

'Knowing you, knowing me'
can other animals have an identity crisis ?



'Knowing you, knowing me'
can other animals have an identity crisis ?

'I need to know you before I can know me'

The evolution of self-awareness:

- Recognising individuals does not imply self-awareness
- Two limitations of not developing self-awareness:
 - Locked in the present and can only sense individuals directly
 - You can't read the thoughts of others

So did animals become self-aware to solve these problems ?

- Problem:
How could self-awareness have evolved without knowing first why it would be useful ?
- Conclusion:
Knowledge of the presence of mental processes in others must have preceded development of self-awareness
- Expectation:
Some animal species may be able to respond to mental processes in others without self-awareness
- Others may, like us, be aware of their own mental state as well as that of others - i.e. a true 'Theory of Mind'

The problem of consciousness

- Are other animals conscious ?
- Arguments against:
 - Computers can do most tasks that animals can

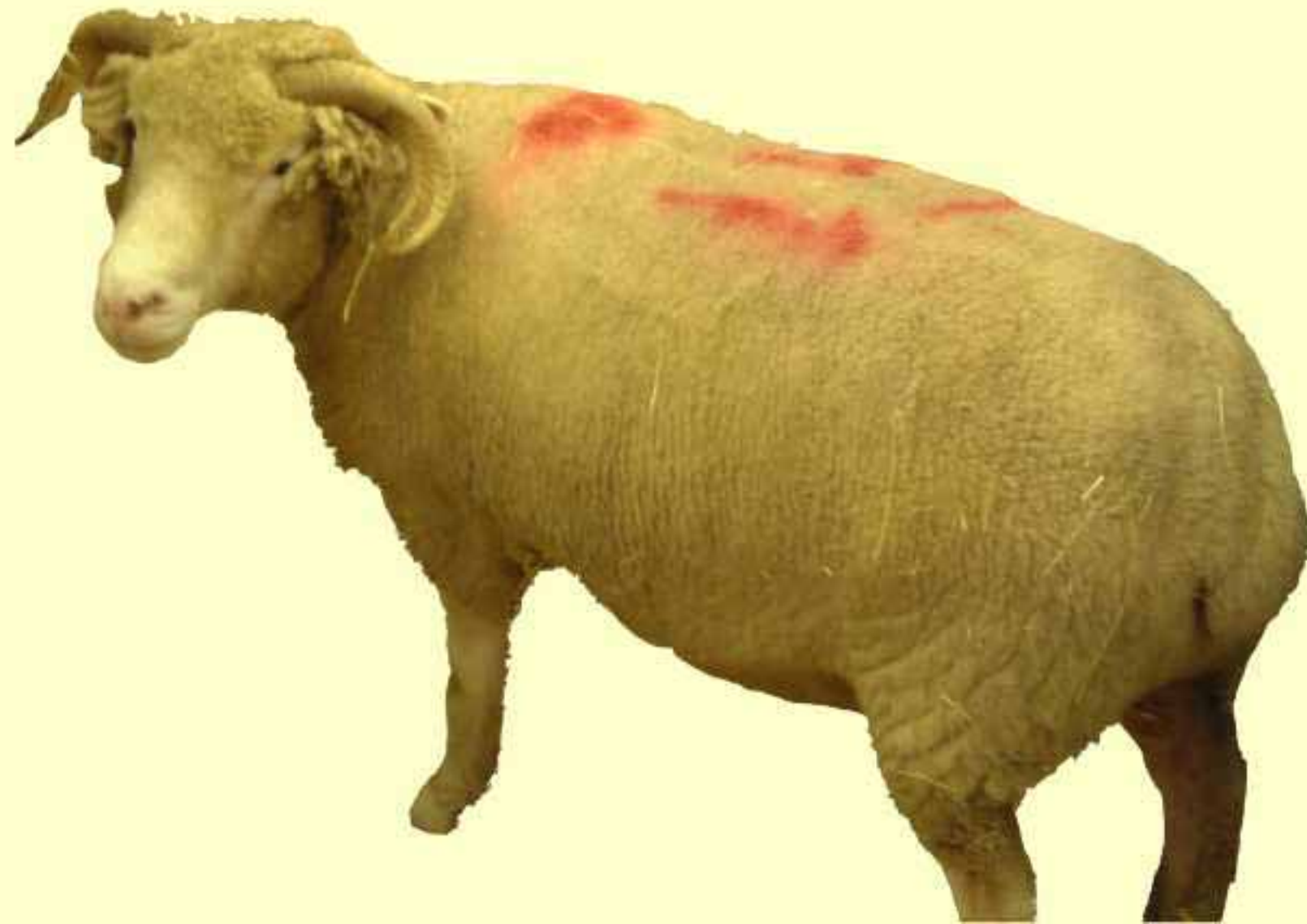
You try solving arithmetical problems without consciousness !

- 'Blindsight', sleepwalking and dreaming

You don't need consciousness for many basic functions,
but you do for most higher cognitive ones

The problem of consciousness

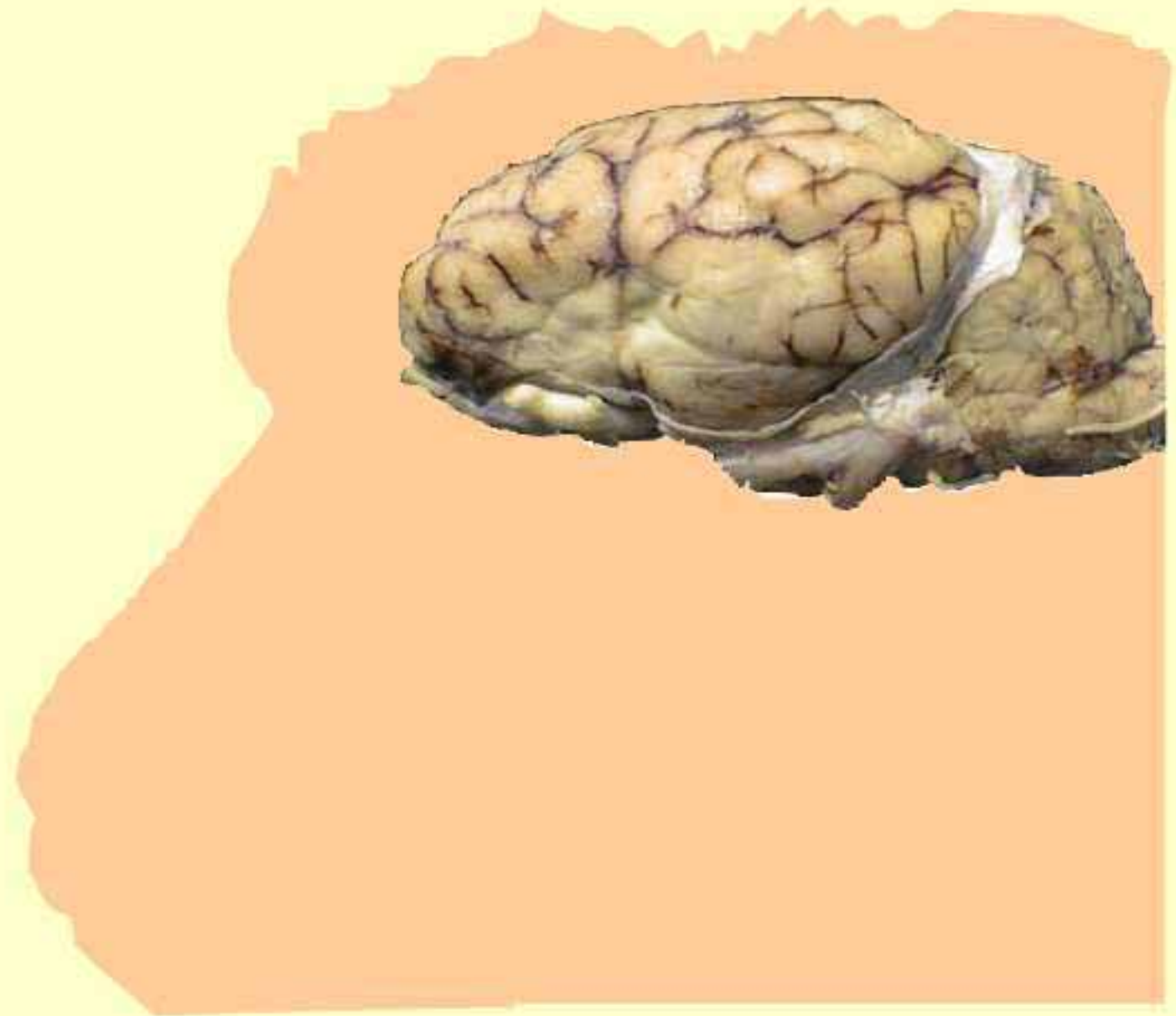
Being conscious involves considerable brain activity



