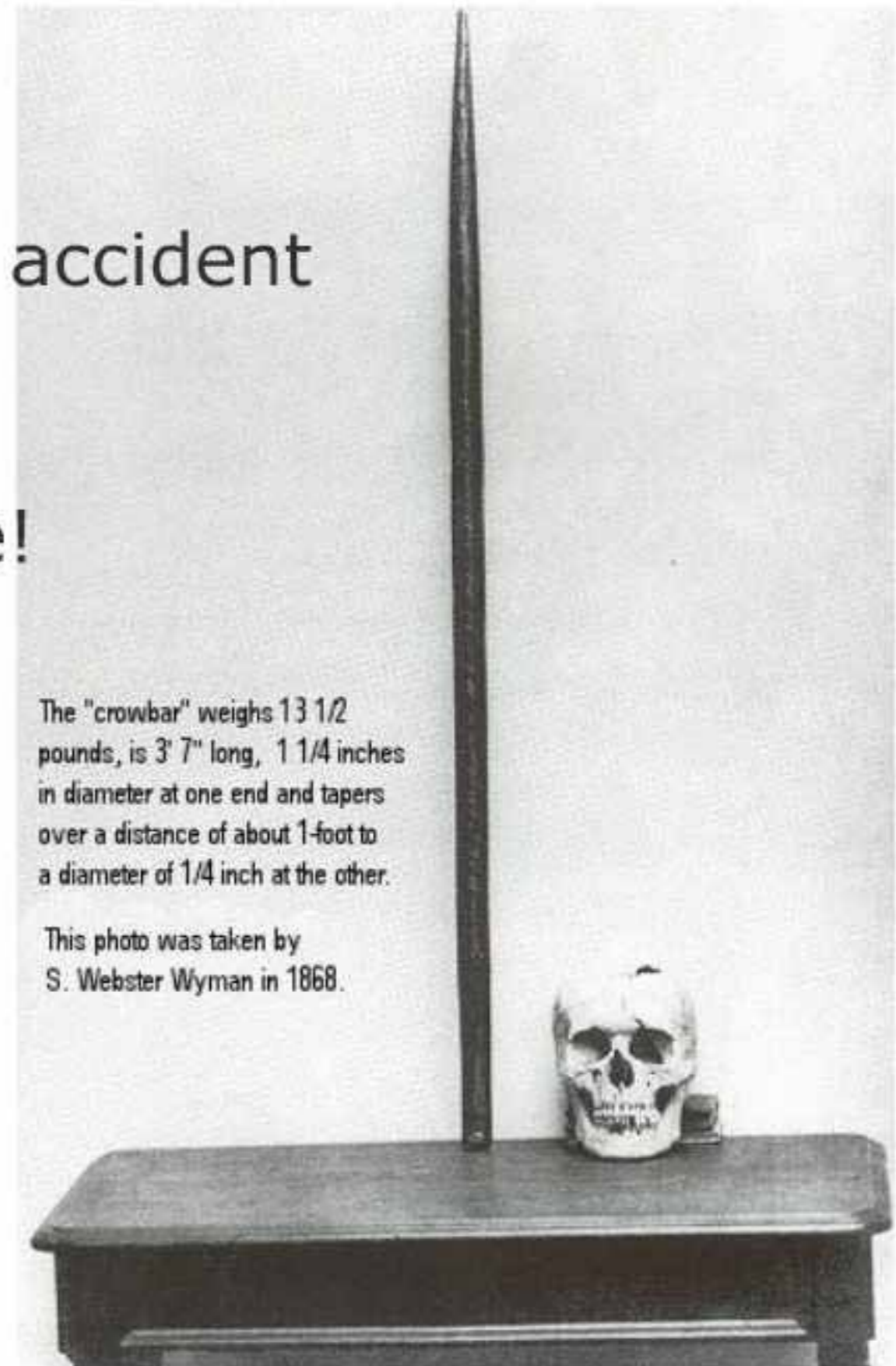
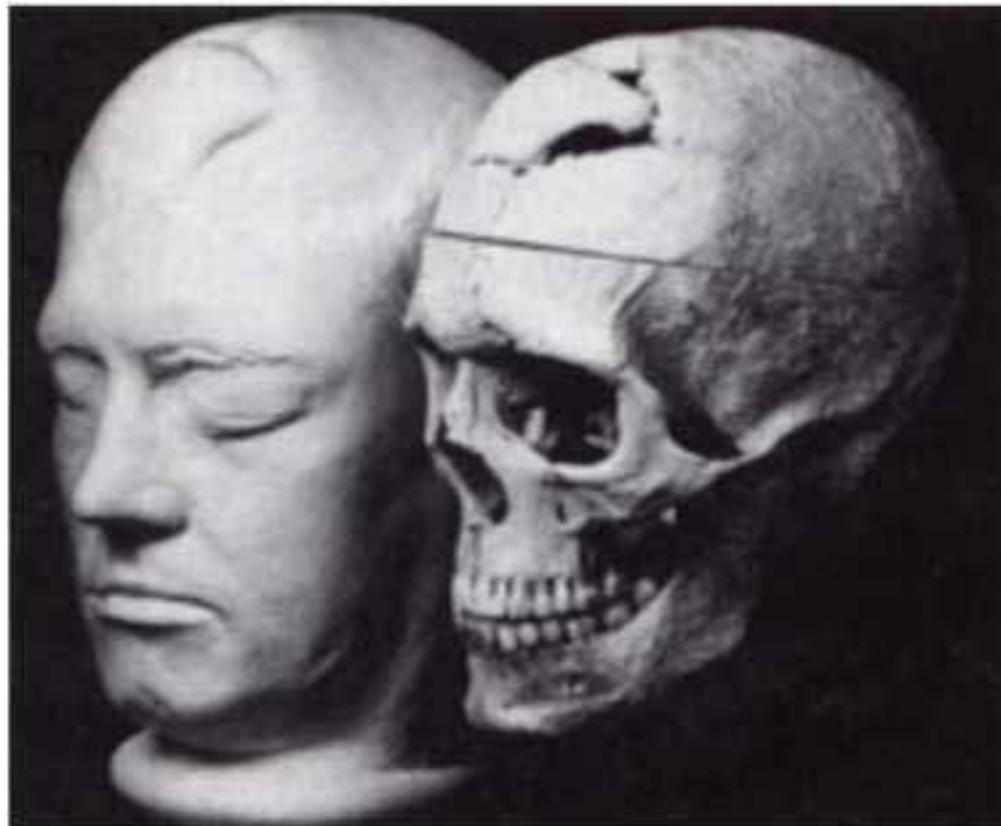
This photo was taken by S. Webster Wyman in 1868.

Revealing the controlling brain:

The case of Phineas Gage:

On 13th September 1848 an accident advanced Neuroscience

Phineas was 'no longer' Gage!

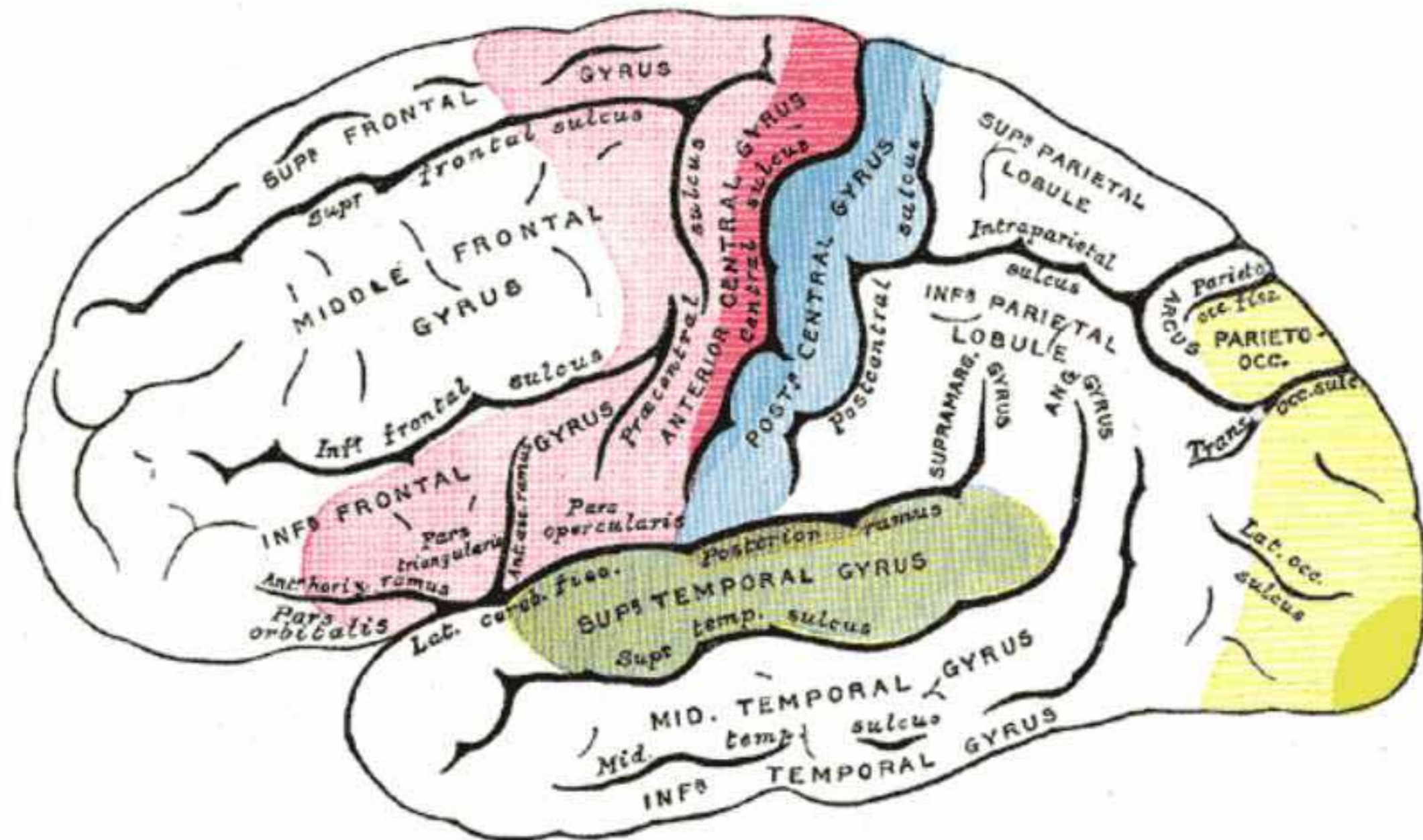


The "crowbar" weighs 13 1/2 pounds, is 3' 7" long, 1 1/4 inches in diameter at one end and tapers over a distance of about 1-foot to a diameter of 1/4 inch at the other.

This photo was taken by S. Webster Wyman in 1868.

Revealing the controlling brain:

The frontal cortex controls impulsive behaviour and aids decision making



Playing for high stakes

How does an occasional flutter turn into pathological gambling?



Playing for high stakes

How does an occasional flutter turn into pathological gambling?

“Well someone’s got to win so why not me?”



Playing for high stakes

How does an occasional flutter turn into pathological gambling?

“Well someone’s got to win so why not me?”

We are willing to accept incredible odds...



Playing for high stakes

How does an occasional flutter turn into pathological gambling?

“Well someone’s got to win so why not me?”

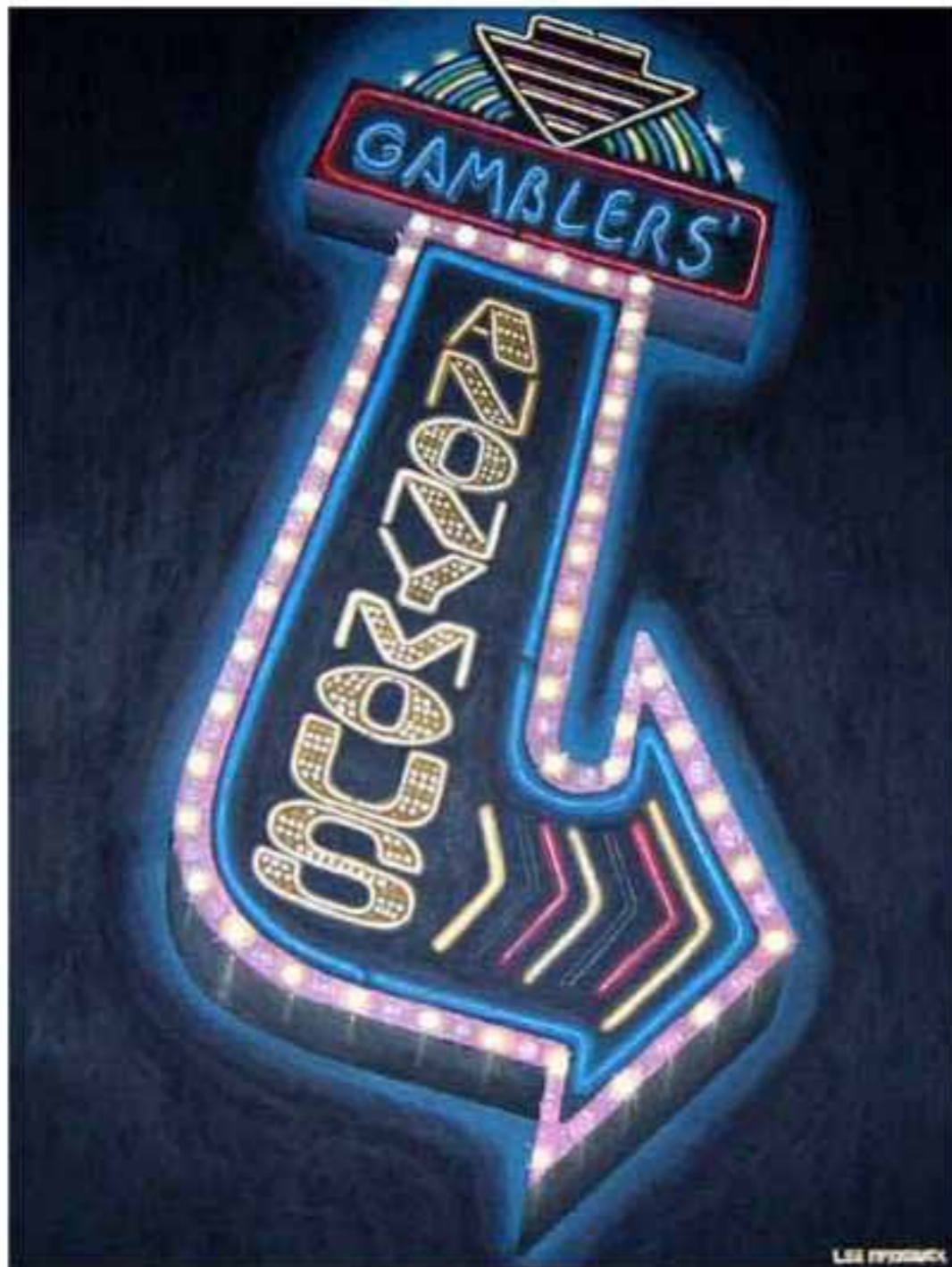
We are willing to accept incredible odds...

...but not when losing is punitive



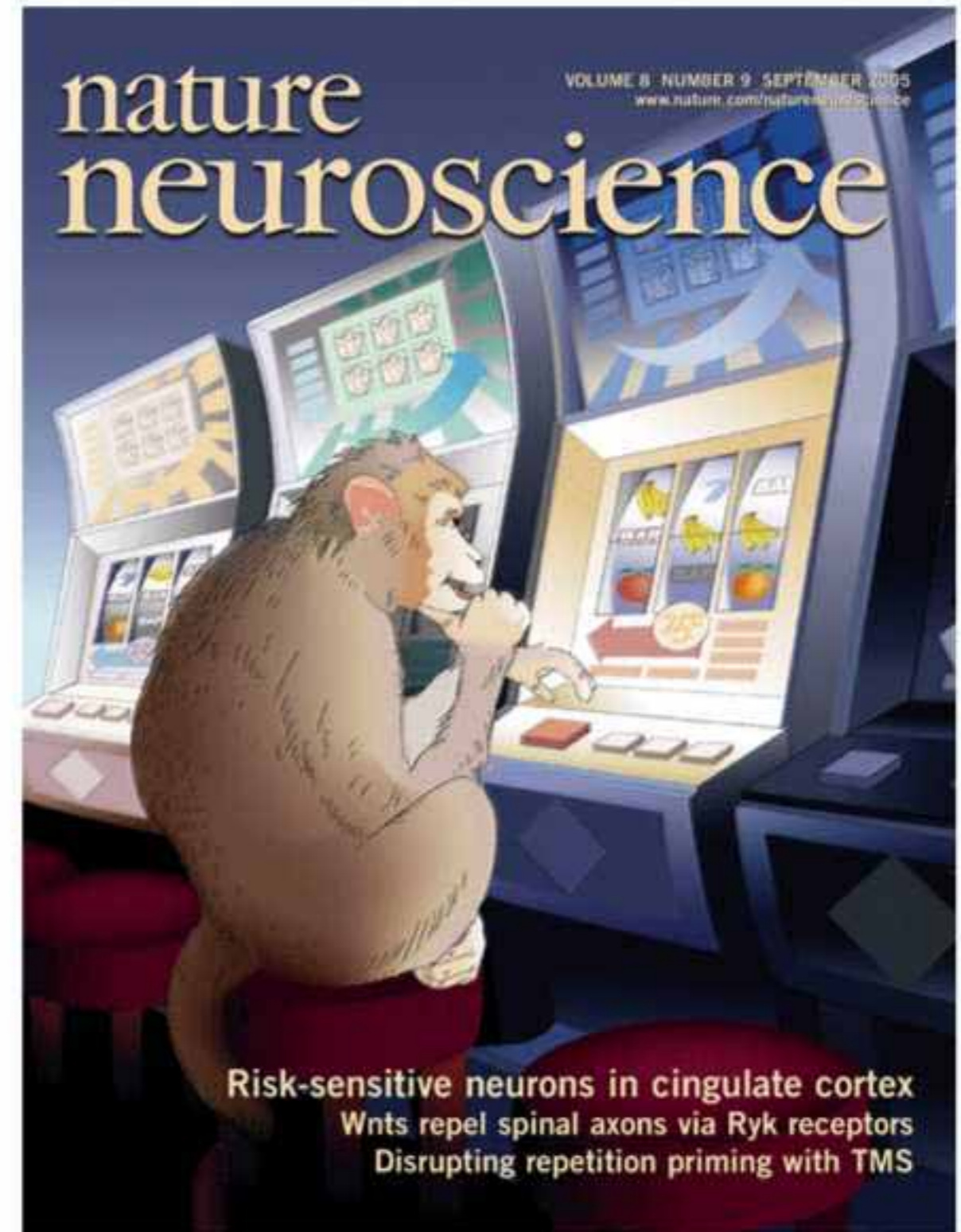
Playing for high stakes

Pathological gamblers see only winning



Playing for high stakes

We and monkeys prefer to risk for big gains
(McCoy and Platt, 2005)



Playing for high stakes

We and monkeys prefer to risk for big gains
(McCoy and Platt, 2005)