The problem of consciousness



The problem of consciousness



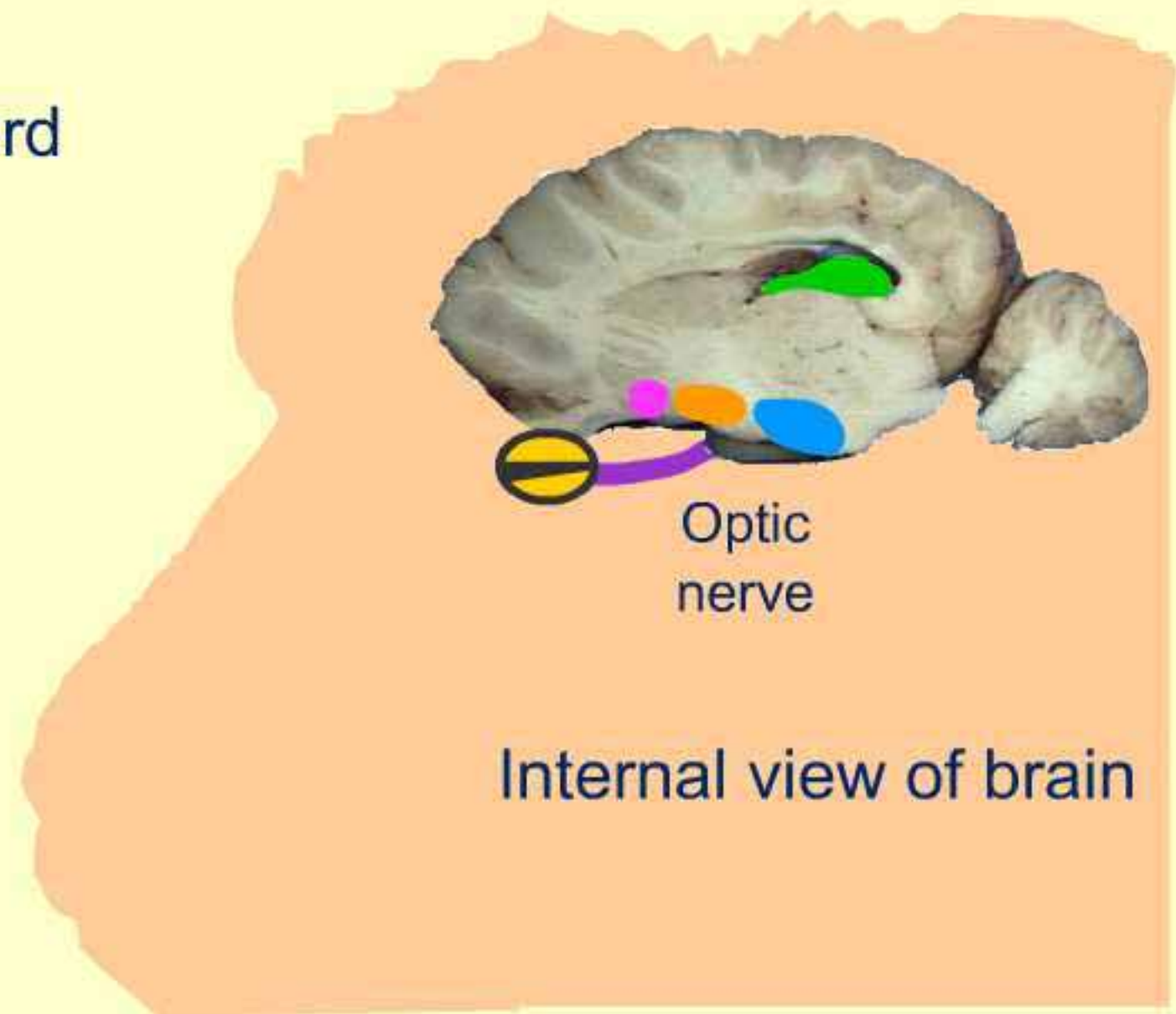
During oestrus - male attractive

The problem of consciousness

- Hippocampus - memory
- Amygdala - emotion
- Hypothalamus - sex
- nuc. accumbens - reward



During oestrus - male attractive



The problem of consciousness



Optic
nerve

Internal view of brain

'In sight, but out of mind ?'

Not during oestrus - male not attractive

Self-awareness and the problem of identity

What are the implications of having self-awareness ?

- Better understanding of others
- Self-motivation and feelings of worth
- Self-doubt, feeling worthless
- Self-expression through artistic and creative media

Self-awareness and the problem of identity

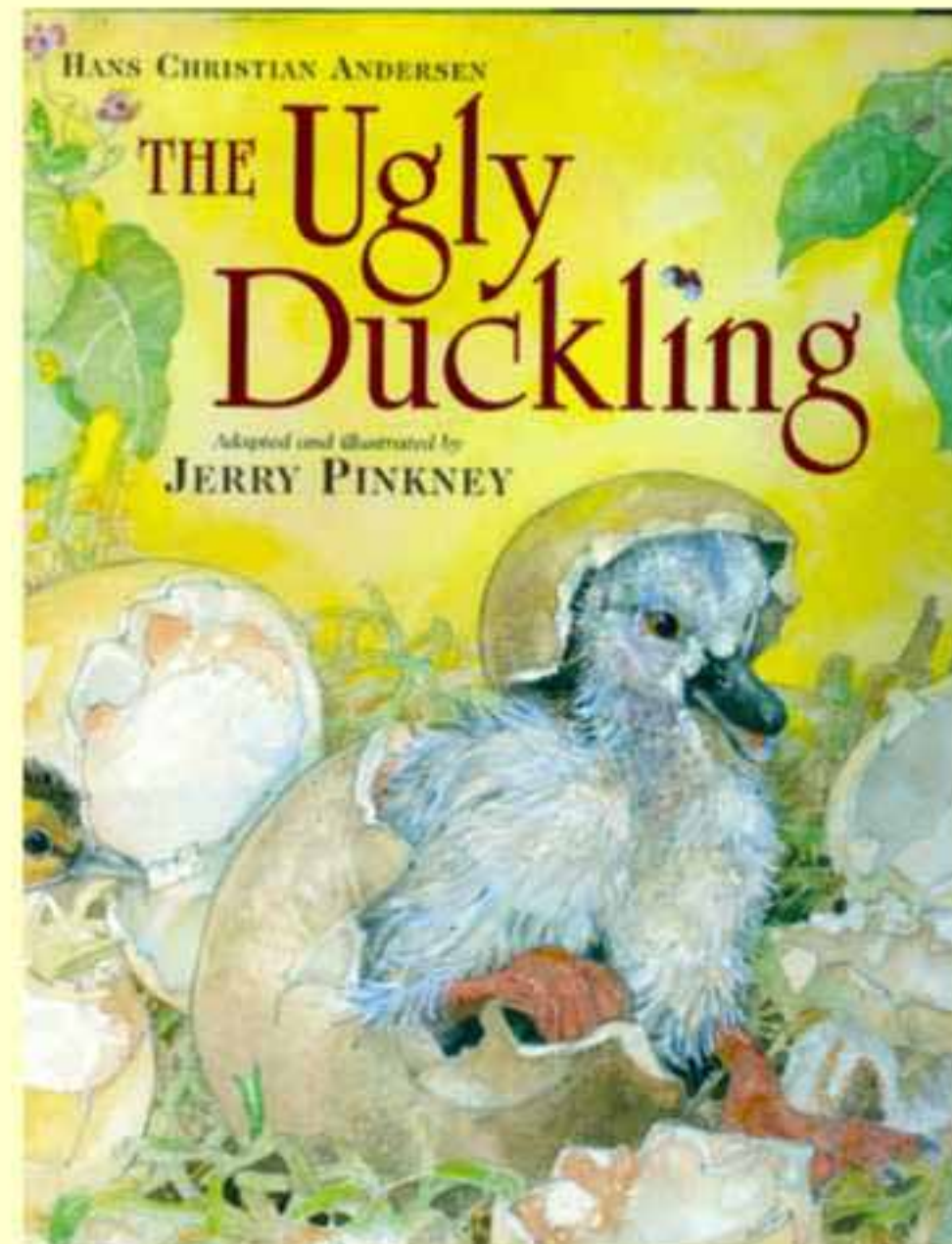
What are the implications of having self-awareness ?