Greater anticipation and excitement



**Baring Asset
Management**
Member of ING Group

Playing for high stakes

We and monkeys prefer to risk for big gains
(McCoy and Platt, 2005)

Greater anticipation and excitement

More, smaller prizes in the lottery would not work



Risk taking as a personality trait

The concept of personality traits dates back to the Greeks



Galen



WILLIAM ENGLAND

Risk taking as a personality trait

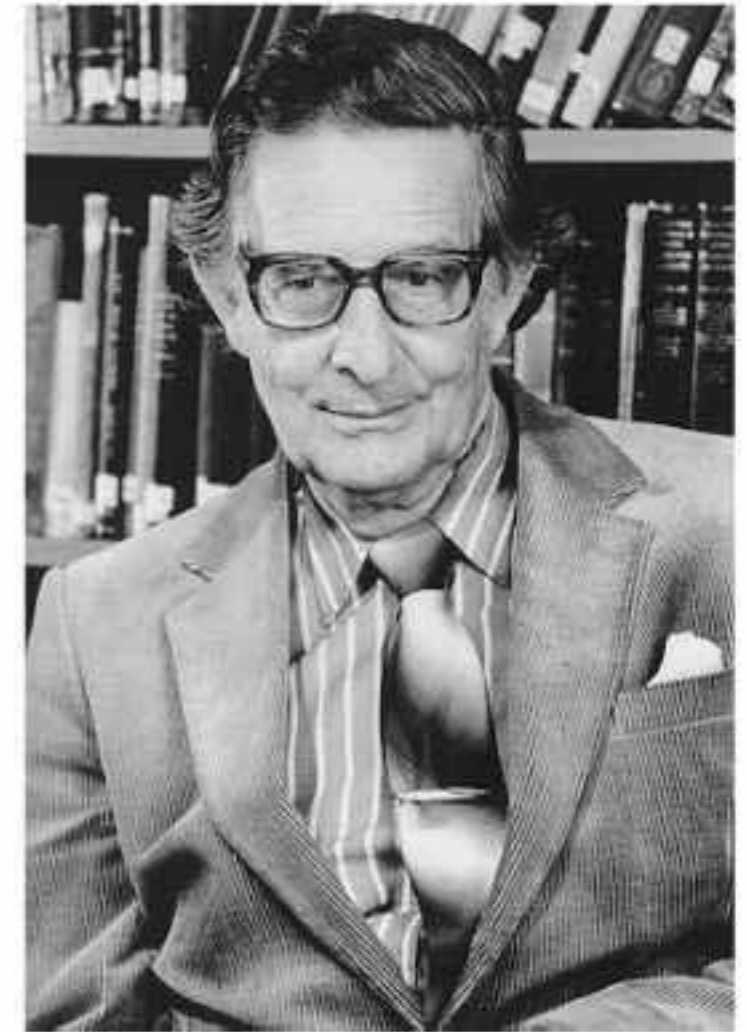
The concept of personality traits dates back to the Greeks

Hans Eysenck

Extraversion vs. introversion

Emotional stability vs. neuroticism

Psychoticism vs. humaneness



Risk taking as a personality trait

Costa and McCrae

Openness to experience

Agreeableness

Conscientiousness



Risk taking as a personality trait

These traits are 30-50% genetically determined



Risk taking as a personality trait

Risk-taking (or sensation-seeking) personality

Pursuit of novel, intense and complex sensations and experiences and the willingness to take risks for the sake of such experience

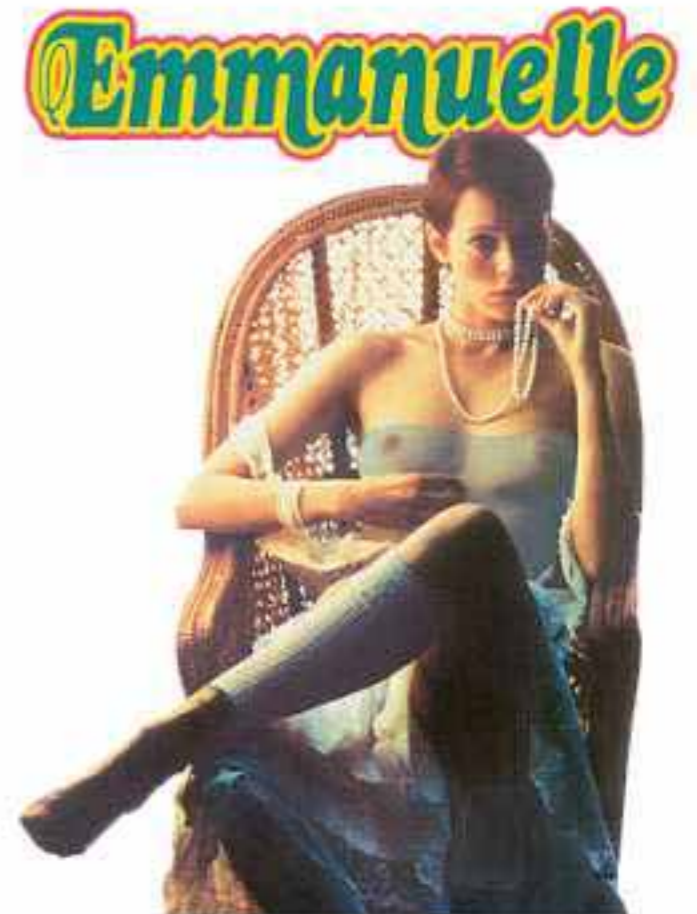
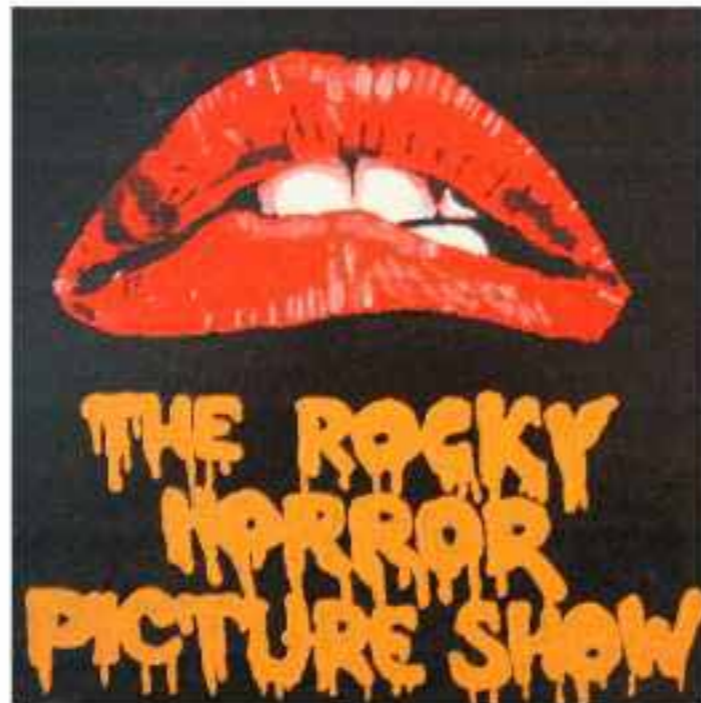
“Risk taking is not the main point of sensation seeking behaviour but the price you pay for engaging in activities that satisfy the need for novelty, change and excitement”



Zuckerman

Risk taking as a personality trait

Not everything sensation-seekers do is risky



Risk taking as a personality trait

There are four sub-divisions:

Sensation-seeking in extreme physical sports
(thrill and adventure)



Risk taking as a personality trait

There are four sub-divisions:

Sensation-seeking in extreme physical sports
(thrill and adventure)

Casting off inhibitions
in a social setting
(disinhibition)



Risk taking as a personality trait

There are four sub-divisions:

Sensation-seeking in extreme physical sports
(thrill and adventure)

Casting off inhibitions
in a social setting
(disinhibition)

Deviant lifestyles
(experience-seeking)



Risk taking as a personality trait

There are four sub-divisions:

Sensation-seeking in extreme physical sports
(thrill and adventure)

Casting off inhibitions
in a social setting
(disinhibition)

Deviant lifestyles
(experience-seeking)

Pursuit of change for change's sake
(boredom susceptibility)



Risk taking as a personality trait

How are these related to six high-risk activities?

Smoking



Risk taking as a personality trait

How are these related to six high-risk activities?

Smoking

Drinking alcohol



Risk taking as a personality trait

How are these related to six high-risk activities?

Smoking

Drinking alcohol

Taking drugs of abuse



Risk taking as a personality trait

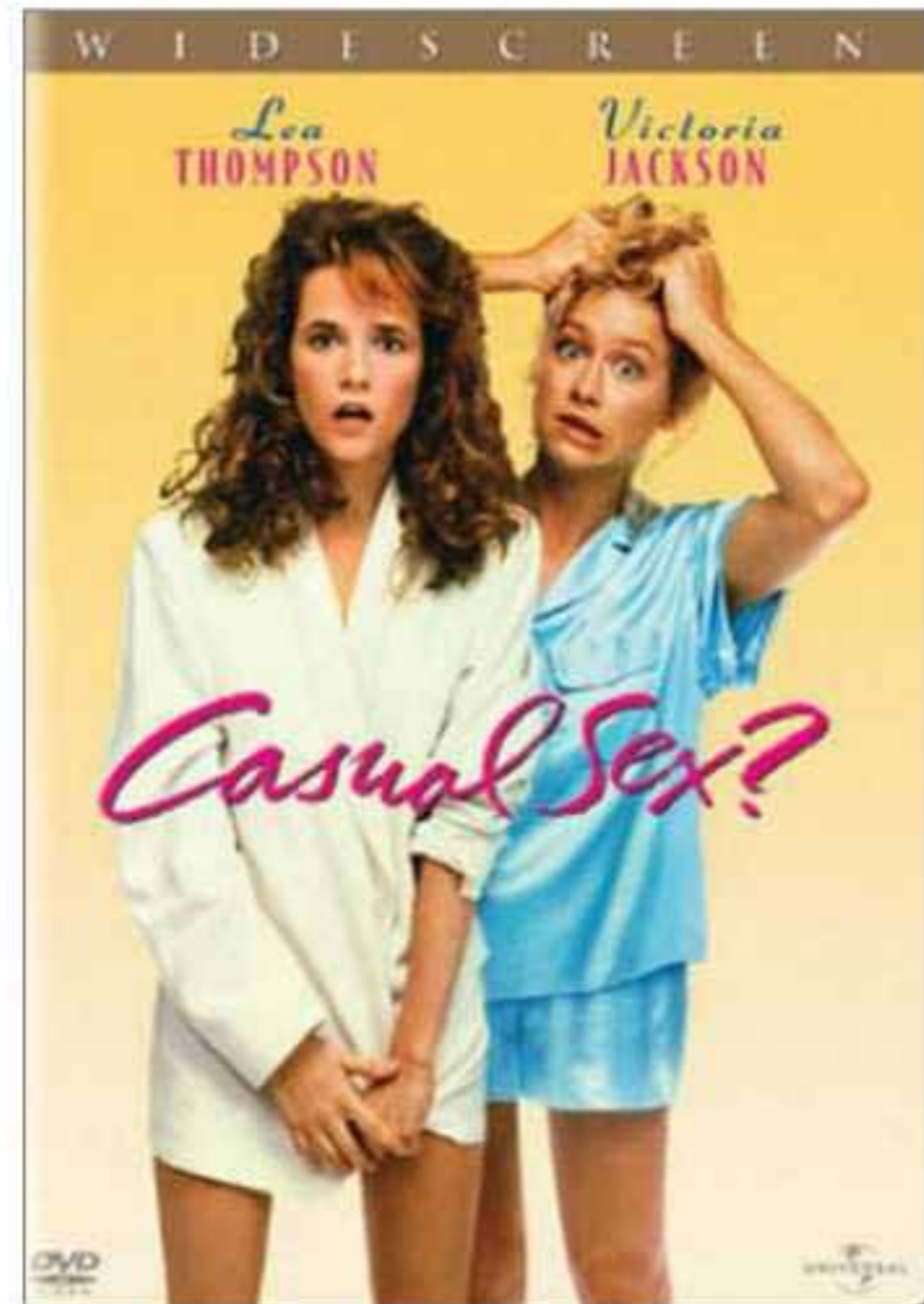
How are these related to six high-risk activities?

Smoking

Drinking alcohol

Taking drugs of abuse

Having unsafe sex



Risk taking as a personality trait

How are these related to six high-risk activities?

Smoking

Drinking alcohol

Taking drugs of abuse

Having unsafe sex

Reckless driving



Risk taking as a personality trait

How are these related to six high-risk activities?

Smoking

Drinking alcohol

Taking drugs of abuse

Having unsafe sex

Reckless driving

Gambling



Risk taking as a personality trait

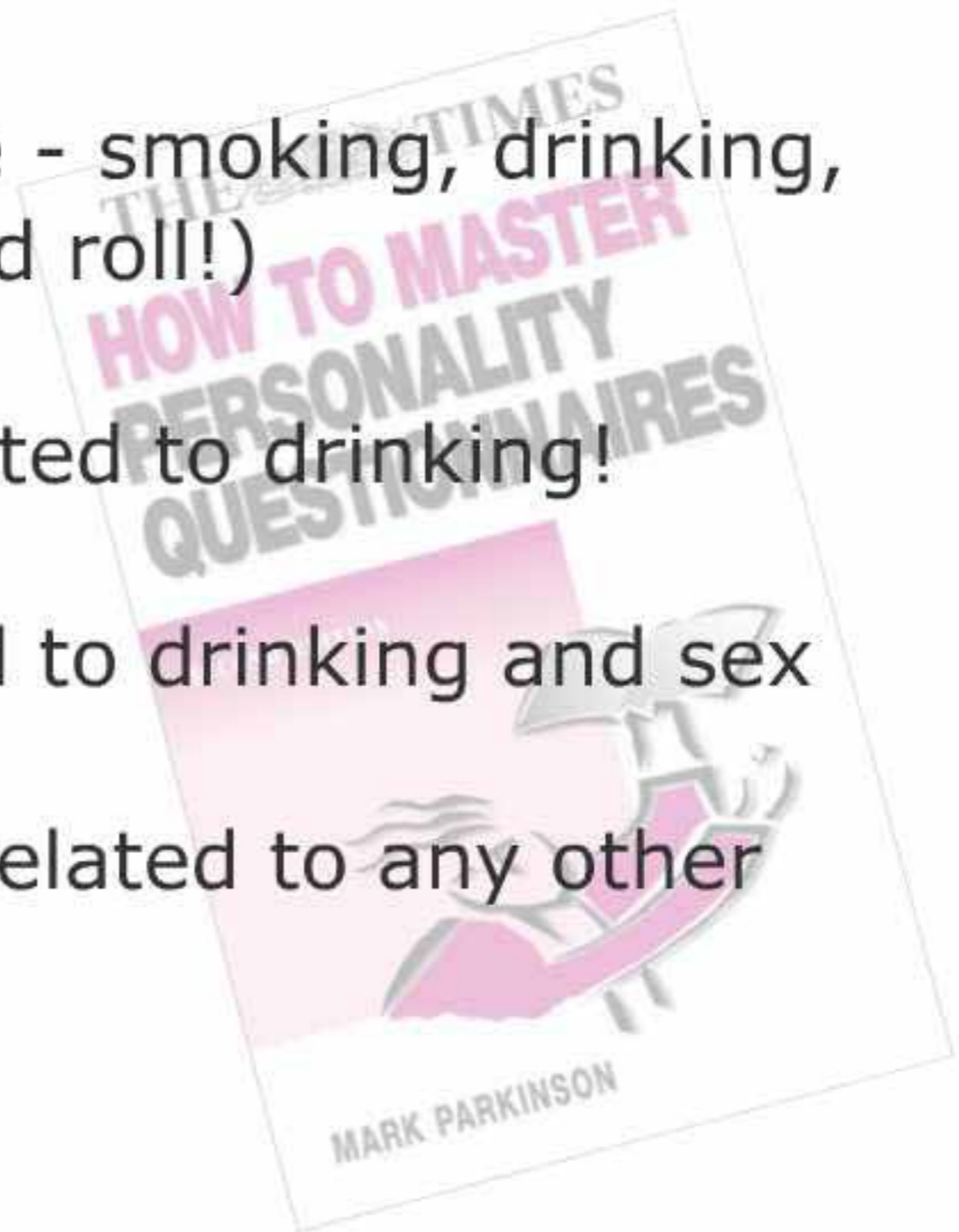
Zuckerman-Kuhlman Personality Questionnaire (ZKPQ)

High degree of concordance - smoking, drinking, sex and drugs (and rock and roll!)

Reckless driving is only related to drinking!