- Moral values
- 'There is nothing either good or bad but thinking makes it so' (Hamlet)
- 'Man is an animal who thinks' (Seneca)
- Concepts of divinity

What about other species ?

- Our self-awareness makes us empathically attribute this same ability to animals
- 'The Ugly Duckling'

-



What about other species ?

- Our self-awareness makes us empathically attribute this same ability to animals
- 'The Ugly Duckling'
- 'When I was a boy I remember two thoughts kept occurring to me and made me laugh. An owl frightened by darkness and a fish afraid of water. Why did I think of them ? Because I felt, dimly, the difference between what is and what should be; between having to endure and finding one's burden unendurable'

(Brand, Act 1. Ibsen)



The quest for proof of self-awareness: Different levels of representation

Third order:

aware that someone else is capable of thinking about what a third party is thinking about



How do we establish self-awareness in other animals ?

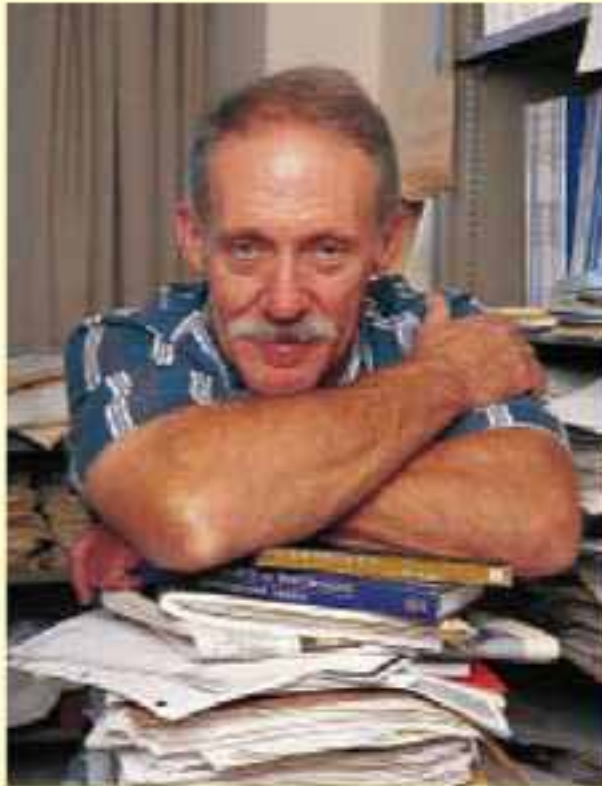
'Mirror mirror on the wall who is the fairest of them all ?'



How do we establish self-awareness in other animals ?

The story of the monkey in the mirror

- 1970 Gordon Gallup Jr introduced mirrors to chimpanzees



How do we establish self-awareness in other animals ?

The story of the monkey in the mirror

- 1970 Gordon Gallup Jr introduced mirrors to chimpanzees
- Mirror for ten days



-
-
-
-
-

How do we establish self-awareness in other animals ?

The story of the monkey in the mirror

- 1970 Gordon Gallup Jr introduced mirrors to chimpanzees
- Mirror for ten days
- Social responses and self-directed behaviours scored



How do we establish self-awareness in other animals ?

The story of the monkey in the mirror

- 1970 Gordon Gallup Jr introduced mirrors to chimpanzees
- Mirror for ten days
- Social responses and self-directed behaviours scored
- Animal anaesthetised and marks placed on top of eye and opposite ear
- Allowed to recover for a day or more
- Re-introduced to the mirror
- Score times marks are touched



How do we establish self-awareness in other animals ?

The story of the monkey in the mirror

Results



-

-

-

-

How do we establish self-awareness in other animals ?

The story of the monkey in the mirror

Results	✓	✗
- Chimpanzees	73 (44.8%)	90 (55.2%)
- Orangutans	5 (83.3%)	1 (16.7%)
- Gorillas	6 (26.1%)	17 (73.9%)
- Gibbons	0 (0%)	3 (100%)



How do we establish self-awareness in other animals ?

The story of the monkey in the mirror

- Bonobos and gibbons show mirror directed behaviour

-
-
-
-



How do we establish self-awareness in other animals ?

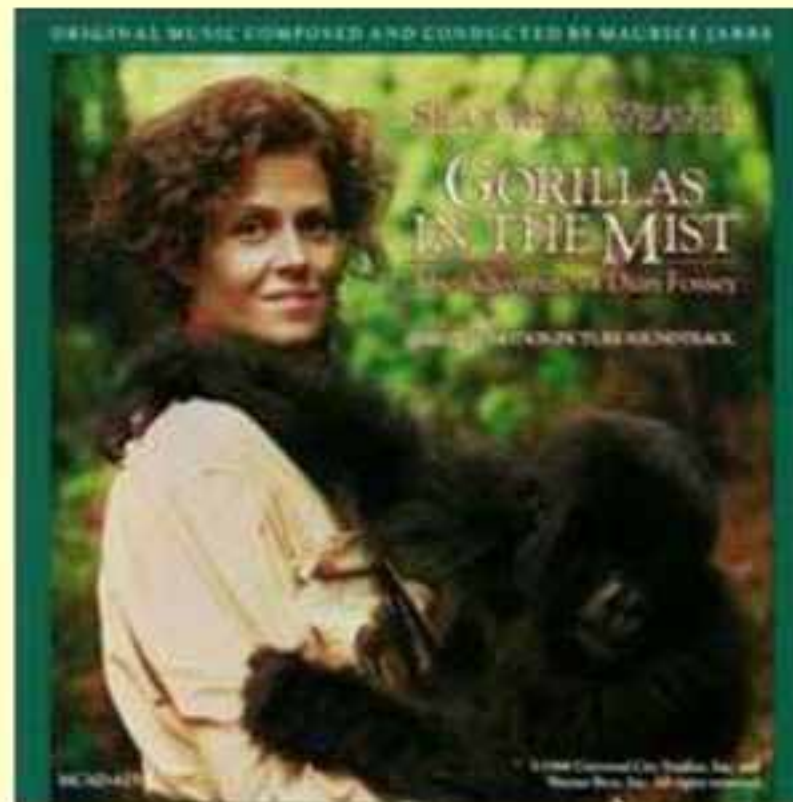
The story of the monkey in the mirror

- Bonobos and gibbons show mirror directed behaviour
- Are 'Gorillas in the mist' for self-recognition ?

-

-

-



How do we establish self-awareness in other animals ?

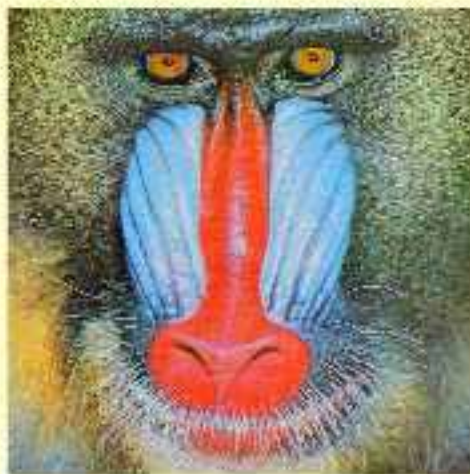
The story of the monkey in the mirror

- Bonobos and gibbons show mirror directed behaviour
- Are 'Gorillas in the mist' for self-recognition ?
- Karyl Swartz and Robert Shumaker
- Make spots more interesting
- Laser show gorillas



What about monkeys other than apes ?