For men gambling is related to drinking and sex

In women gambling is not related to any other form of risk-taking



Risk taking as a personality trait

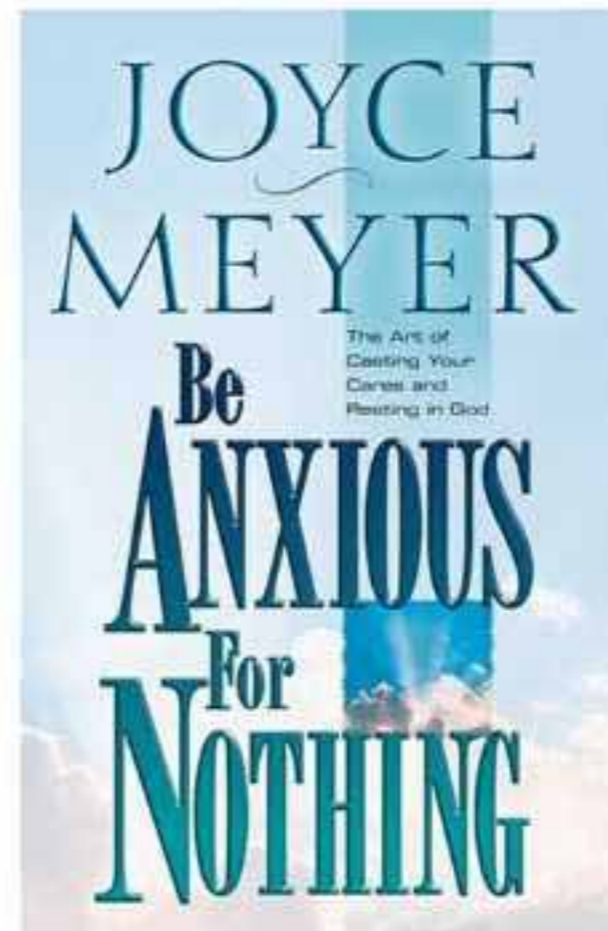
People who take risks score high on impulsive sensation-seeking, aggression hostility and sociability personality traits



Risk taking as a personality trait

People who take risks score high on impulsive sensation-seeking, aggression hostility and sociability personality traits

There is no relationship to neuroticism/anxiety



Risk taking as a personality trait

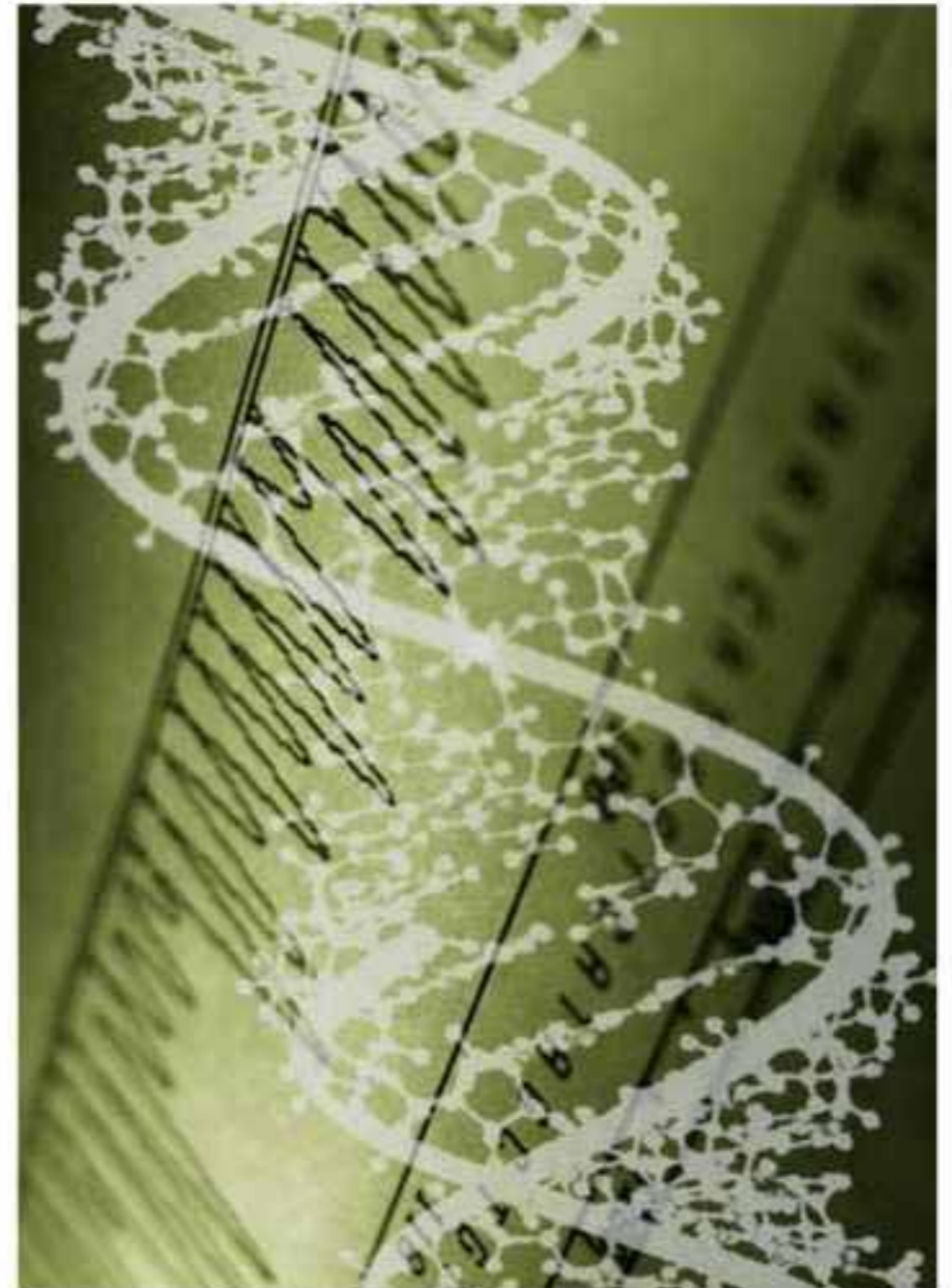
Men are higher risk takers than women due to impulsive sensation-seeking



Risk taking as a personality trait

Men are higher risk takers than women due to impulsive sensation-seeking

Risk taking personality has a 60% genetic contribution



Risk taking as a personality trait

Men are higher risk takers than women due to impulsive sensation-seeking

Risk taking personality has a 60% genetic contribution

40% experience is due mainly to factors outside the family environment



Male and female gamblers - the differences

Men prefer fast action and competitive games with strategic skill



Male and female gamblers - the differences

Men prefer fast action and competitive games with strategic skill

Beating other players is very important



Male and female gamblers - the differences

Men prefer fast action and competitive games with strategic skill

Beating other players is very important

With young men it is more about self-esteem and recognition than money



Male and female gamblers - the differences

Women prioritise gambling in social situations...



Male and female gamblers - the differences

Women prioritise gambling in social situations...

...and don't tend to boast about their winnings to their fellow gamblers



How do we assess risk?

The somatic marker hypothesis



Update

TRENDS in Cognitive Sciences Vol.9 No.4 April 2005

Full text provided by www.sciencedirect.com

SCIENCE @ DIRECT®

Research Focus

The Iowa Gambling Task and the somatic marker hypothesis: some questions and answers

A. Bechara, H. Damasio, D. Tranel and A.R. Damasio

Department of Neurology (Division of Cognitive Neuroscience), University of Iowa College of Medicine, Iowa, USA

How do we assess risk?

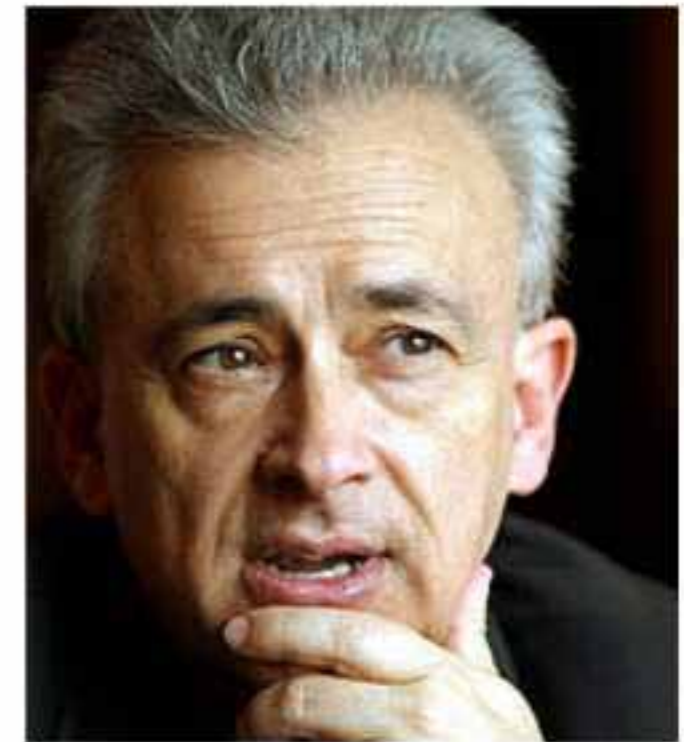
The somatic marker hypothesis

The body's response to the stress, anxiety of risk provides an automatic feedback

Antonio Damasio, University of Iowa

The Iowa Gambling Task

	"Bad" decks		"Good" decks	
	A	B	C	D
Gain per card	\$100	\$100	\$50	\$50
Loss per 10 cards	\$1250	\$1250	\$250	\$250
Net per 10 cards	-\$250	-\$250	+\$250	+\$250



How do we assess risk?

The somatic marker hypothesis

The brain's cognitive centres may compute risk independently

Maia & McClelland, 2005

Research Focus Response

The somatic marker hypothesis: still many questions but no answers

Response to Bechara et al.

Tiago V. Maia¹ and James L. McClelland^{1,2}

¹Department of Psychology, Carnegie Mellon University, 5000 Forbes Avenue, Pittsburgh, Pennsylvania 15213, USA

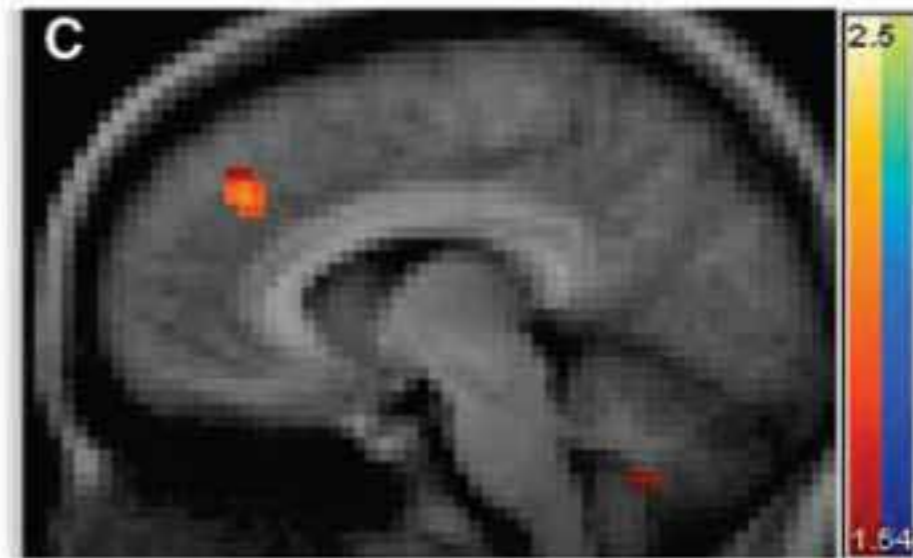
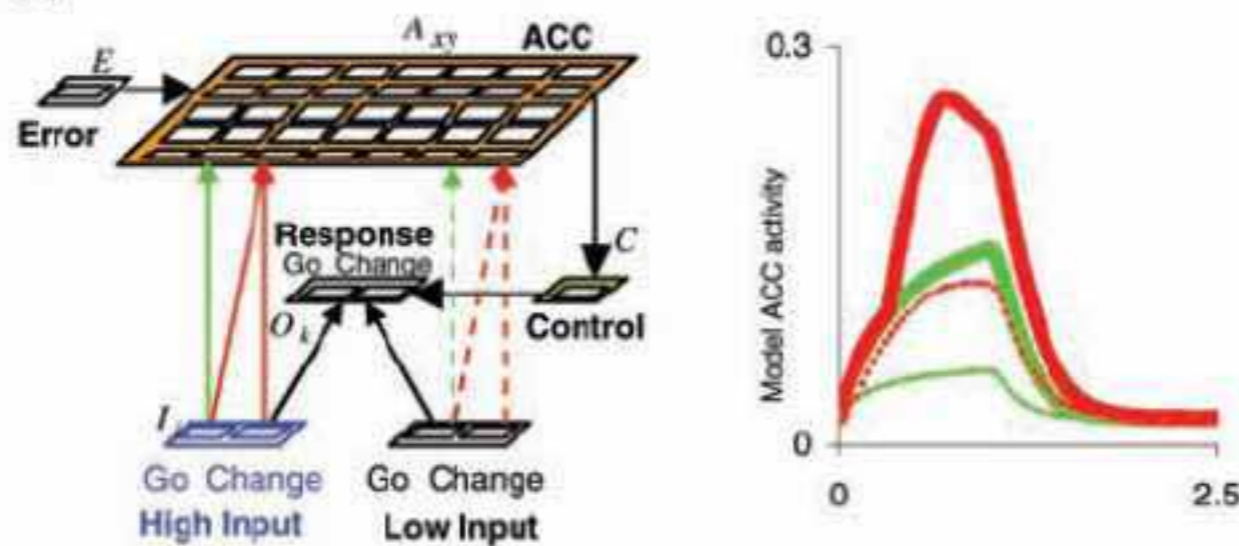
²Center for the Neural Basis of Cognition, Carnegie Mellon University, 115 Mellon Institute, 4400 Fifth Avenue, Pittsburgh, Pennsylvania 15213, USA

An 'Oops' centre in the brain?

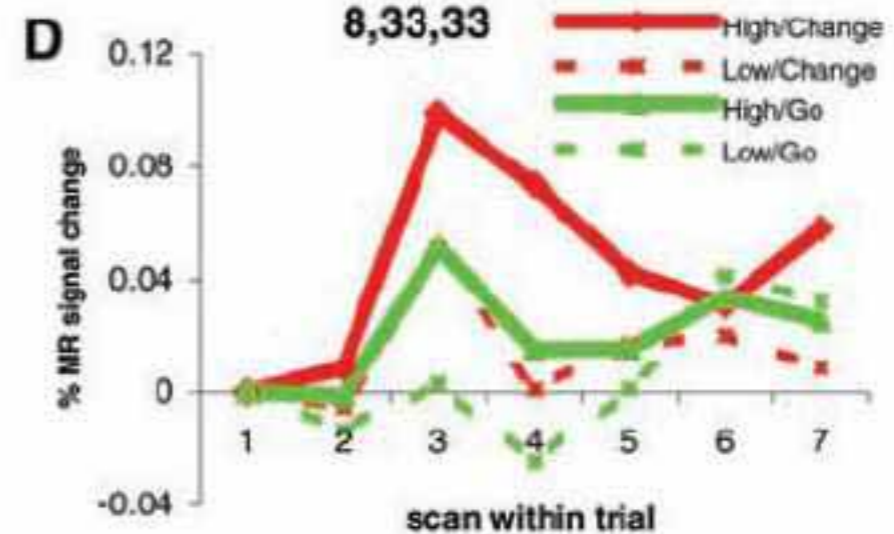
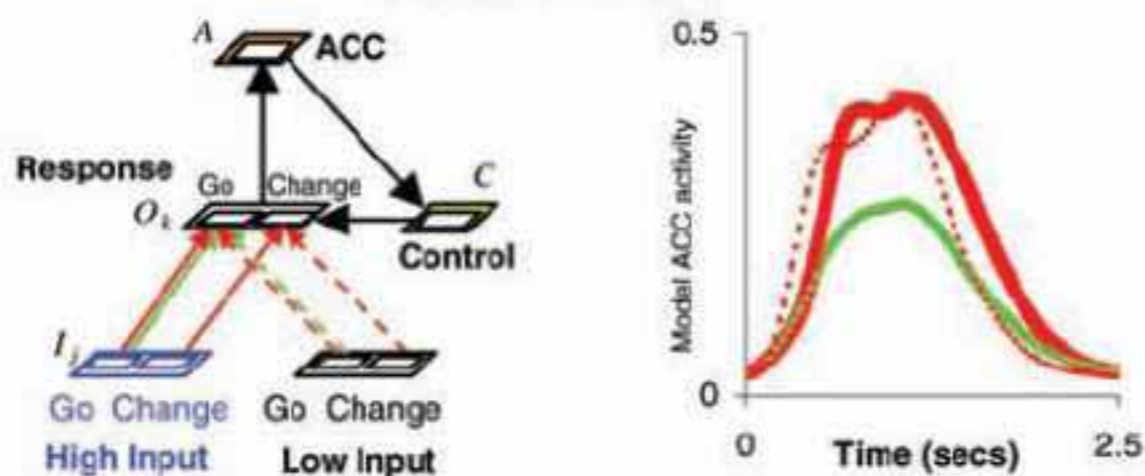
Cingulate cortex networks learn to predict mistakes accurately

Brown & Braver, 2005

A Error-Likelihood Model



B Conflict Model



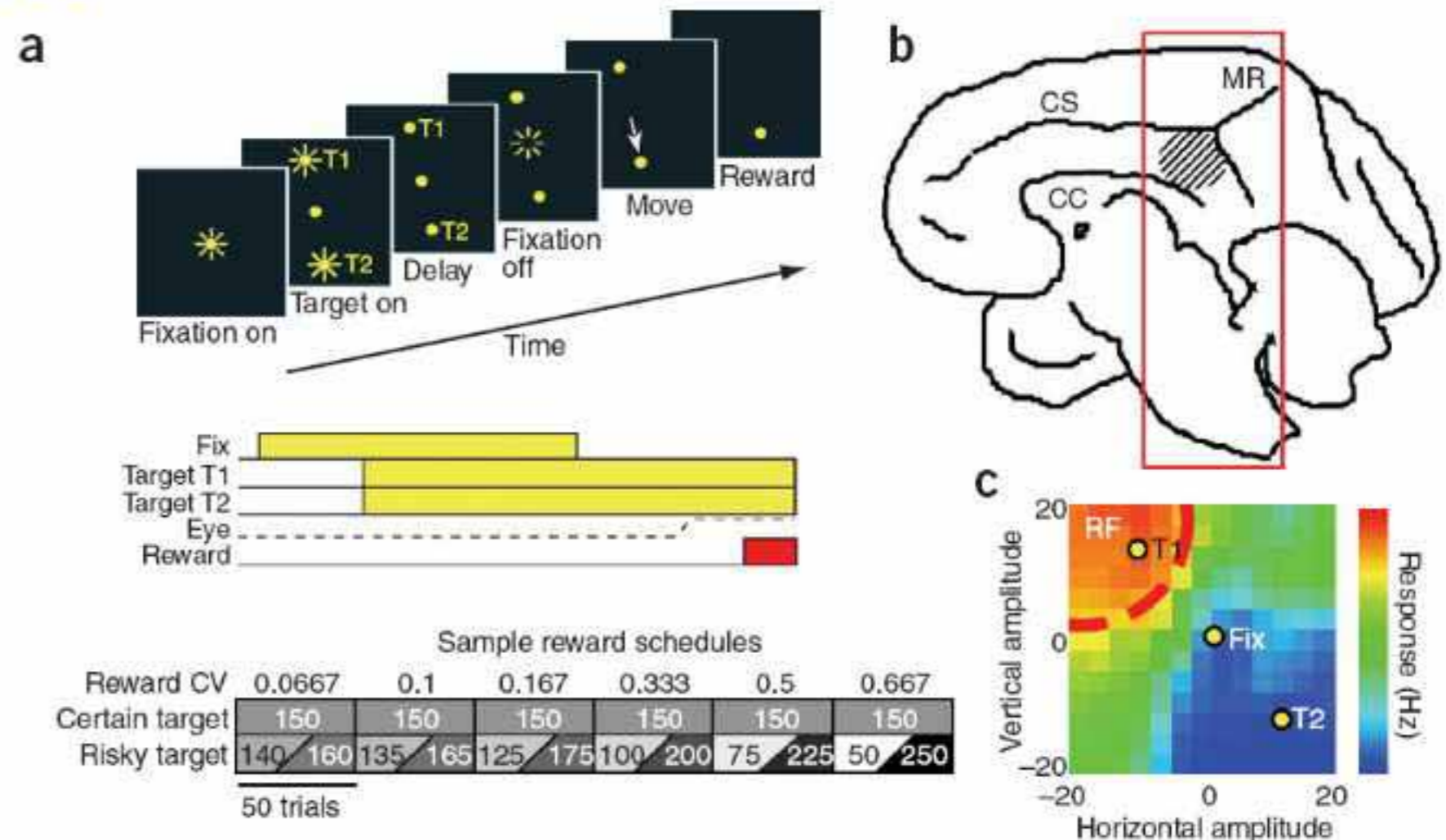
An 'Oops' centre in the brain?

Cingulate cortex networks learn to predict mistakes accurately

Brown & Braver, 2005

Also compute the level of risk in gambling tasks

McCoy & Platt, 2005



Emotional control and computing reward

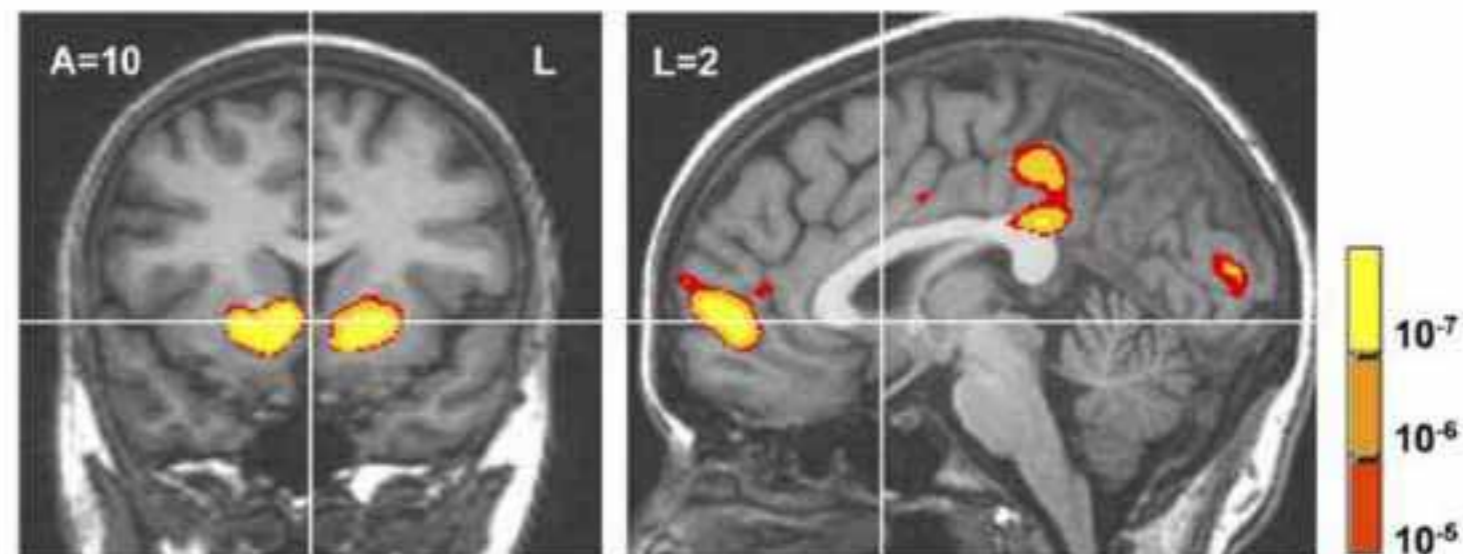
Why can this go wrong?

Emotional control and computing reward

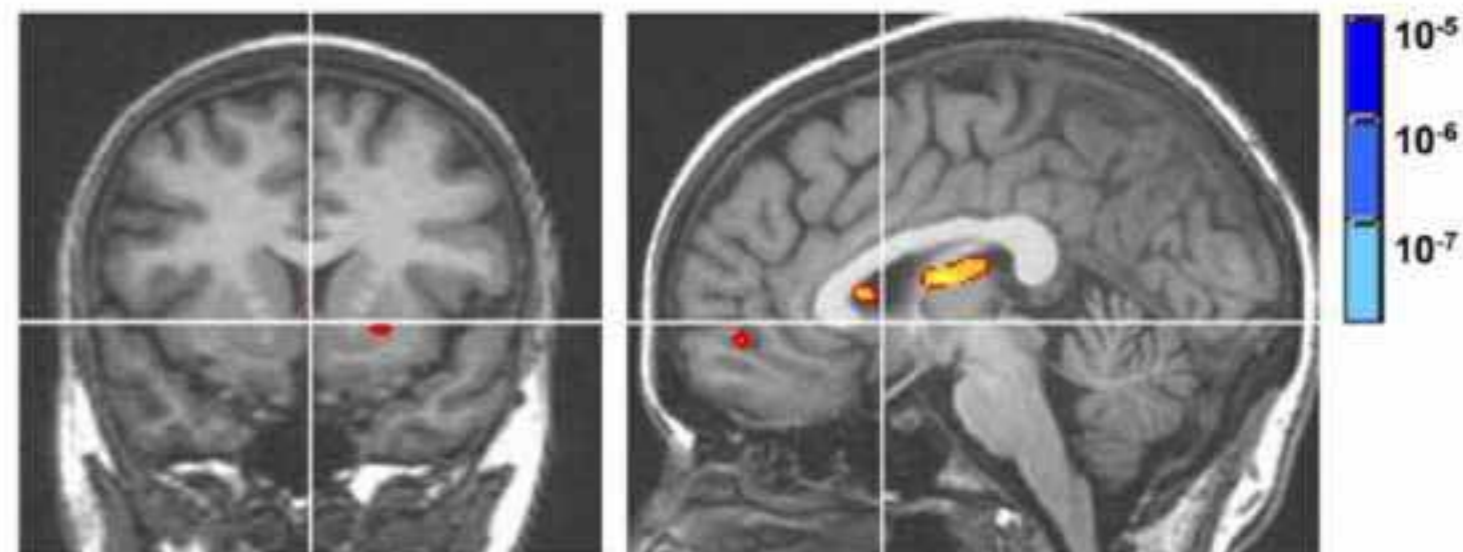
Why can this go wrong?

Gambling with positive anticipation activates brain reward centres

Outcome:
Gain vs. Loss



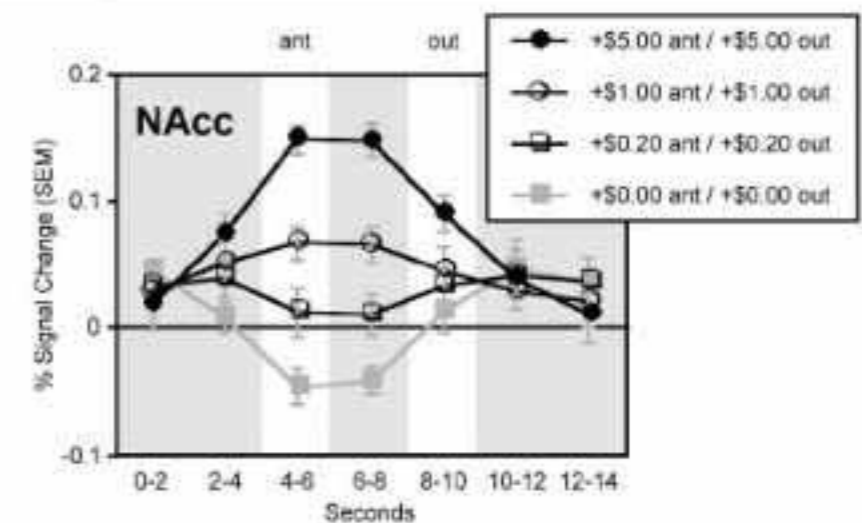
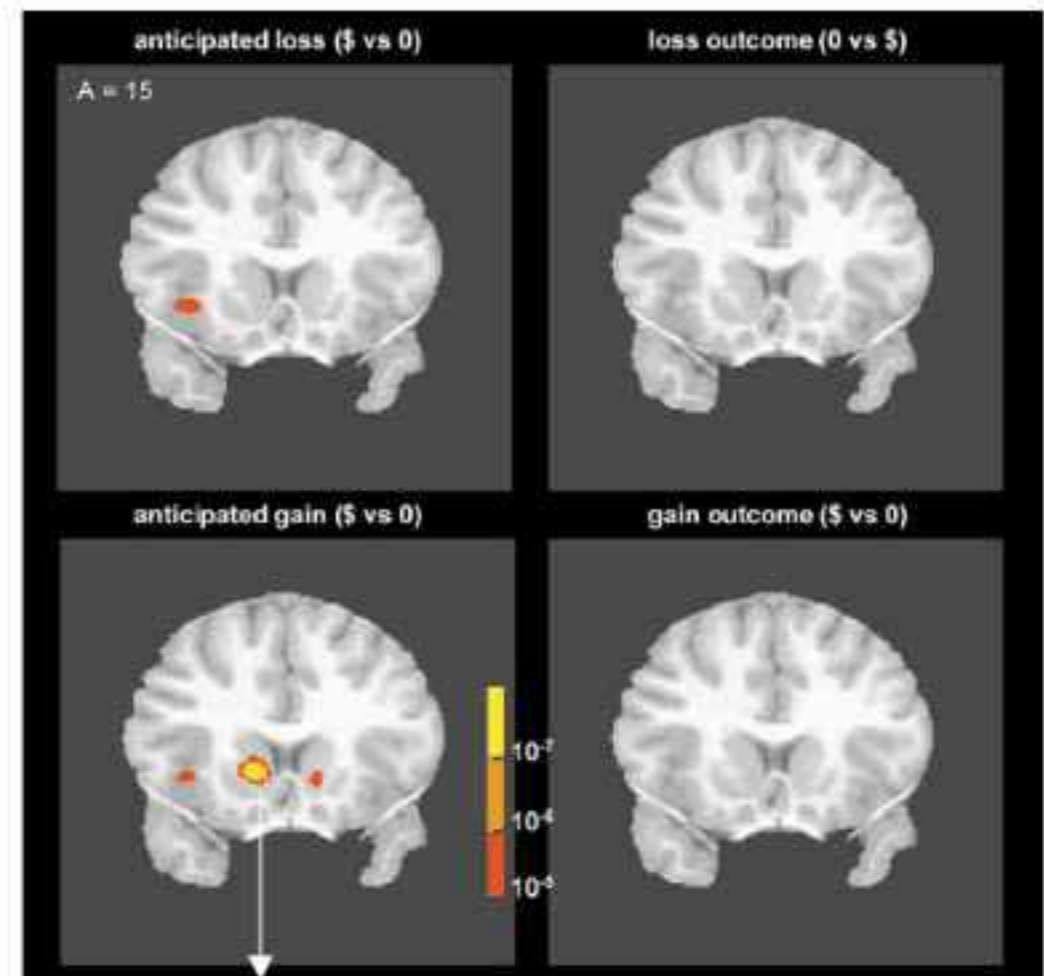
Market:
Relative Value



Kuhnen *et al* 2005

Emotional control and computing reward

The higher the anticipated reward the greater the activation

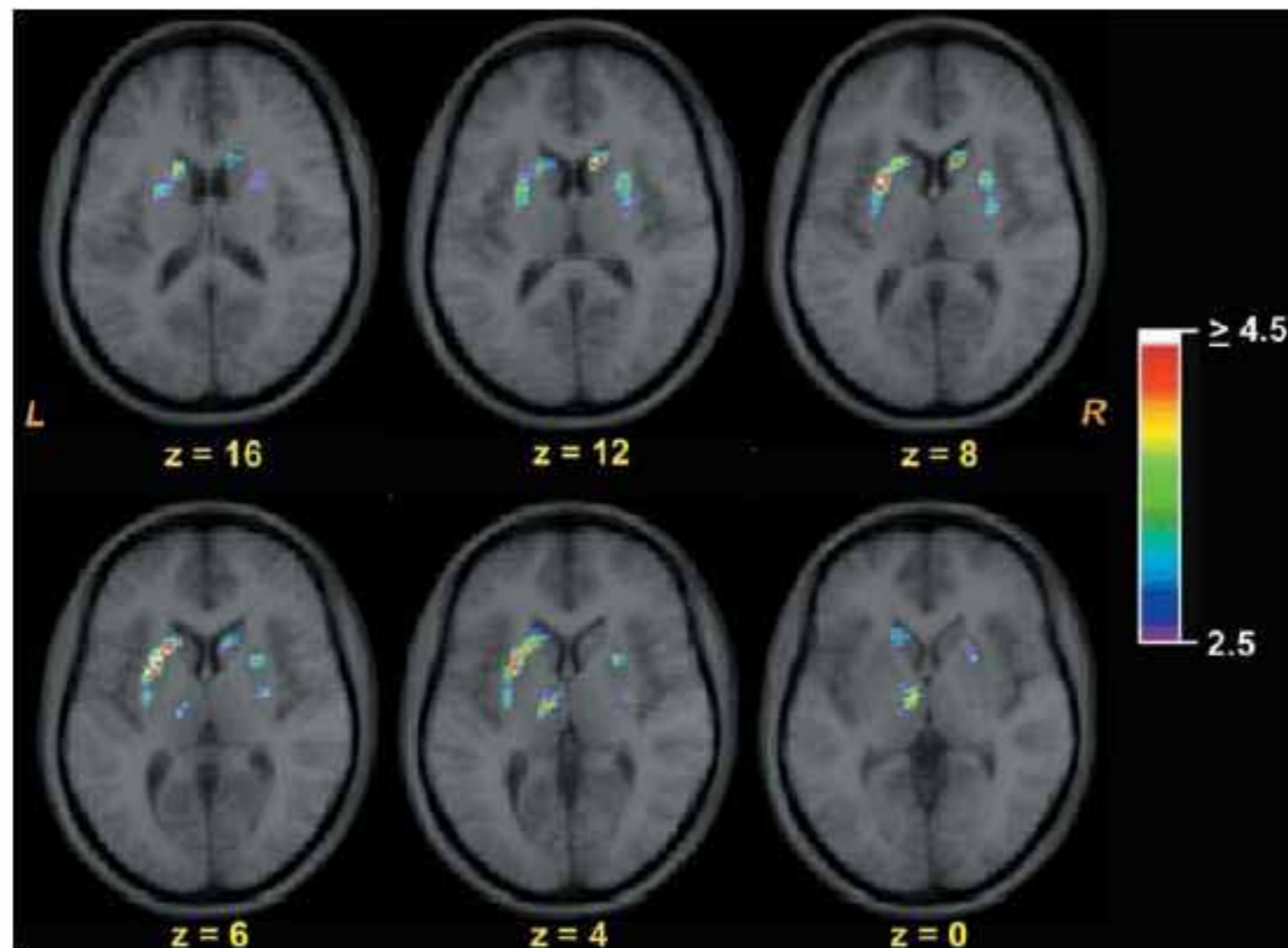


Knutson *et al* 2003

Emotional control and computing reward

The higher the anticipated reward the greater the activation

Dopamine is released at this time



Zald *et al* 2004

Emotional control and computing reward

The higher the anticipated reward the greater the activation

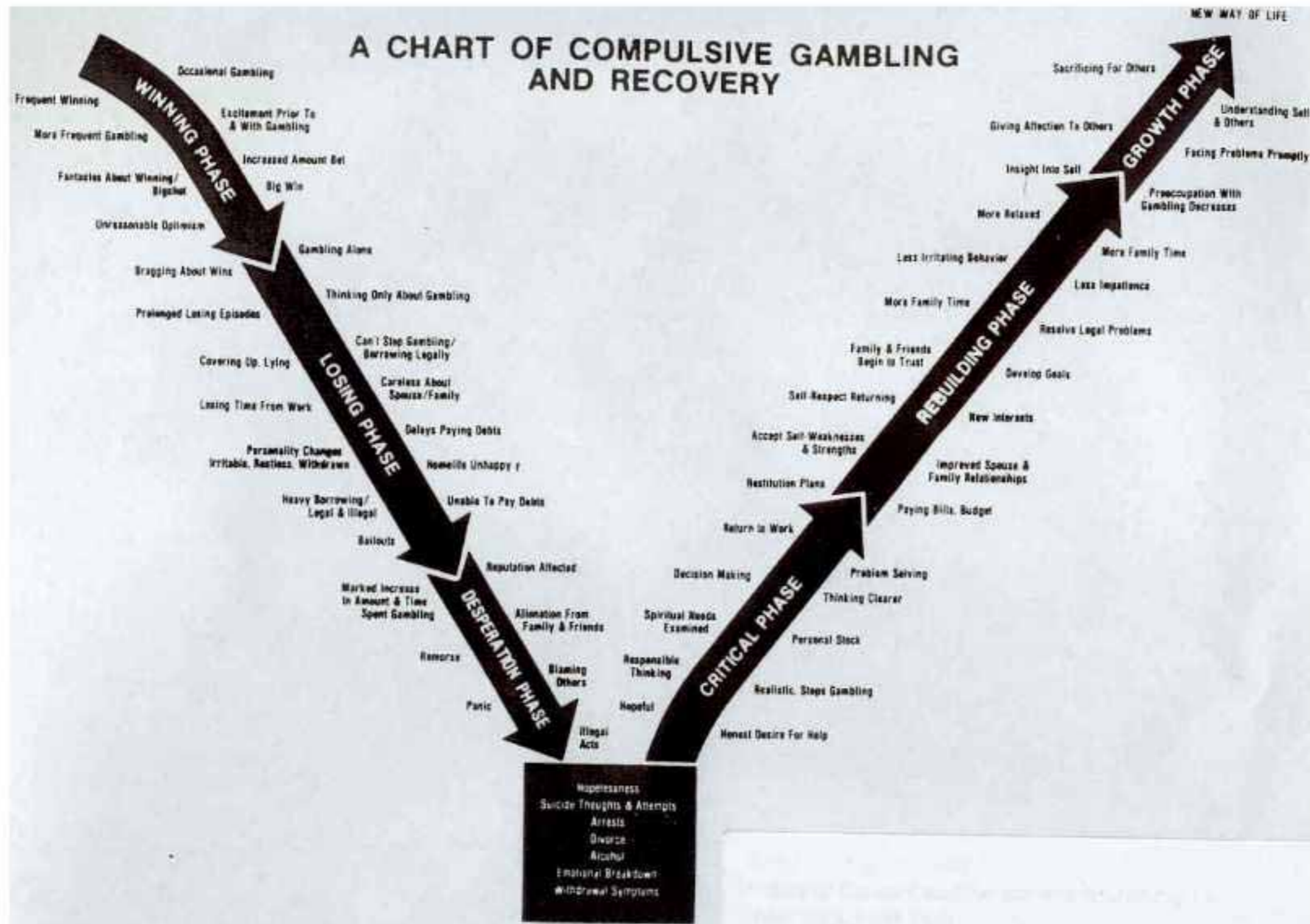
Dopamine is released at this time

Same region as for a cocaine addict!