- Baboons, guenons, macaques, squirrel monkeys, owl monkeys, marmosets, cotton-top tamarins, lemurs and bush-babies
- All fail to pass the mirror test



What about monkeys other than apes ?

- Baboons, guenons, macaques, squirrel monkeys, owl monkeys, marmosets, cotton-top tamarins, lemurs and bush-babies
- All fail to pass the mirror test

-



What about monkeys other than apes ?

- Baboons, guenons, macaques, squirrel monkeys, owl monkeys, marmosets, cotton-top tamarins, lemurs and bush-babies
- All fail to pass the mirror test
- Can learn to use mirror to detect other objects



Dolphins in the mirror

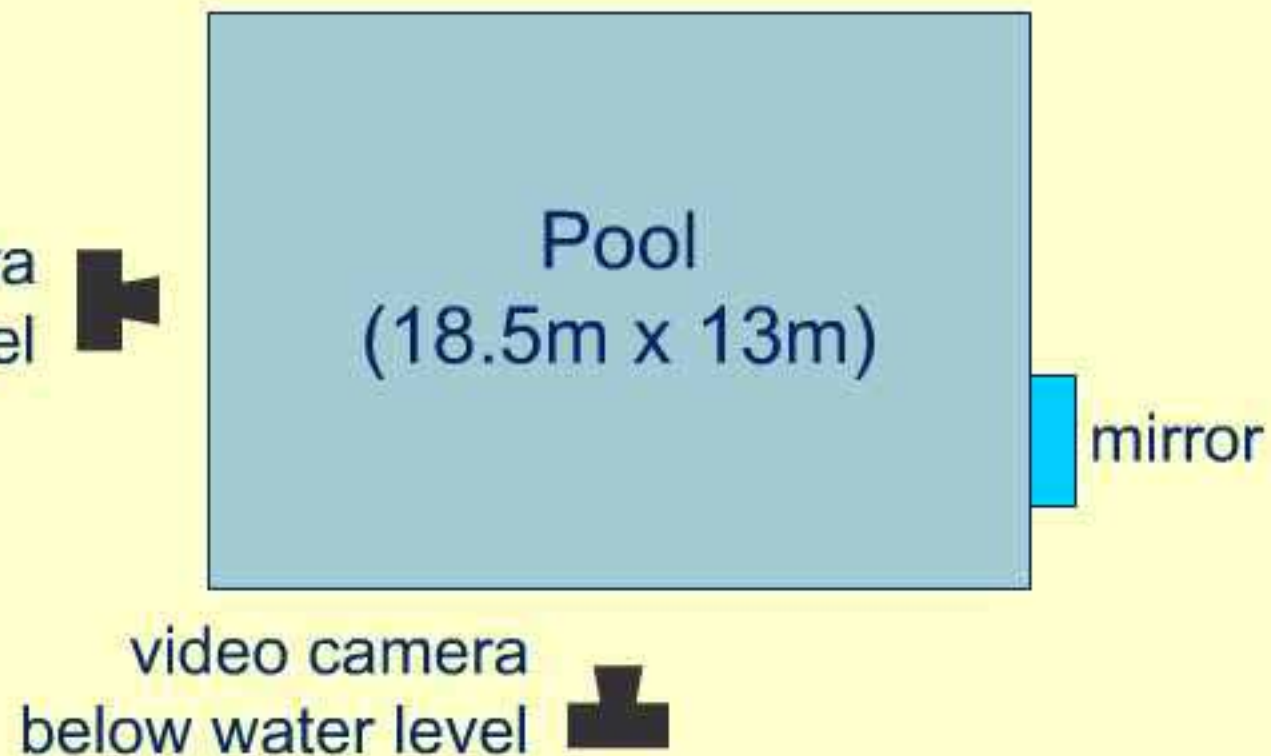
Reiss and Marino 2001

- Do show mirror self recognition

-



video camera
below water level



Dolphins in the mirror

Reiss and Marino 2001

- Do show mirror self recognition

-



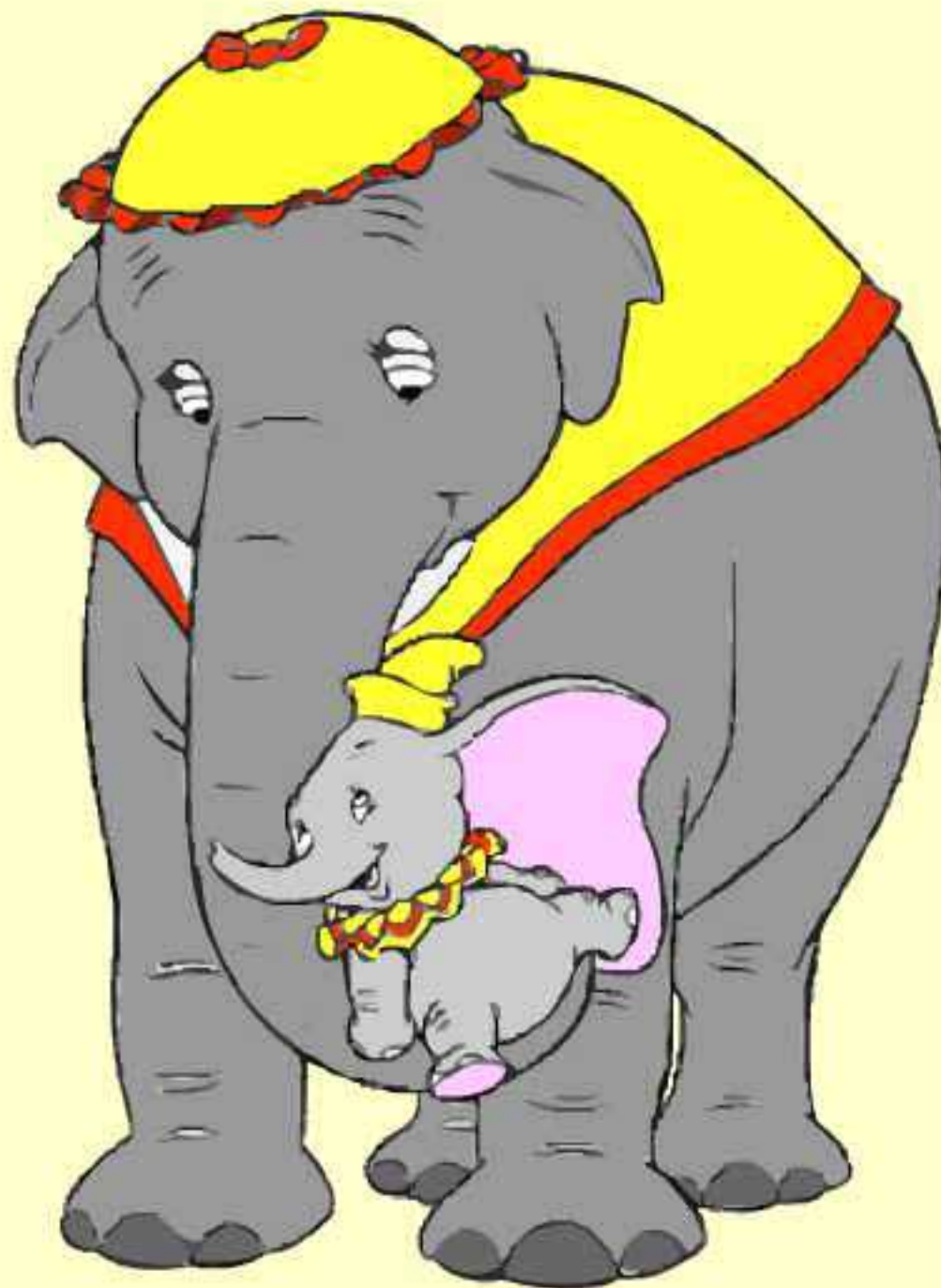
Example mark



Observation videos

Other animal species in the mirror

- Elephants in a Las Vegas casino - Patricia Simonet



Humans in the mirror

- Cannot pass test until 18 - 24 months of age
- If video used to introduce a delay requires age above 4 years



Standard tests for establishing human theory of mind

- Knowing that others have the solution
- Knowing that others can lie
- Knowing that others can hold false beliefs

Does passing the mirror test constitute proof of theory of mind ?