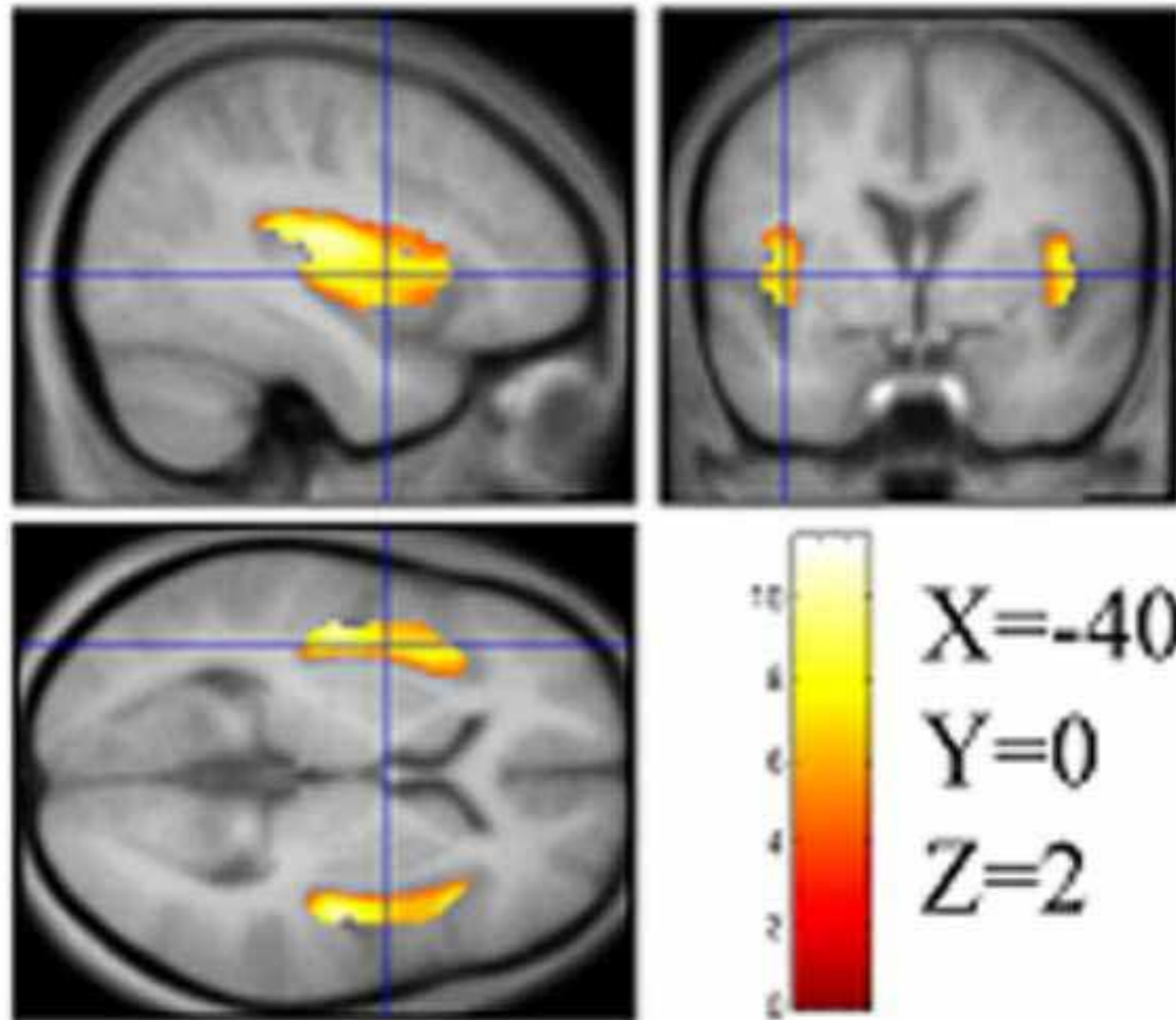
Emotional control and computing reward

Gambling can become an addiction



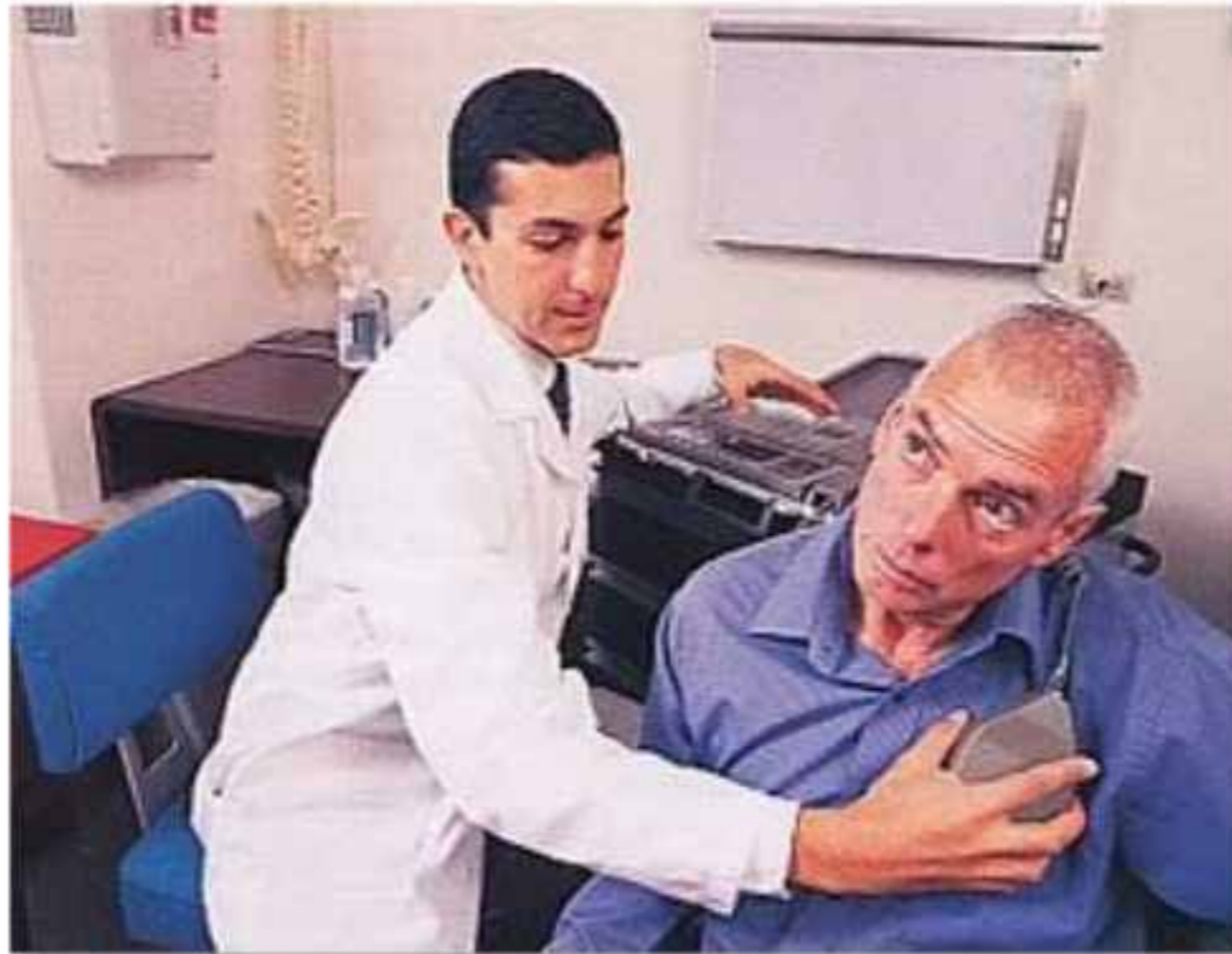
Emotional control and computing reward

Risk aversion activates anxiety brain regions



Emotional control and computing reward

Treatment with dopamine agonists can cause pathological gambling



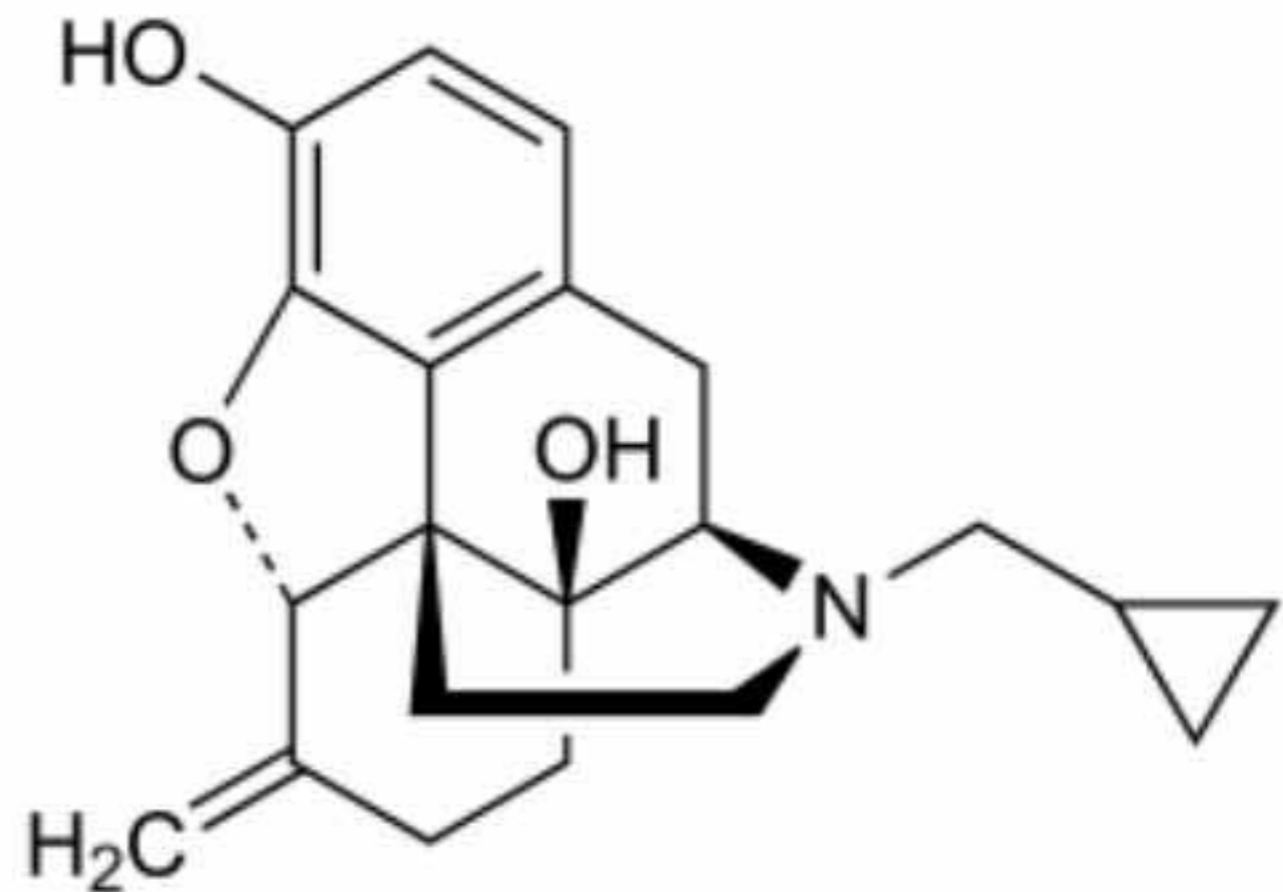
Emotional control and computing reward

Treatment with dopamine agonists can cause pathological gambling

Brain opiates also involved in reward:

Naltrexone

Nalmefene

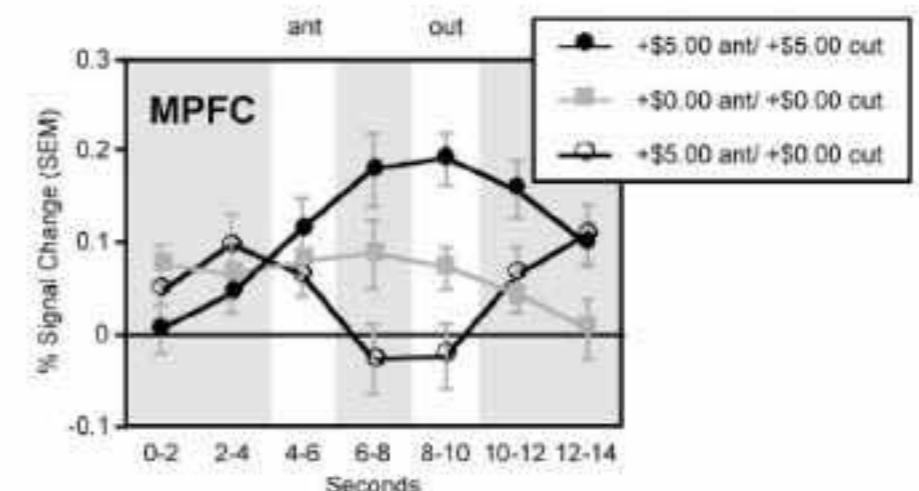
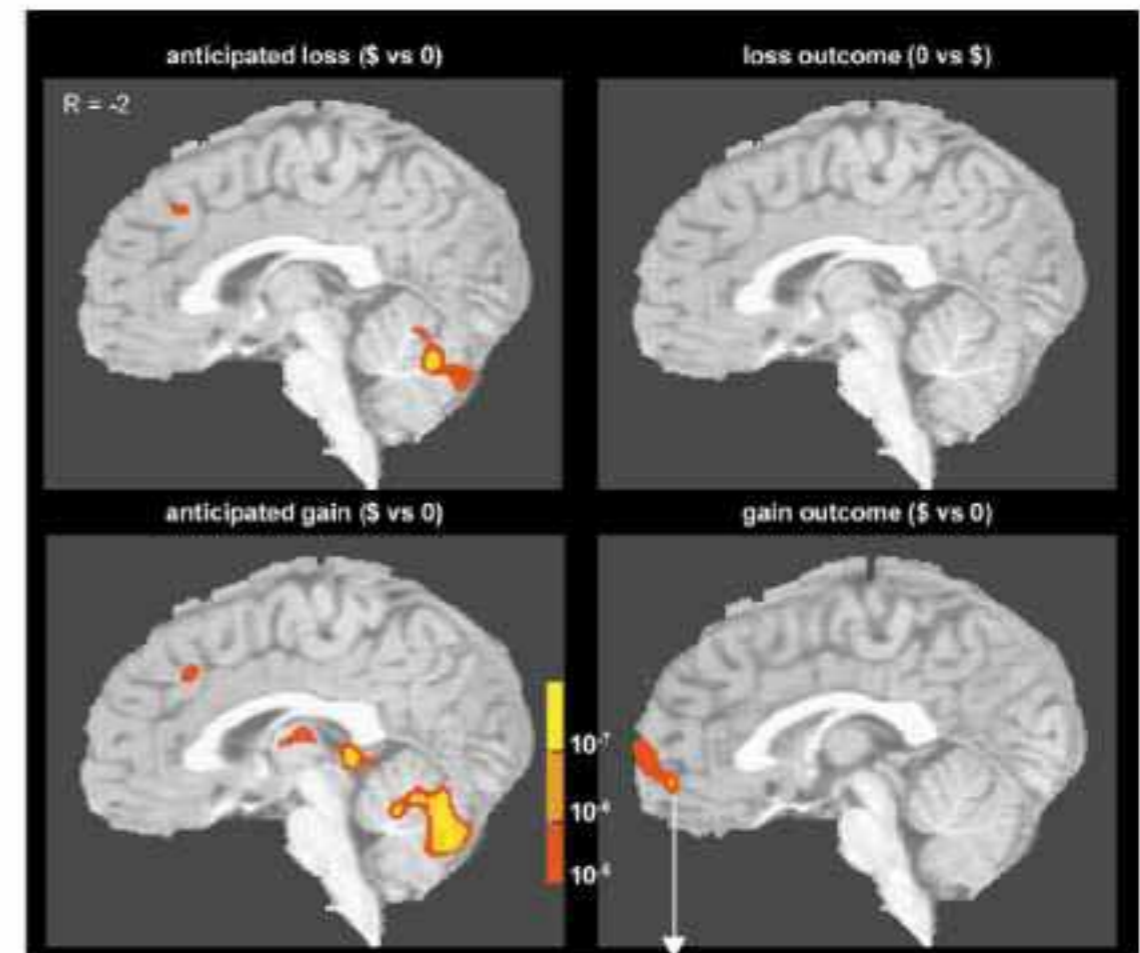


The frontal cortex

The medial prefrontal cortex is activated when reward outcome matches expectation

If the gamble fails there is reduced activation

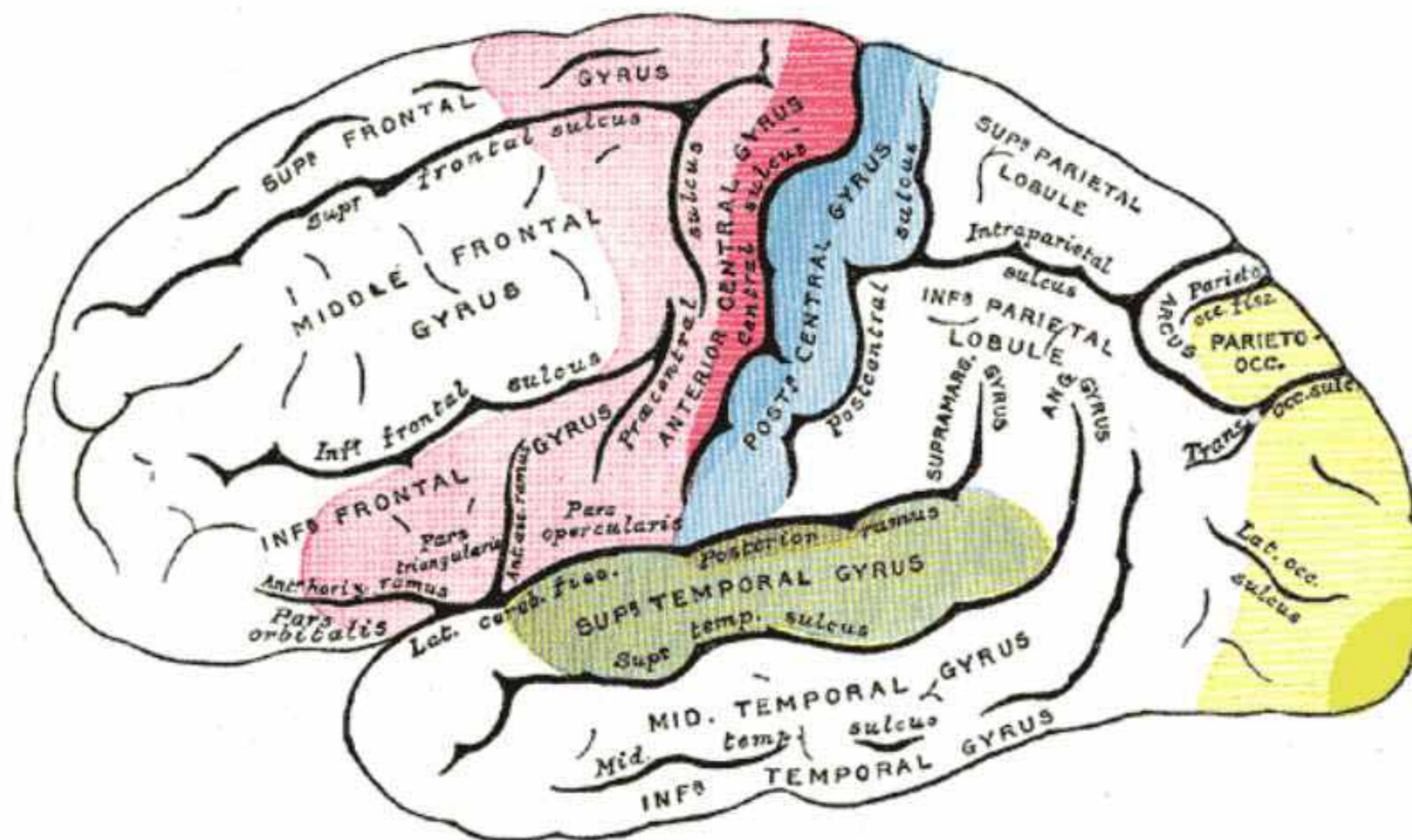
So failure helps promote another attempt



Knutson *et al* 2003

The frontal cortex

There is reduced frontal cortex activity in...



The frontal cortex

There is reduced frontal cortex activity in...

Pathological gamblers



The frontal cortex

There is reduced frontal cortex activity in...

Pathological gamblers

Alcoholics



The frontal cortex

There is reduced frontal cortex activity in...

Pathological gamblers

Alcoholics

People with:

High aggression

Clinical anxiety

ADD

OCD

Depression



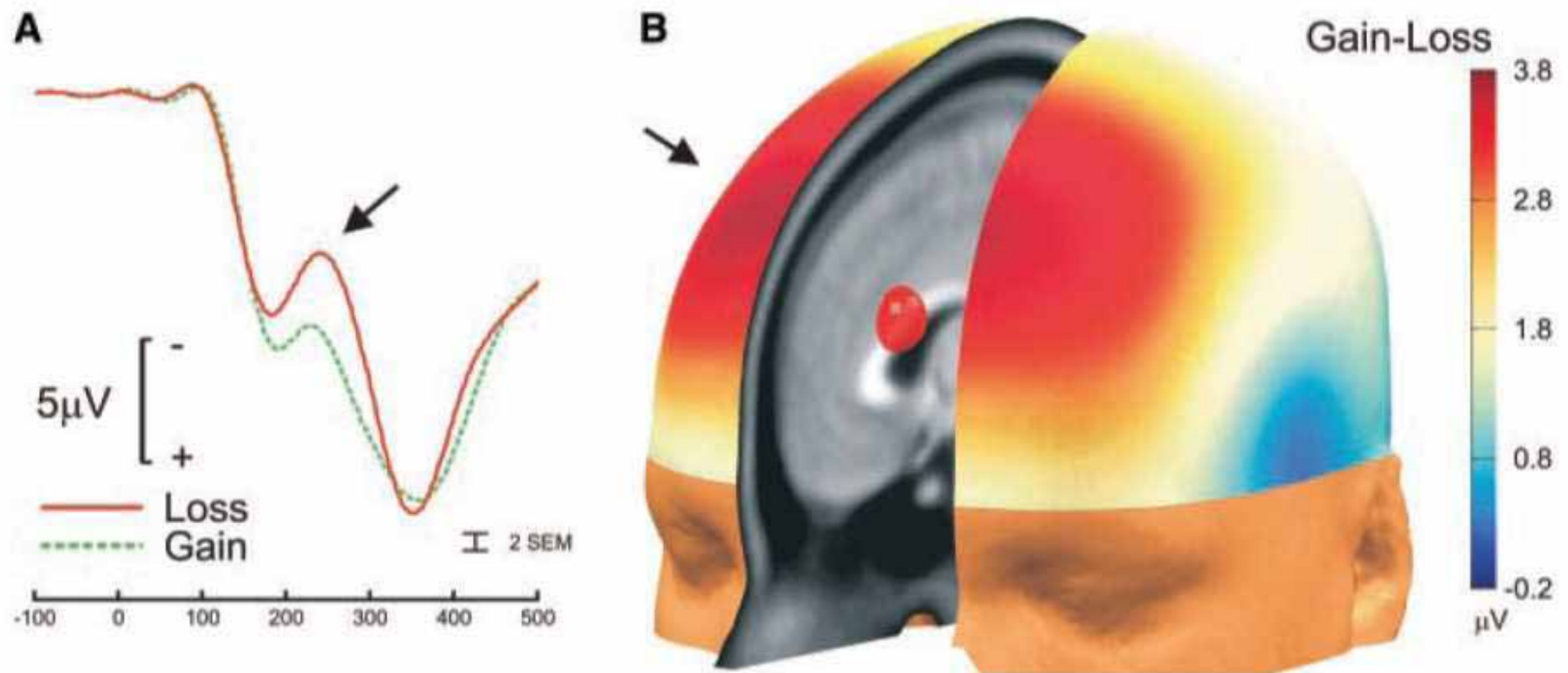
The frontal cortex

Decreased levels of serotonin



The frontal cortex

Frontal cortex also computes good and bad outcomes in 250ms



Gehring *et al* 2002

The frontal cortex

Frontal cortex also computes good and bad outcomes in 250ms

So reduced activity means high impulsivity and poor judgement



The frontal cortex

Frontal cortex also computes good and bad outcomes in 250ms

So reduced activity means high impulsivity and poor judgement

Frontal cortex function is impaired during normal ageing

Denberg, Tranel & Bechara 2005



The frontal cortex

Frontal cortex also computes good and bad outcomes in 250ms

So reduced activity means high impulsivity and poor judgement

Frontal cortex function is impaired during normal ageing

Denberg, Tranel & Bechara 2005

Although motivation to gamble declines with age

The risky teenager

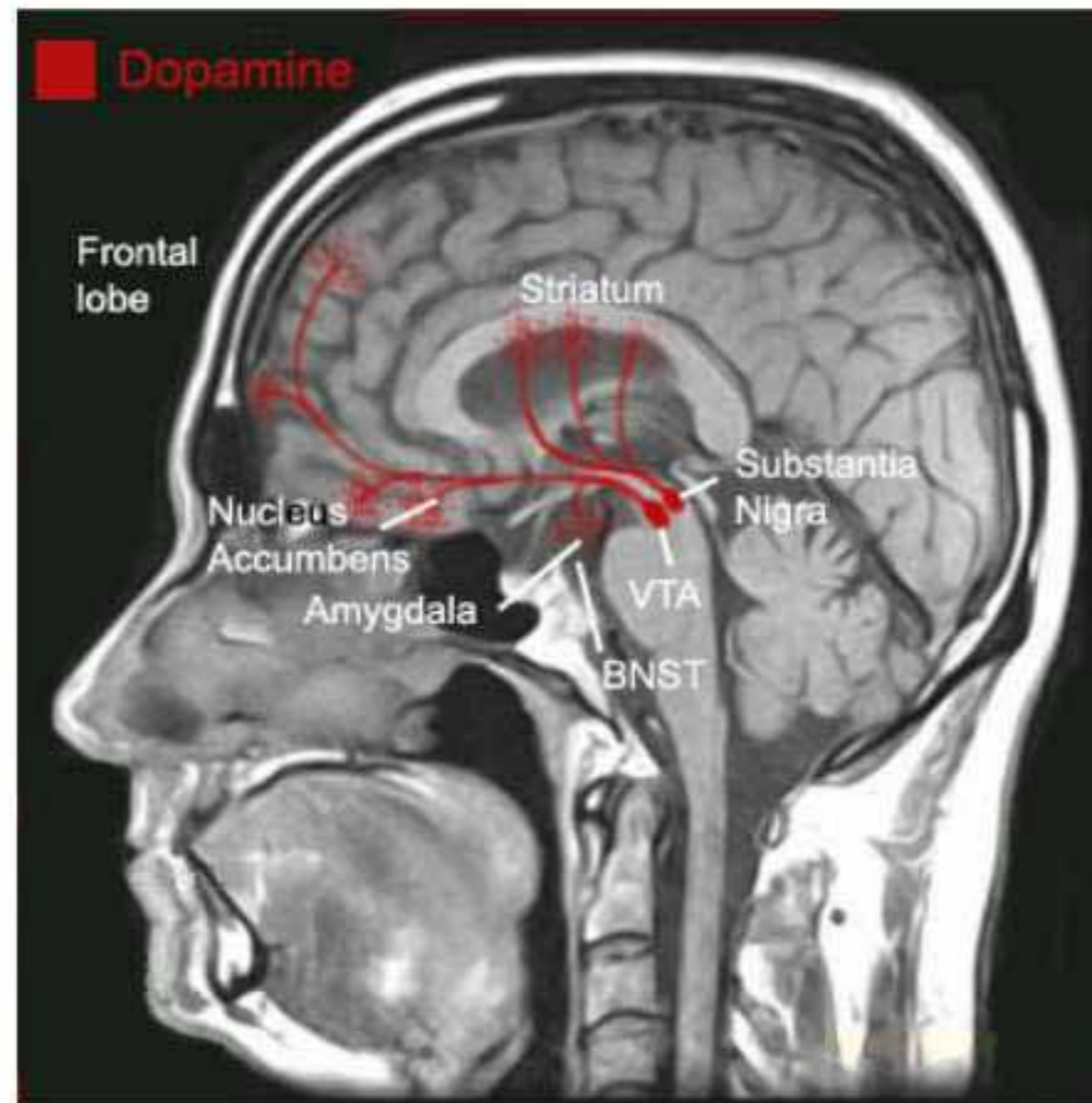
Teenagers are greater risk takers than older adults



Have less developed control and risk assessment in frontal cortex

The risky teenager

Smaller response in brain dopaminergic pleasure centres



The risks of the most magnificent obsession

The mating game is highest risk social activity we engage in



The risks of the most magnificent obsession

The mating game is highest risk social activity we engage in

Females have to choose the right male...



The risks of the most magnificent obsession

The mating game is highest risk social activity we engage in

Females have to choose the right male...

...and find risk-taking in males sexually attractive



The risks of the most magnificent obsession

Taking risks together is a big turn-on



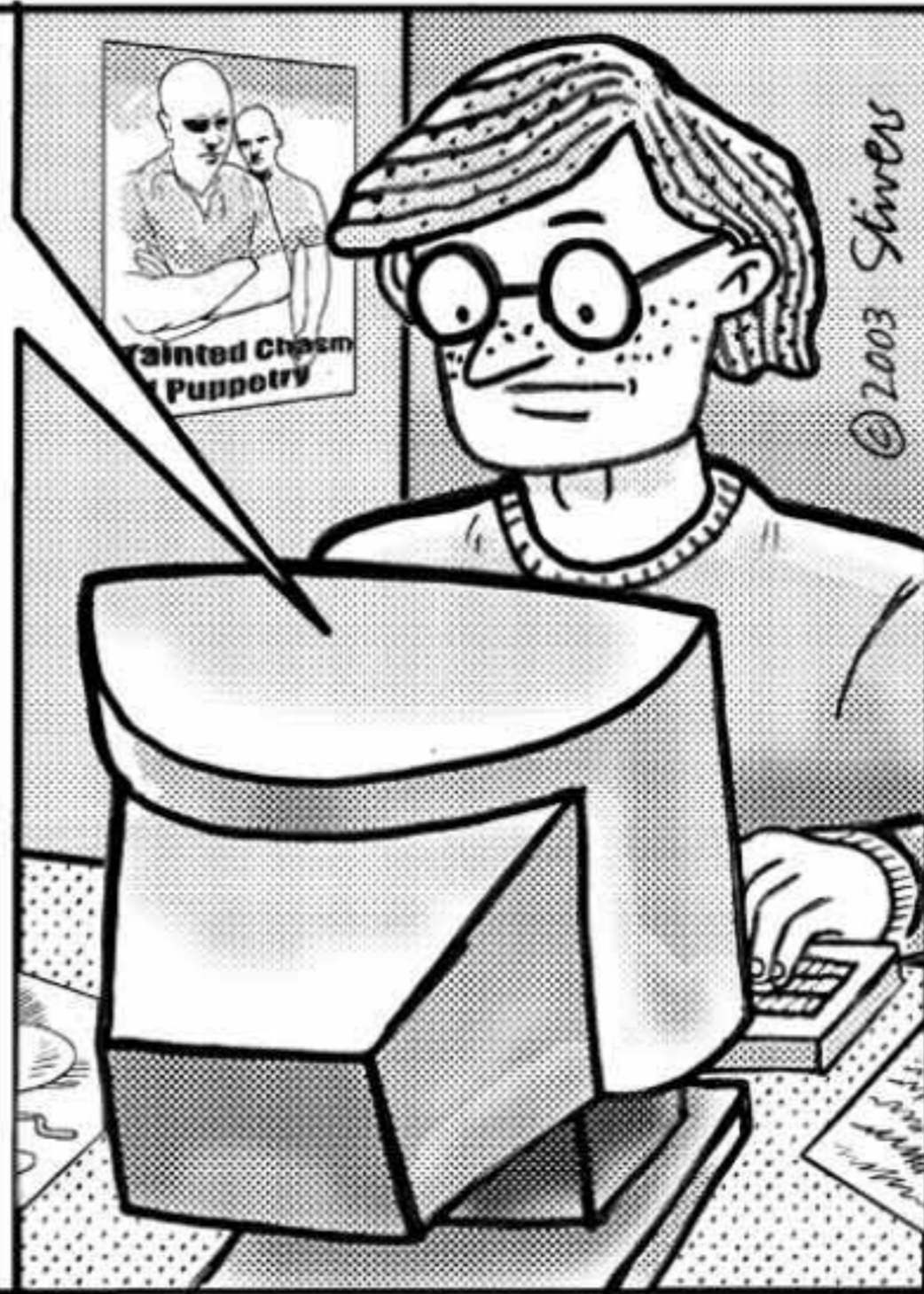
The risks of the most magnificent obsession

Internet dating – meeting 'offline' is a higher risk than 'online'

gimli55: there's this girl in trig that I really like...

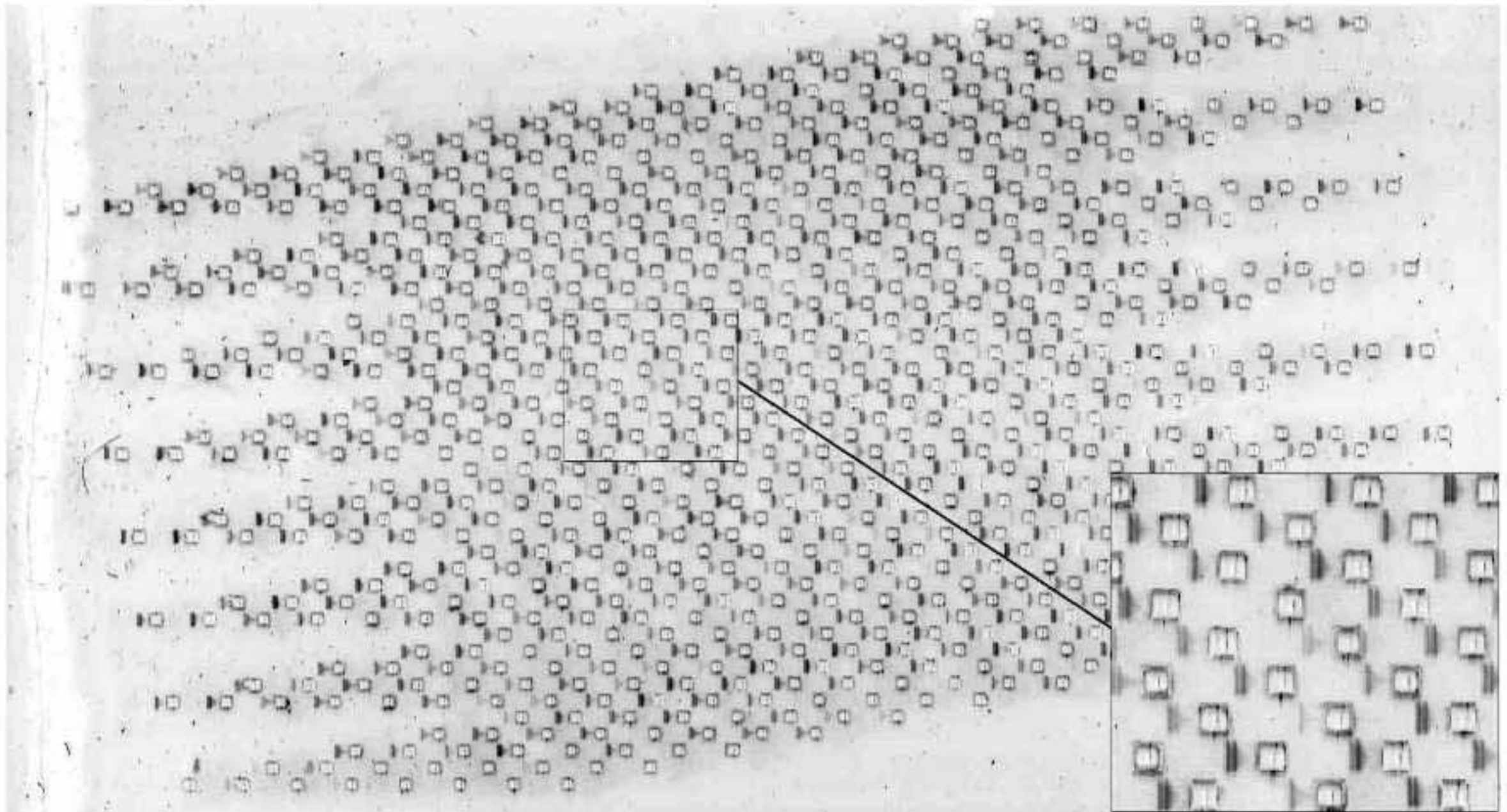
hesdeadjim42: so r u going to ask her out?

gimli55: no. but i made a Sim that looks EXACTLY like her...



The risks of the most magnificent obsession

So the mating game actually helps promote risk-taking genes!



The risks of the most magnificent obsession

Having sex is a big risk...

RISKY SEX

- fun sex?

- great sex?

- lots of sex?

DANGEROUS SEX!

The risks of the most magnificent obsession

Having sex is a big risk...

...which may be why men are so quick!

41 Mistakes Men Make in Bed



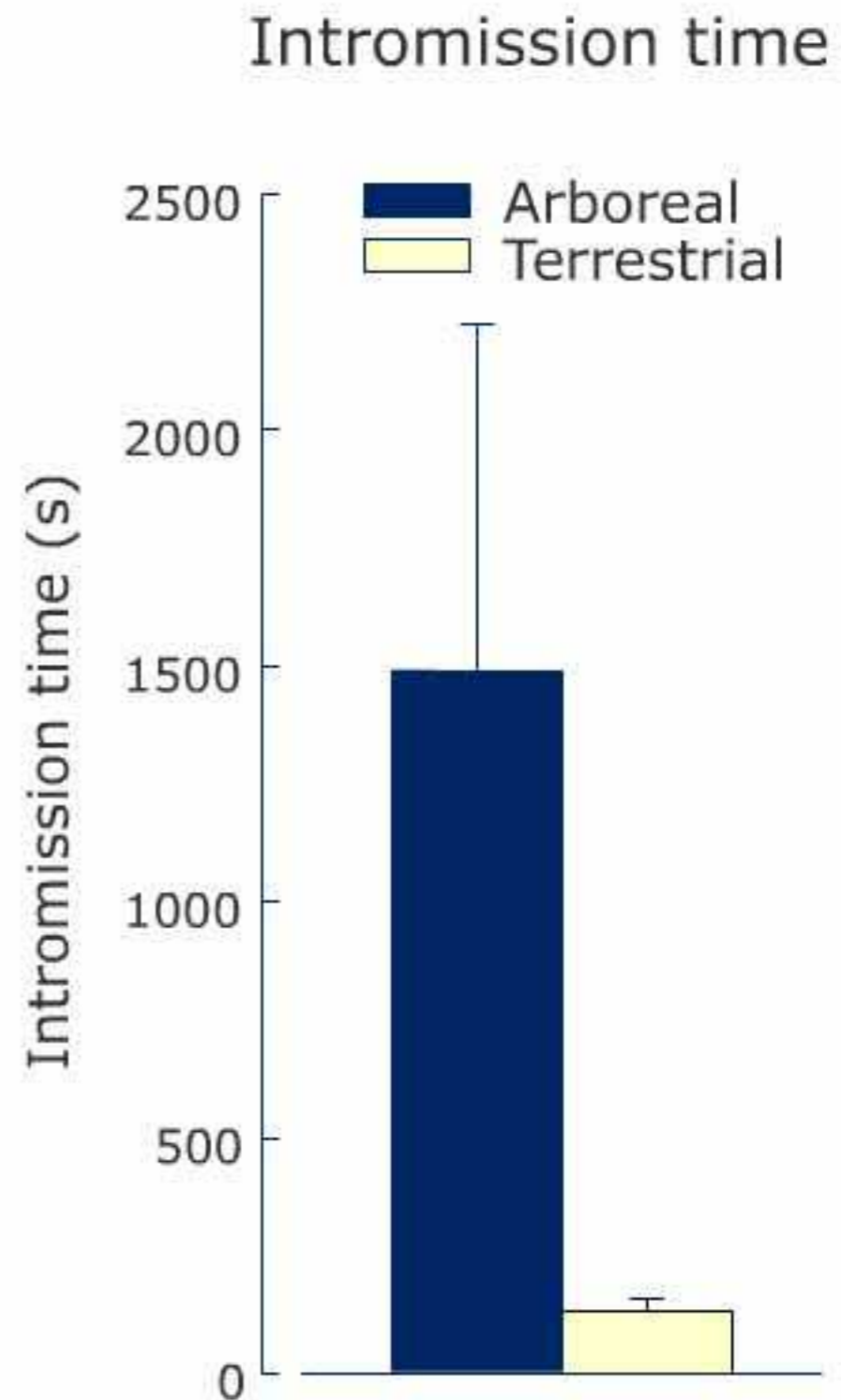
Yours if You Order Now -
The Greatest Collection of
Seduction Tactics and
Mistakes to Avoid

**"New Resource Reveals The
Common Mistakes
Men Make in Bed"**

Frustrated Men Only-Potent information for your sexual life with your mate. This e-book reveals some of the secrets in meeting, dating and becoming intimate with gorgeous women.