- What about other evidence in animals ?
- Co-operative transfer

-

-

-



Does passing the mirror test constitute proof of theory of mind ?

- What about other evidence in animals ?
- Co-operative transfer
- Result: Chimpanzee - ✓ Rhesus monkey - ✗
- Knowing that someone can see you



Does passing the mirror test constitute proof of theory of mind ?

- What about other evidence in animals ?
- Co-operative transfer
- Result: Chimpanzee - ✓ Rhesus monkey - ✗
- Knowing that someone can see you

-



Does passing the mirror test constitute proof of theory of mind ?

- What about other evidence in animals ?
- Co-operative transfer
- Result: Chimpanzee - ✓ Rhesus monkey - ✗
- Knowing that someone can see you
- Two-year old humans have no problem with this test



Deception

- Deception strategies for obtaining food or sex
- Chimpanzees and record players



Empathy with other individuals showing grief or depression

- Responses to grief and depression in others

-



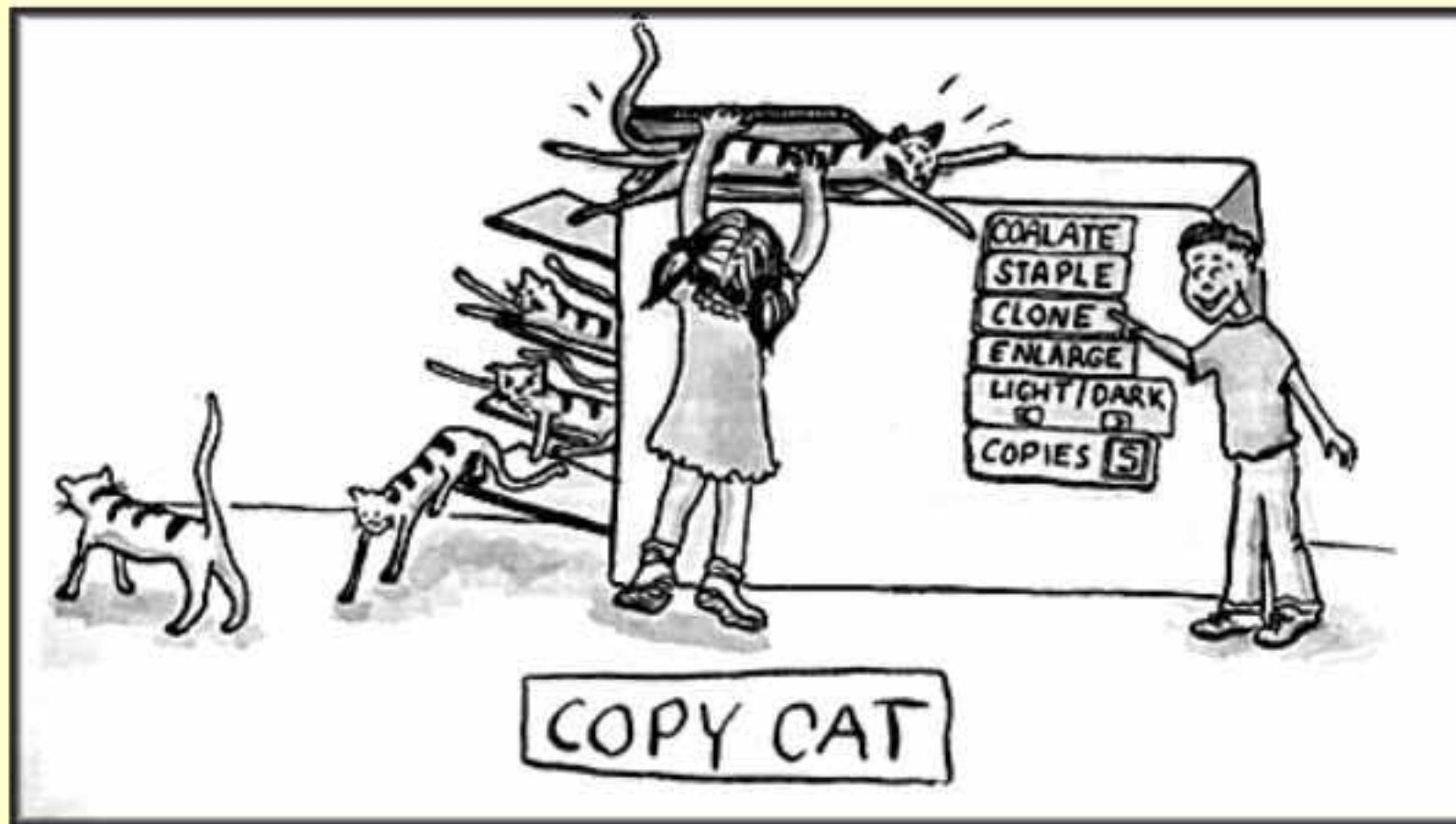
Empathy with other individuals showing grief or depression

- Responses to grief and depression in others
- Helping the wounded



Imitation

- Simple Simon and copycats



Imitation

- Simple Simon and copycats
- Tool use

-

-



Imitation

- Simple Simon and copycats
- Tool use
- Following gaze
-



Imitation

- Simple Simon and copycats
- Tool use
- Following gaze
- Understanding finger pointing



Artistic representation

Chimpanzee 'art'