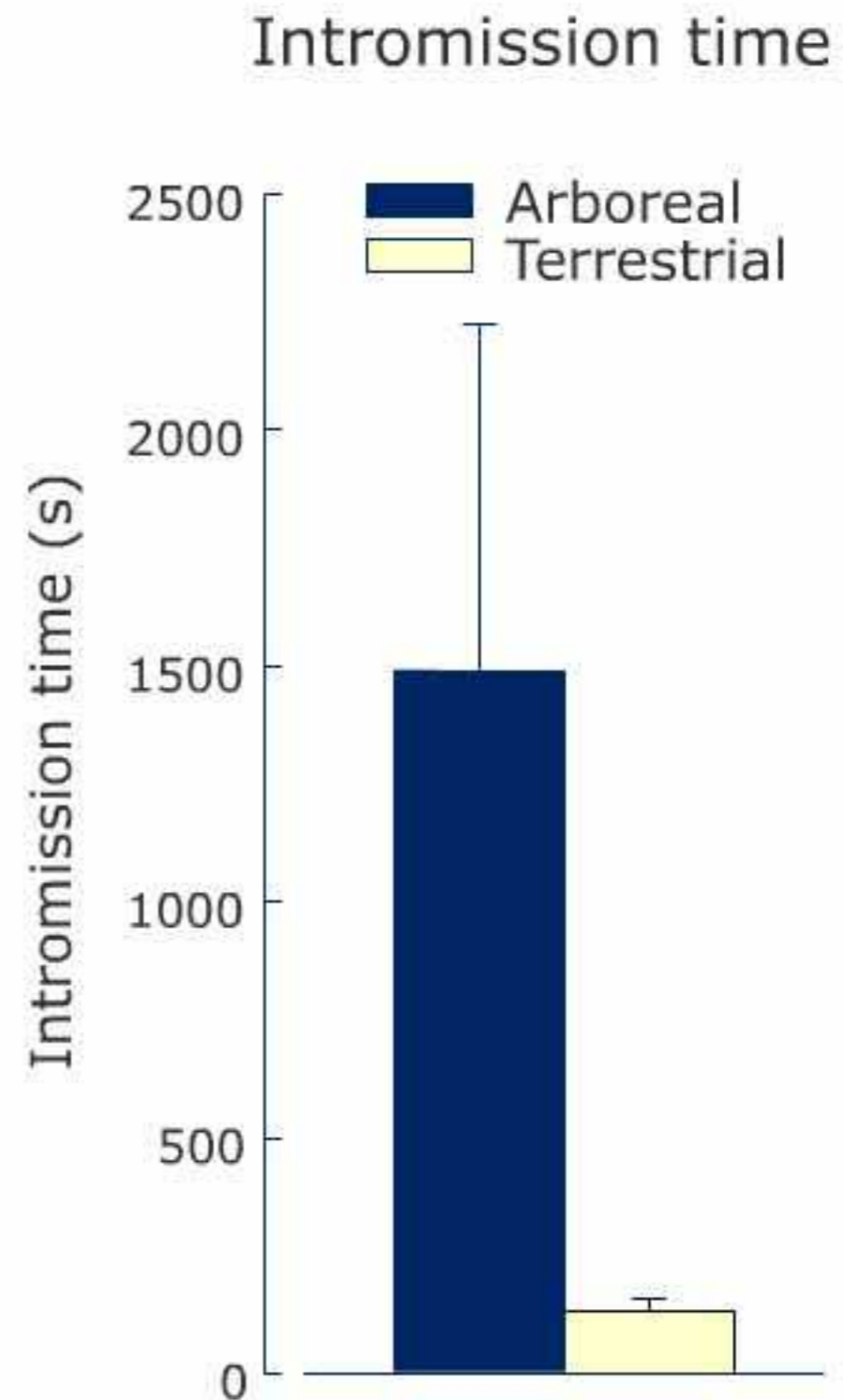
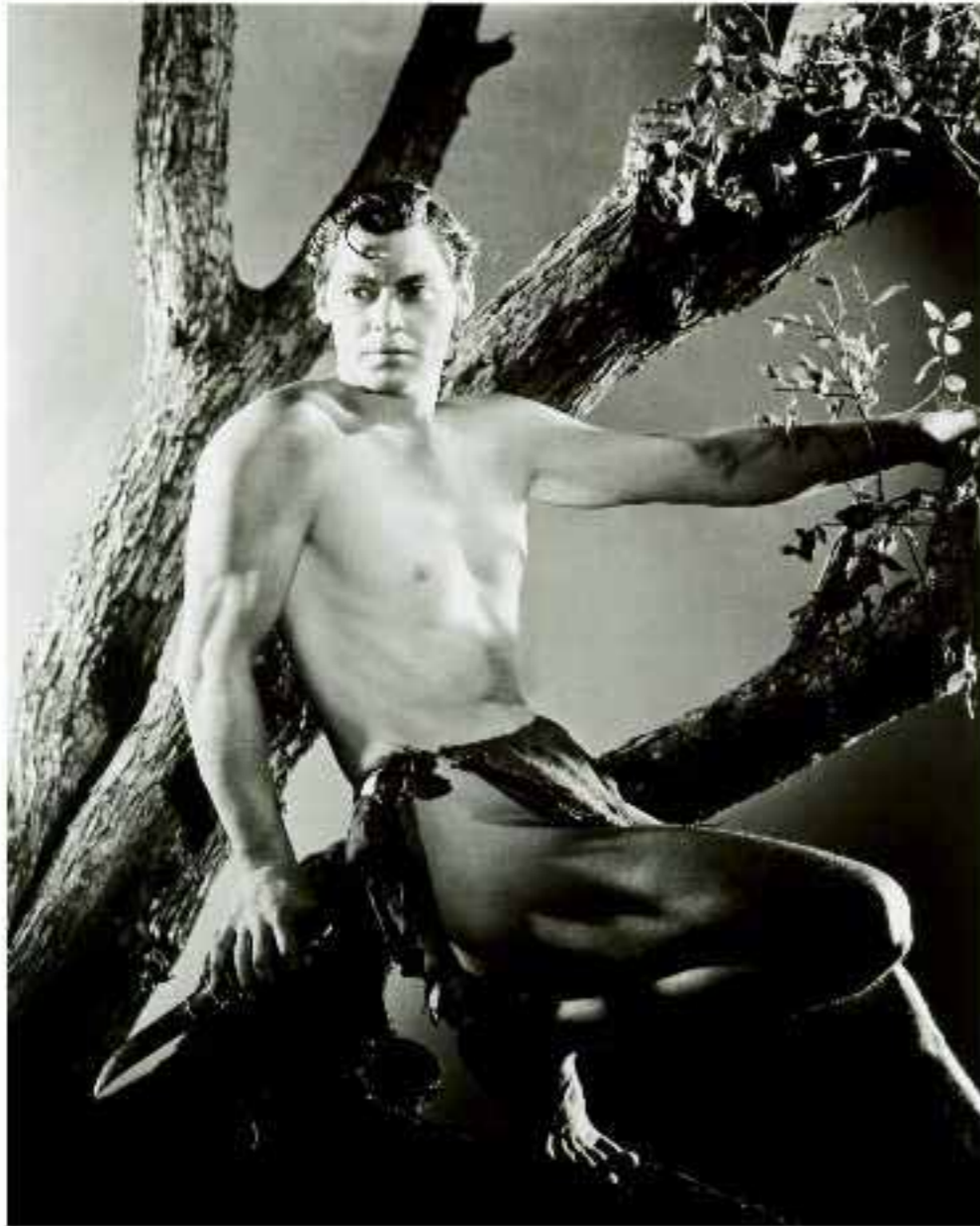
The risks of the most magnificent obsession

But species that live in trees take their time!



The risks of the most magnificent obsession

But species that live in trees take their time!

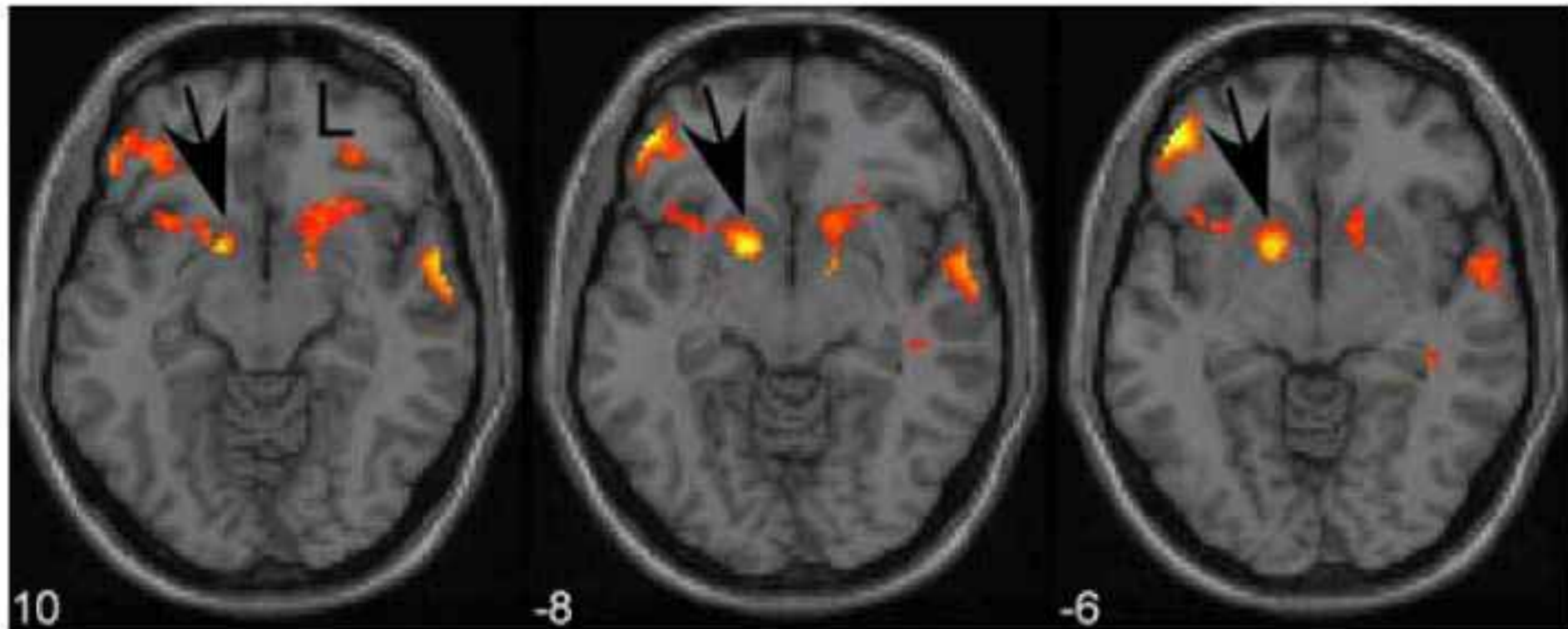


The risks of the most magnificent obsession

Being rejected in love is like gambling for big gains or losses



Helen Fisher



The risks of the most magnificent obsession

Being rejected in love is like gambling for big gains or losses

So losing in love is like taking a hit on the stock market!