'bird'
Washoe



'toothbrush'
Washoe



'redberry'
Washoe



'gocar'
Tatu

Knowing your place and the places of others in a social hierarchy

- Dorothy Cheney and Robert Seyfarth

-

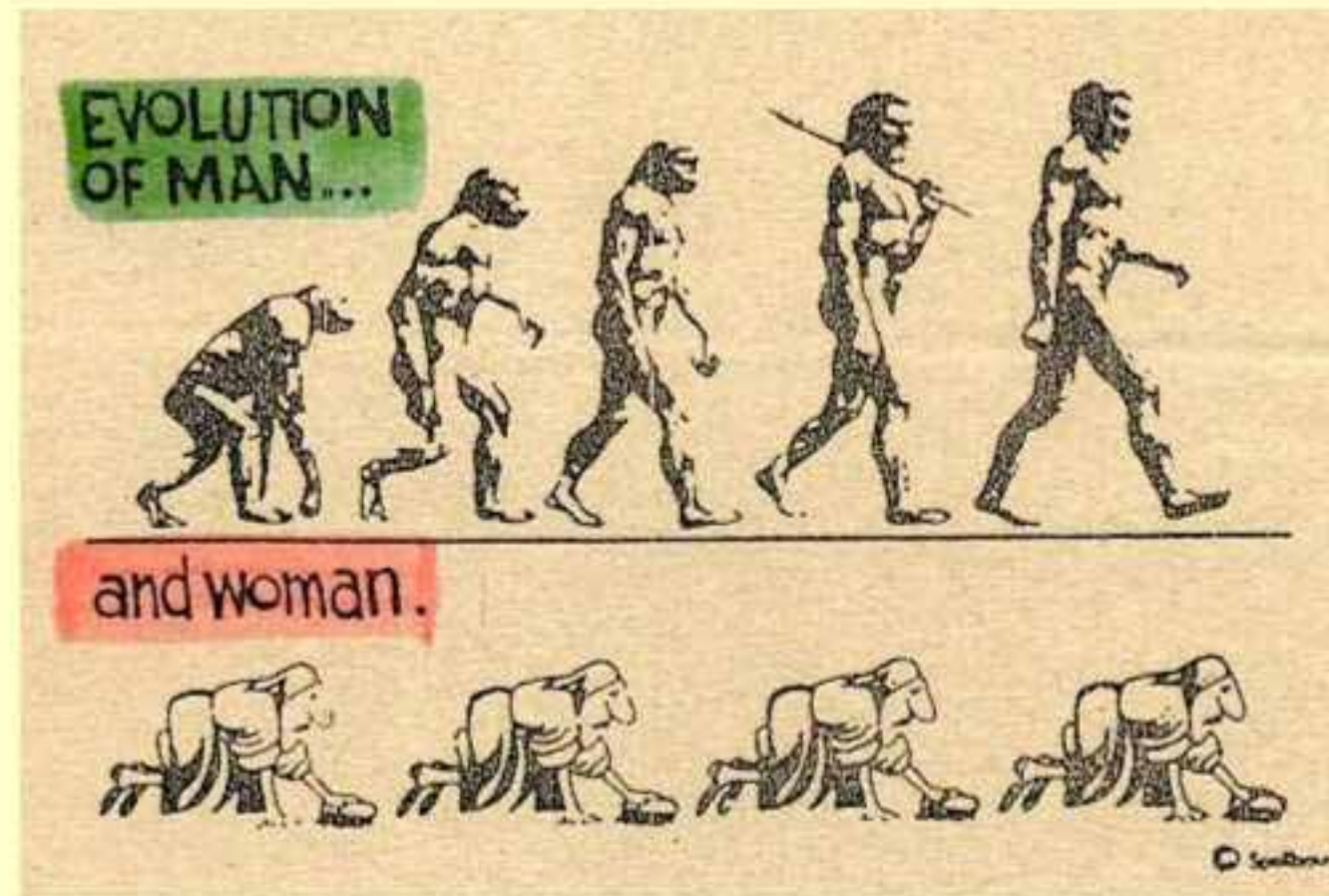
-

-



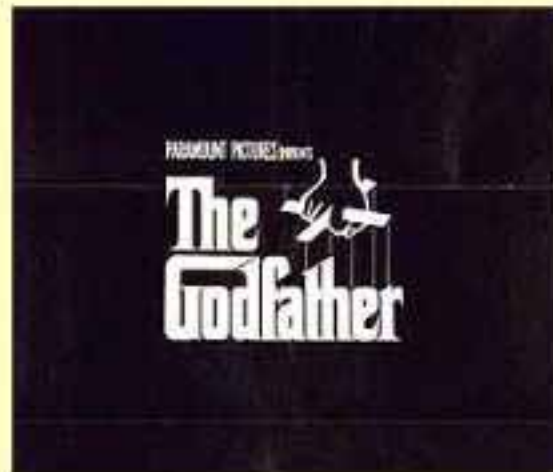
Knowing your place and the places of others in a social hierarchy

- Dorothy Cheney and Robert Seyfarth
- Knowing who's who in the pecking order



Knowing your place and the places of others in a social hierarchy

- Dorothy Cheney and Robert Seyfarth
- Knowing who's who in the pecking order
- Taking it out on the weaker relatives of your aggressors
-



Knowing your place and the places of others in a social hierarchy

- Dorothy Cheney and Robert Seyfarth
- Knowing who's who in the pecking order
- Taking it out on the weaker relatives of your aggressors
- Little big man vervet !



So what might apes see in the mirror ?

- Enhanced visualisation of body image ? - visual kinaesthesia

-

-

-

-



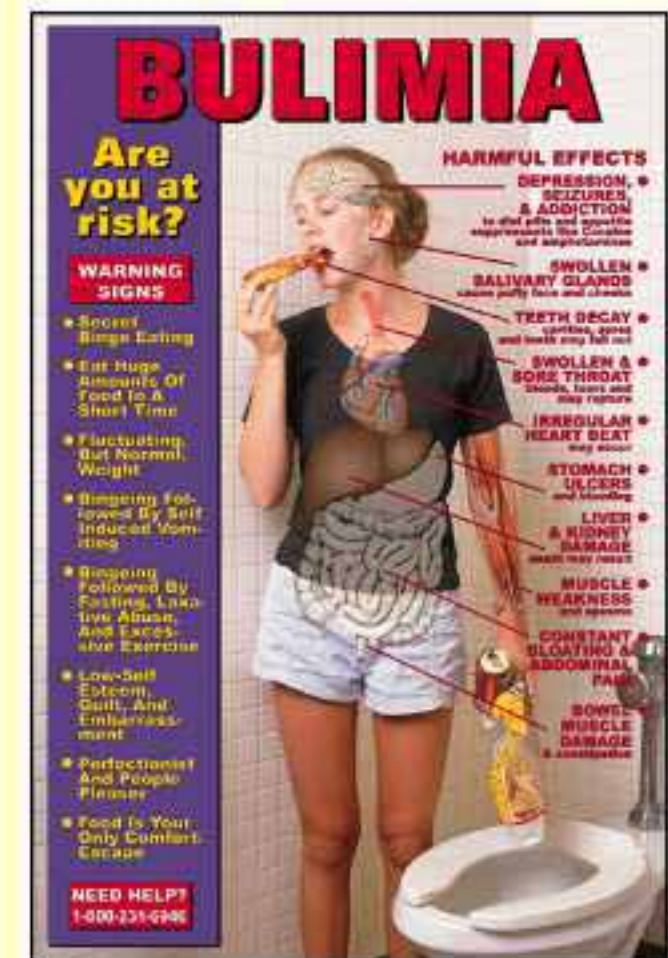
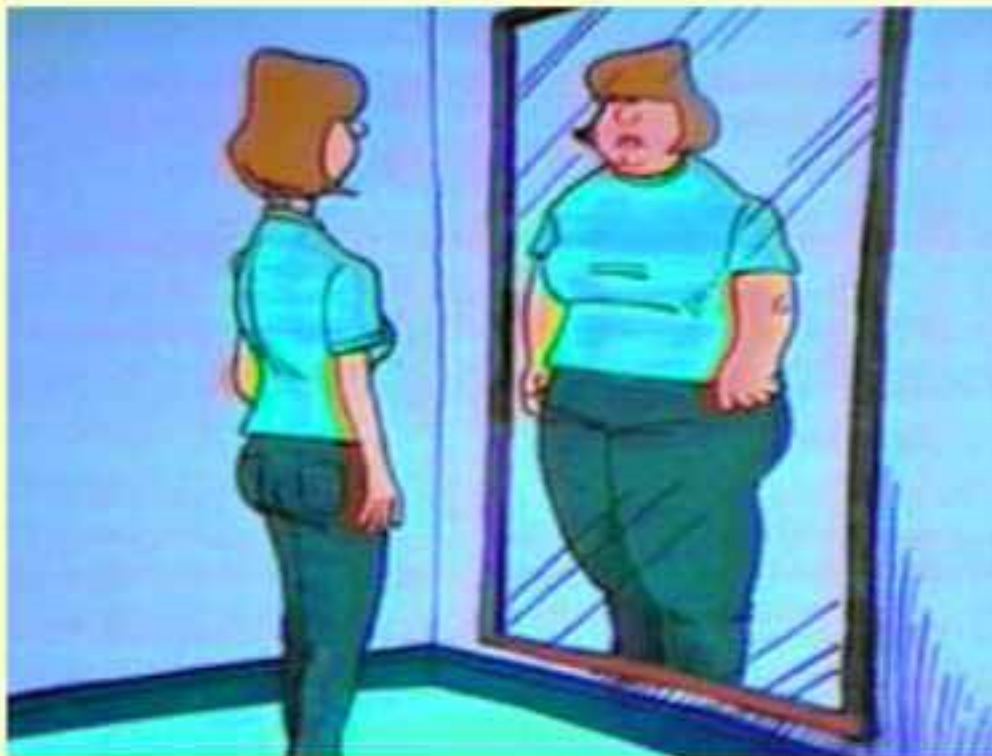
So what might apes see in the mirror ?

- Enhanced visualisation of body image ? - visual kinaesthesia
- 'That's the same as me' instead of 'That's me' ?



So what might apes see in the mirror ?

- Enhanced visualisation of body image ? - visual kinaesthesia
- 'That's the same as me' instead of 'That's me' ?
- Distorted body images in humans



So what might apes see in the mirror ?