The importance of trust

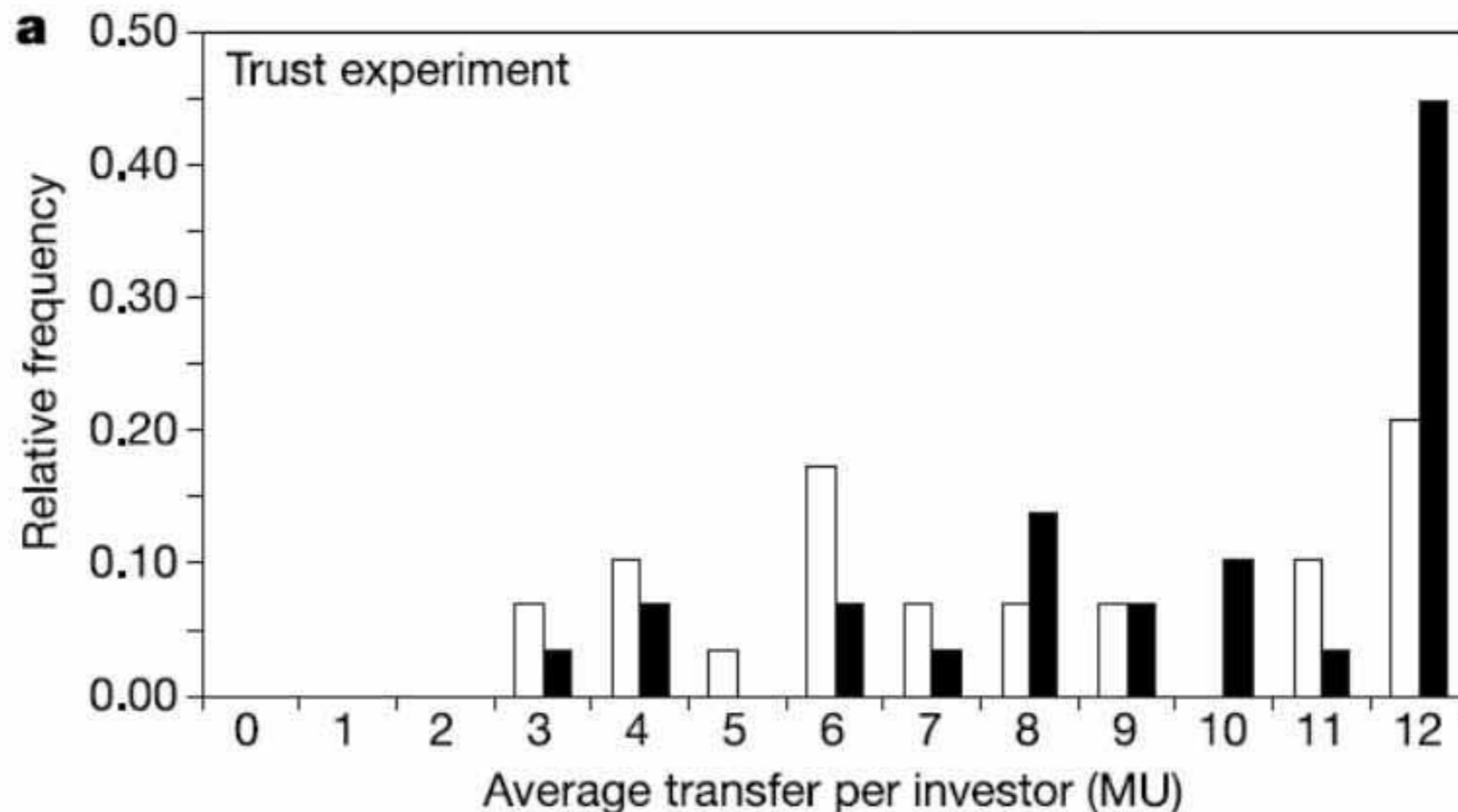
You will risk more if you trust someone



The importance of trust

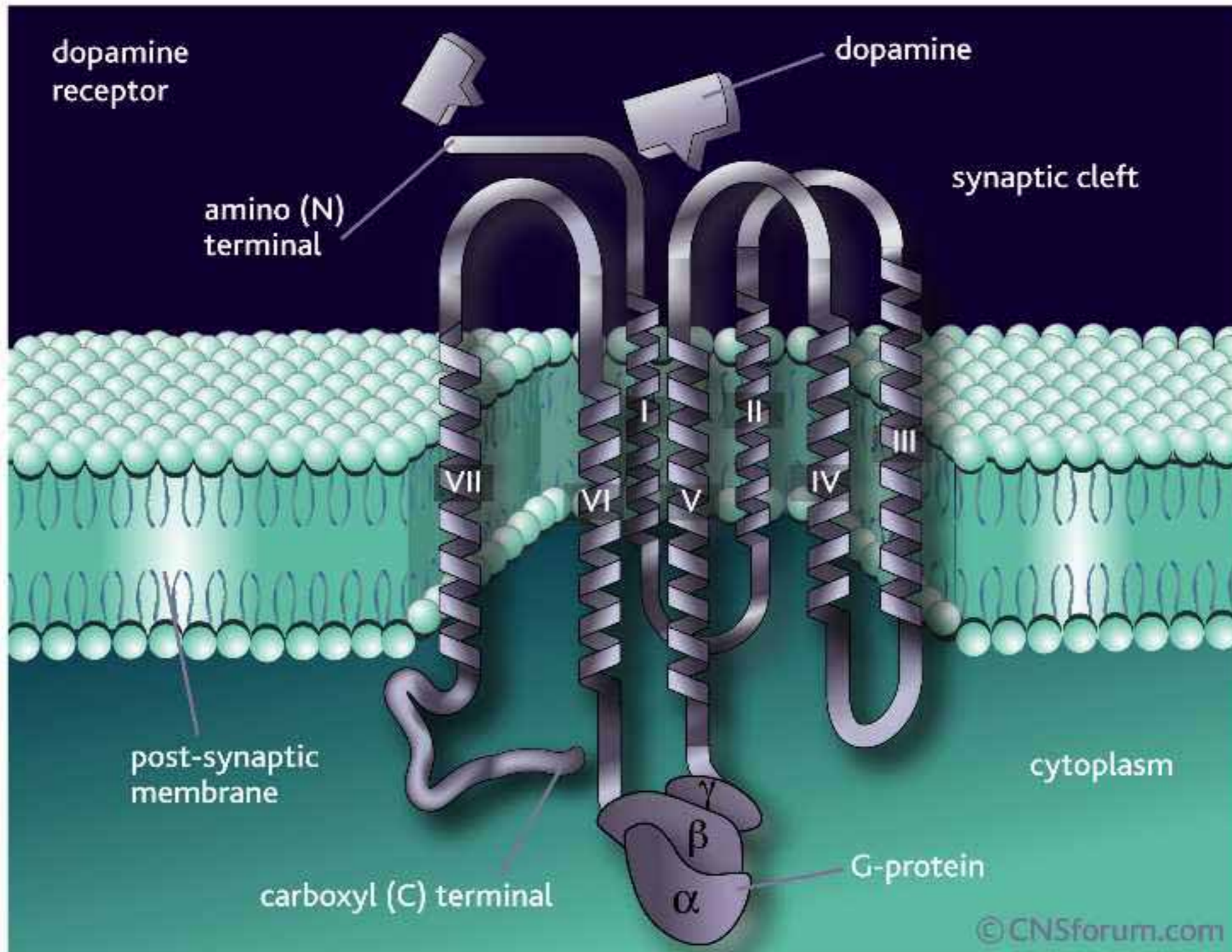
You will risk more if you trust someone

So spray oxytocin up a potential investor's nose!
Kosfeld et al



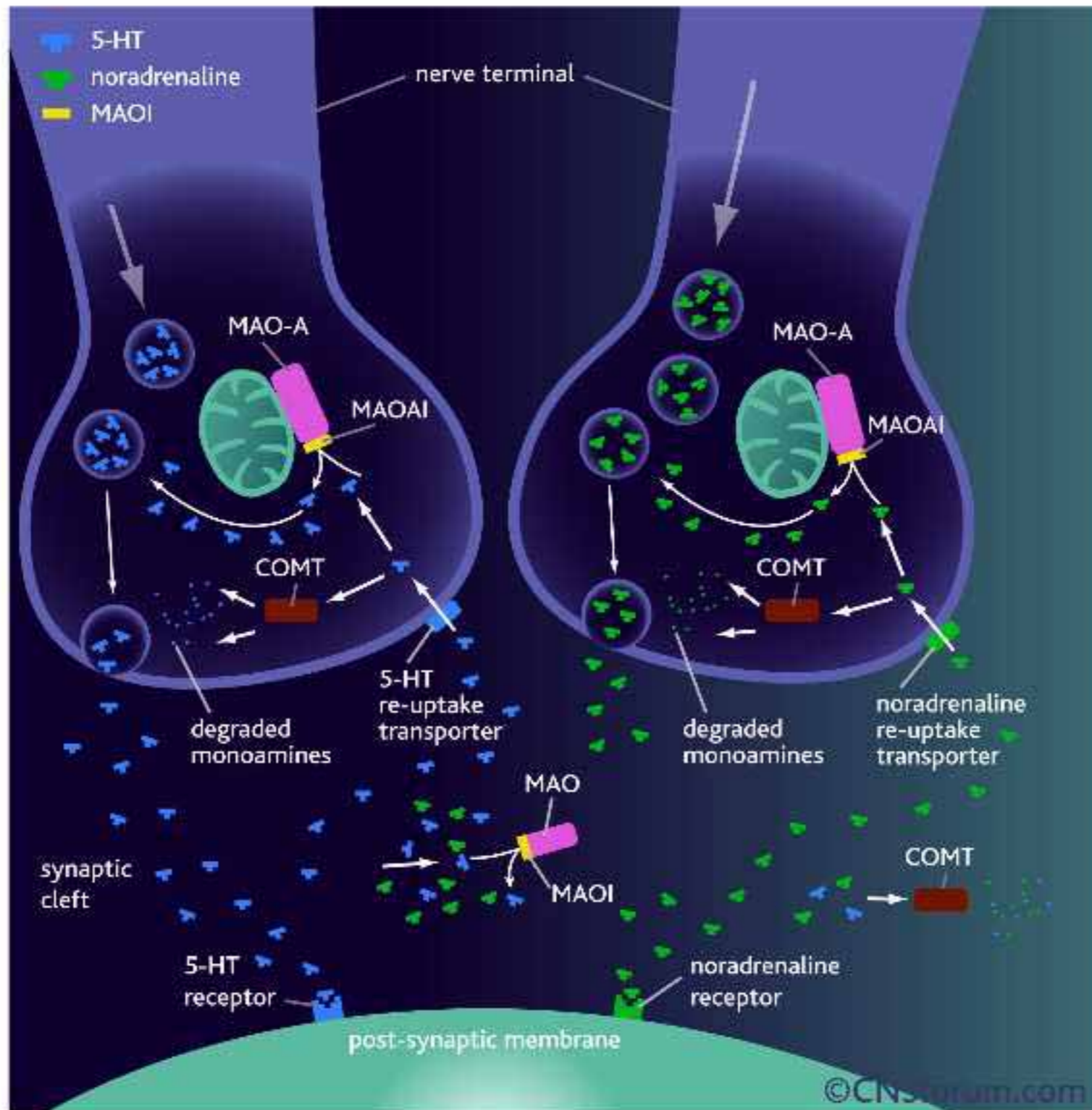
Genes and risk

Dopamine D4 and D3 receptor



Genes and risk

Serotonin transporter and monoamine oxidase A



Genes and risk

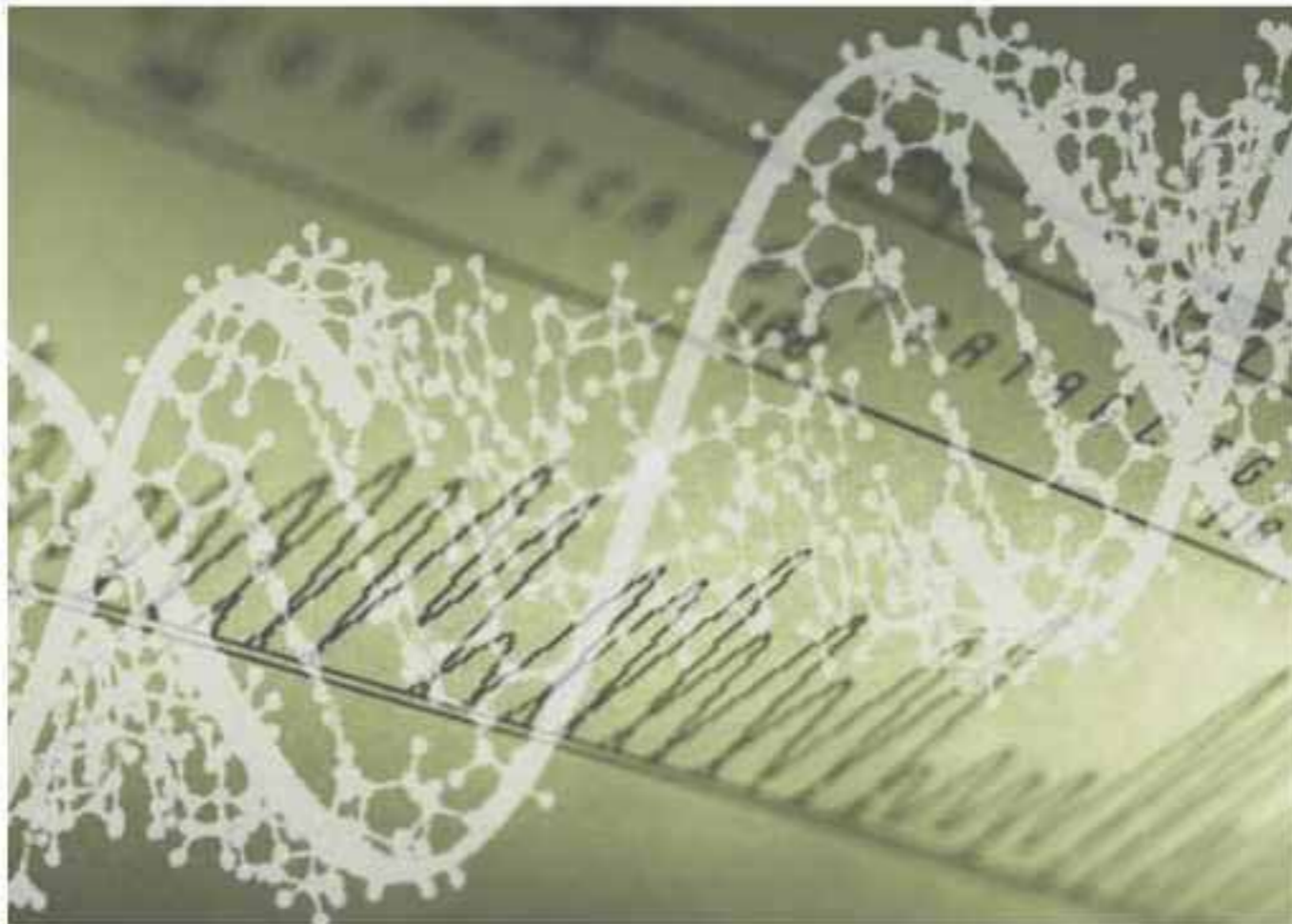
Not enough genes identified yet for DNA profiling!



Genes and risk

Not enough genes identified yet for DNA profiling!

However if the trait is 60% genetic...

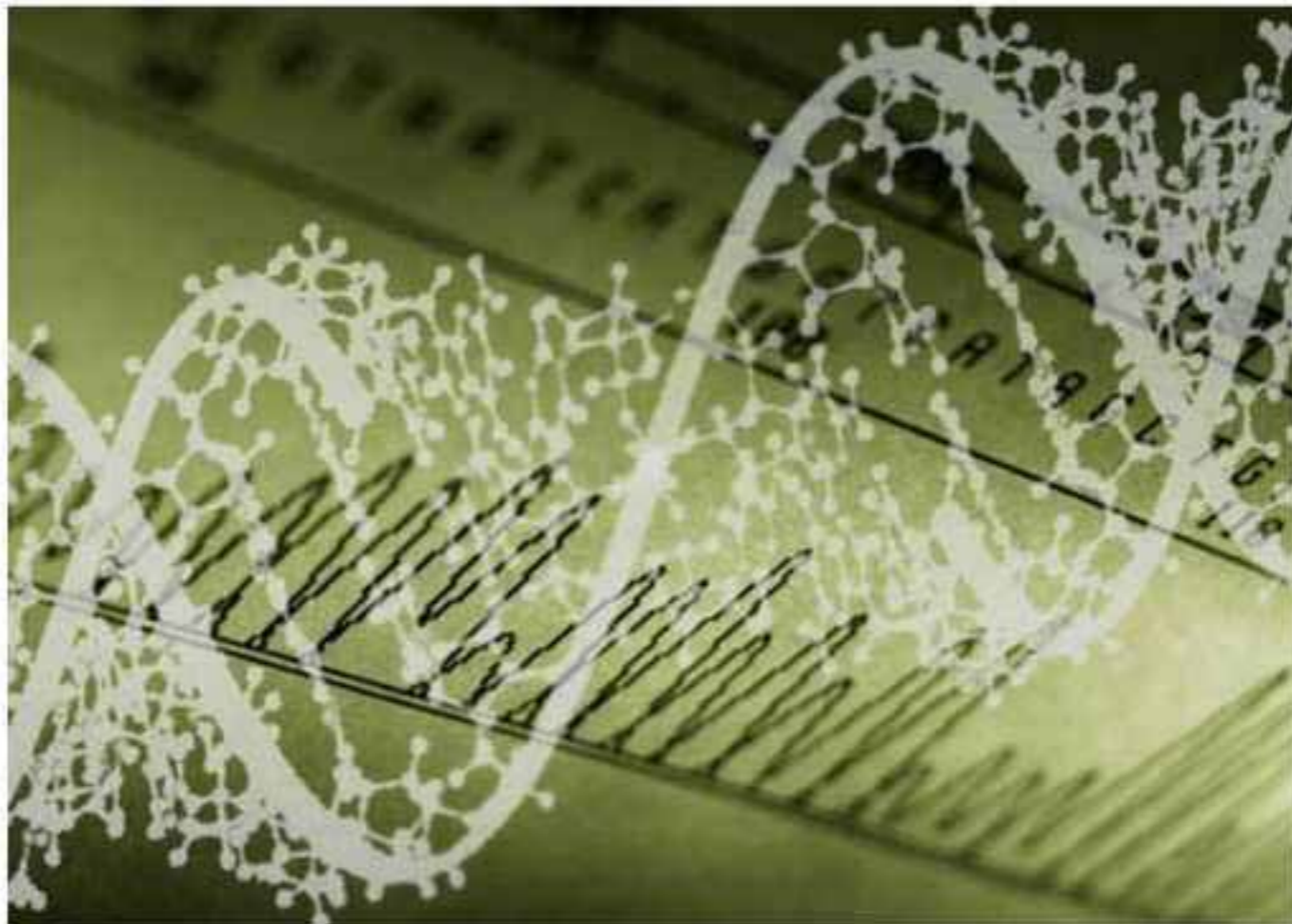


Genes and risk

Not enough genes identified yet for DNA profiling!

However if the trait is 60% genetic...

...it's only a matter of time



Insurance risks and bringing down the bank

Nick Leeson ran up a debt of £827 million over around 3 years

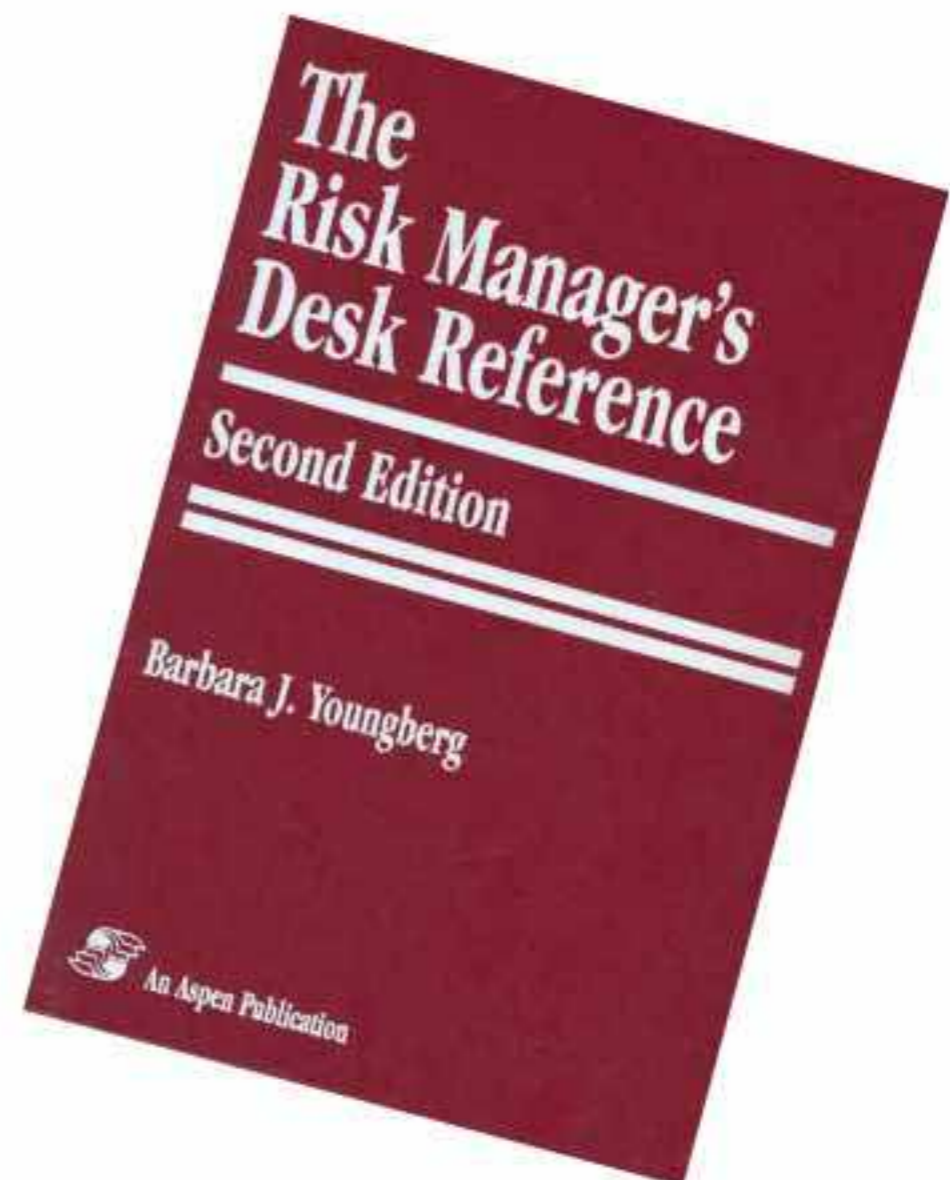


**Baring Asset
Management**
Member of ING Group

Insurance risks and bringing down the bank

'Speculate to accumulate' system rewards risk-takers

Most organisations have senior risk managers



Insurance risks and bringing down the bank

'Speculate to accumulate' system rewards risk-takers

Most organisations have senior risk managers

Insurance companies conclude that high risk in one area means high risk in all



"We've considered every potential risk except the risks of avoiding all risks."

Conclusions

Risk taking is essential for survival

Our ancestors were big risk takers

We like novelty

Taking risks can give pleasure...

...and activate the same brain areas as cocaine

Conclusions

Control centres regulate impulsivity

And compute risk and likely reward outcome

Risk taking may be a personality trait

Risk aversion activates anxiety promoting regions

Pathological gambling involves reduced control...

.. and altered dopamine and serotonin activity

Conclusions

Teenagers take more risks

Old age impairs judgement of risk

The mating game also involves high risks

Don't trust a salesman with an oxytocin spray...

...or an employee with a long D4 receptor gene...

...unless in the business of speculation

Conclusions

Keep taking risks if you want to make something of your life

But...



Conclusions

...remember that some risks may not be worth it!

BBC SPORT

You are in: Football:

Front Page
Football
Teams
Statistics
FA Cup
Eng Prem
World Cup
Champions
League
Uefa Cup
Worthington Cup
Eng Div 1
Eng Div 2
Eng Div 3
Eng Conf
Scot Prem
Scottish Cup
CIS Ins Cup
Scot Div 1
Scot Div 2
Scot Div 3
Europe
Africa
League of Wales

WORLD CUP

England's odds lengthen



Beckham's injury is a major blow for England

British bookmakers William Hill have lengthened the odds on England winning the World Cup in the wake of David Beckham's injury.

BECKHAM'S FITNESS BATTLE

A race against time

- ▶ Beckham's Man Utd aim
- ▶ Beckham hopeful
- ▶ Fifa boost Beckham
- ▶ Beckham's England lift
- ▶ Out for six weeks
- ▶ Feet in the papers
- ▶ Duscher unrepentant
- ▶ The key dates
- ▶ Career highs and lows

The injury explained

- ▶ Giggs offers hope
- ▶ Medical assessment
- ▶ 'When I broke my foot'
- ▶ Injury in pictures

Impact on England