- Enhanced visualisation of body image ? - visual kinaesthesia
- 'That's the same as me' instead of 'That's me' ?
- Distorted body images in humans
- Gorillas on the ground
-



So what might apes see in the mirror ?

- Enhanced visualisation of body image ? - visual kinaesthesia
- 'That's the same as me' instead of 'That's me' ?
- Distorted body images in humans
- Gorillas on the ground
- Supported by failure to deal with delayed video images



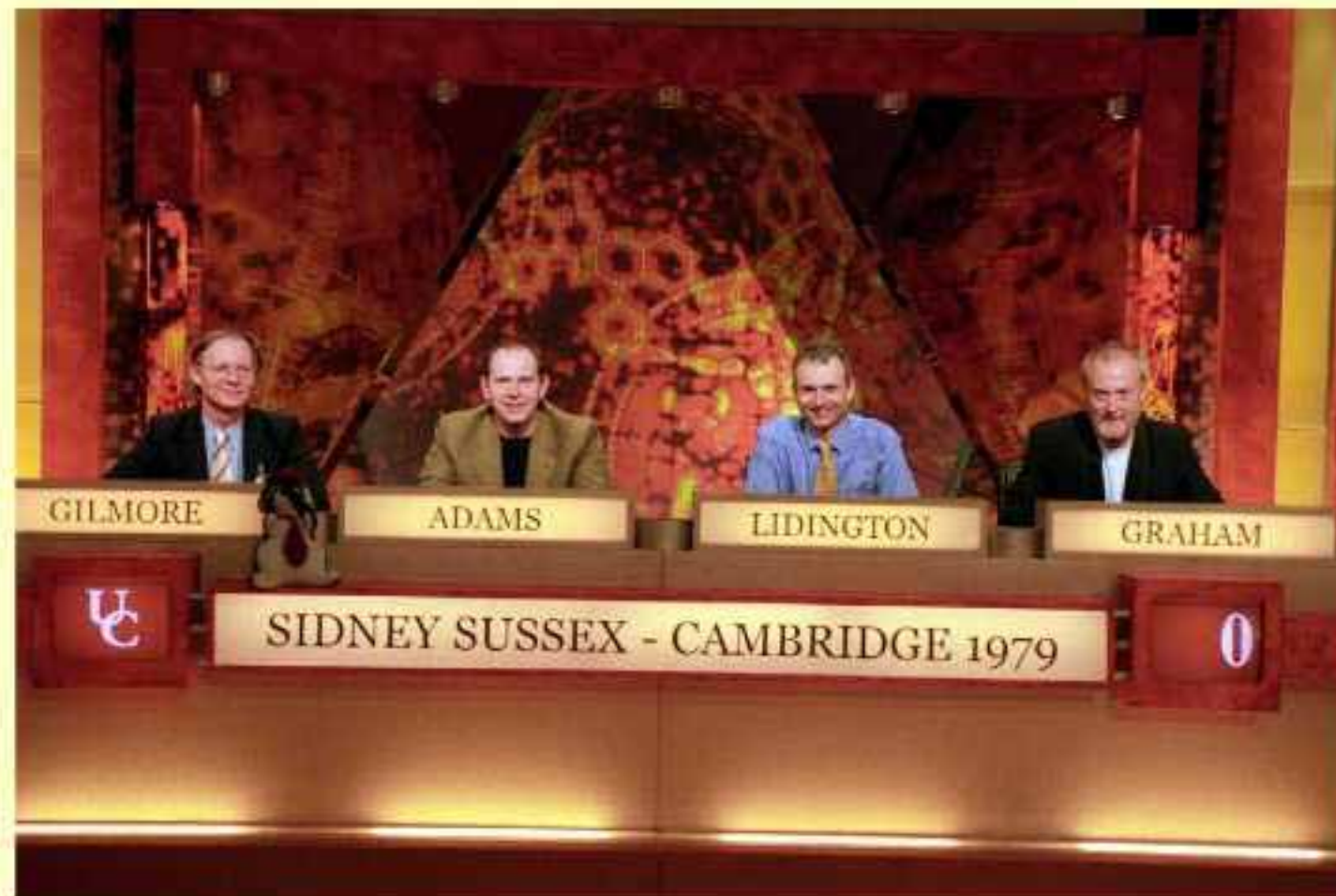
So are all animals radical behaviourists rather than cognitive psychologists ?

- Most tests are of knowledge of information

-

-

-



So are all animals radical behaviourists rather than cognitive psychologists ?

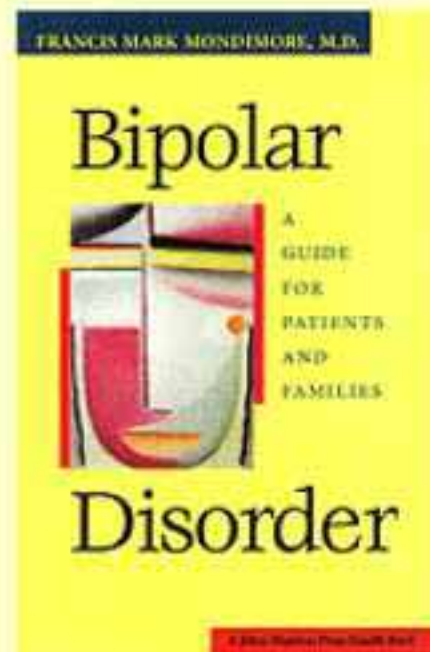
- Most tests are of knowledge of information
- Children attribute feelings and emotions to others first
- However other animals are better at detecting body responses to emotion
- Timing of mirror test in chimpanzees may be critical



Do humans ever fail self-recognition or theory of mind tests ?

- Mental retardation, Autism, schizophrenia, bipolar disorder, Alzheimer's, senile dementia - brain damage

-



Do humans ever fail self-recognition or theory of mind tests ?

- Mental retardation, Autism, schizophrenia, bipolar disorder, Alzheimer's, senile dementia - brain damage
- So are animals like autistic humans ?

Alternative strategies for achieving theory of mind

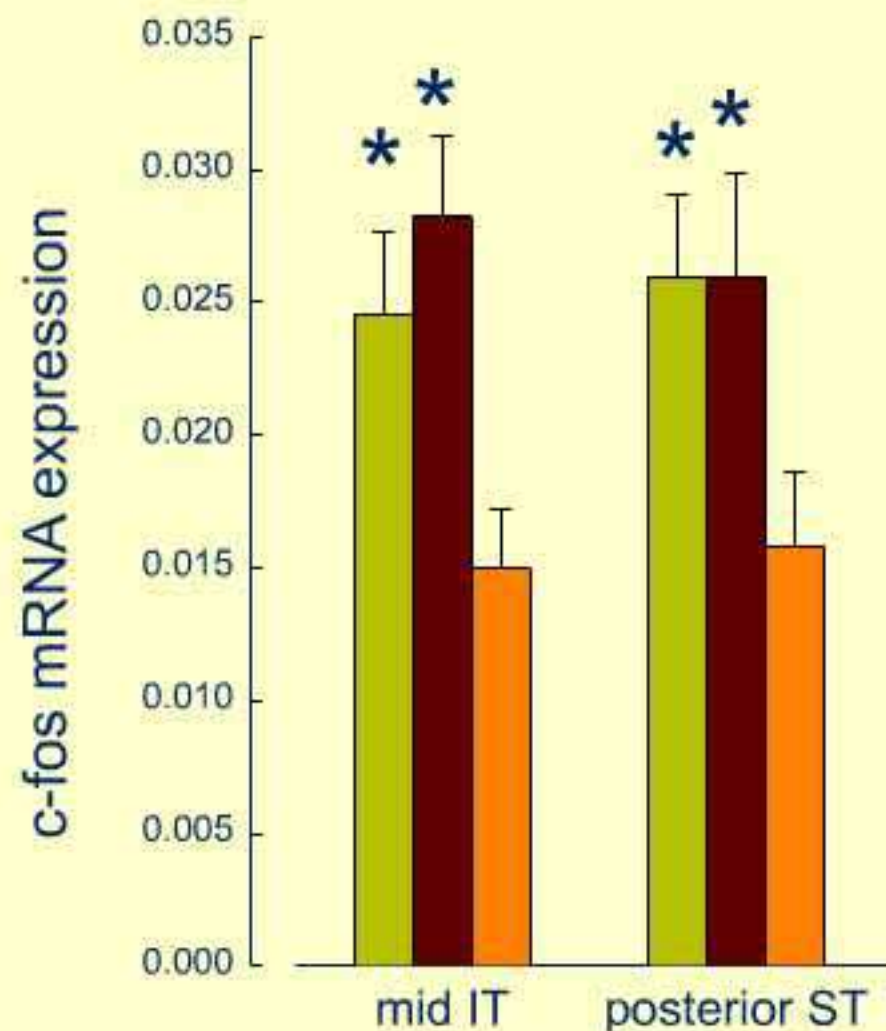
- Autism and 'picture in the head' teaching

-



Alternative strategies for achieving theory of mind

- Autism and 'picture in the head' teaching
- Mental imagery in animals ?



Face of lamb



Bleat of own lamb



Mixed bleat of own lamb

Alternative strategies for achieving theory of mind

- Autism and 'picture in the head' teaching
- Mental imagery in animals ?
- Involuntary, driven by perceived changes in internal state or environment

Alternative strategies for achieving theory of mind

- So animals are like Sky digital interactive ?

-

-

-

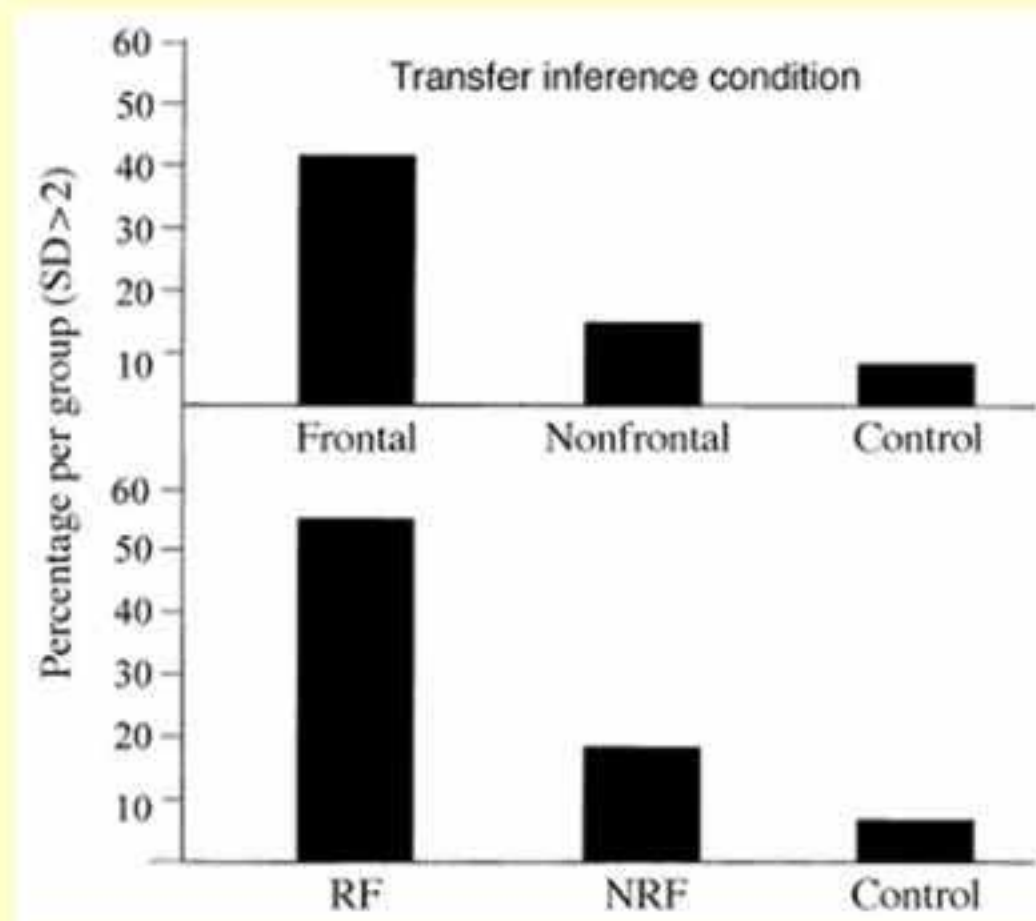


Alternative strategies for achieving theory of mind

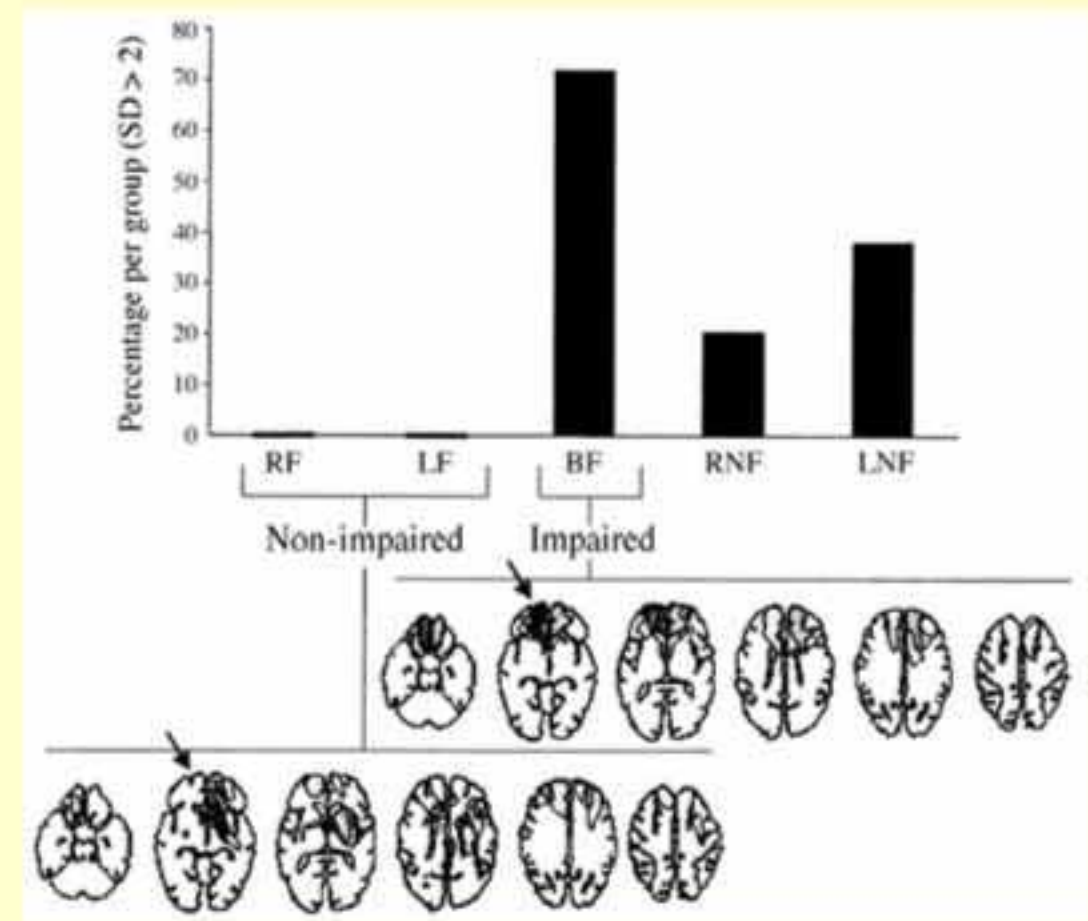
- So animals are like Sky digital interactive ?
- No, because picture replays are also emotion replays
- Could be smell, sound or touch based
- Could explain increased sensitivity to emotional and information states in others without empathy

The human brain, self-recognition and theory of mind

- The frontal cortex and amygdala are important



Transfer inference task



Deception task

Stuss *et al* 2001

The human brain, self-recognition and theory of mind

- The frontal cortex and amygdala are important
- Damage to these regions also may promote impulsivity, aggression and poor interpersonal skills
- Right hemisphere self-recognition advantage

-

-



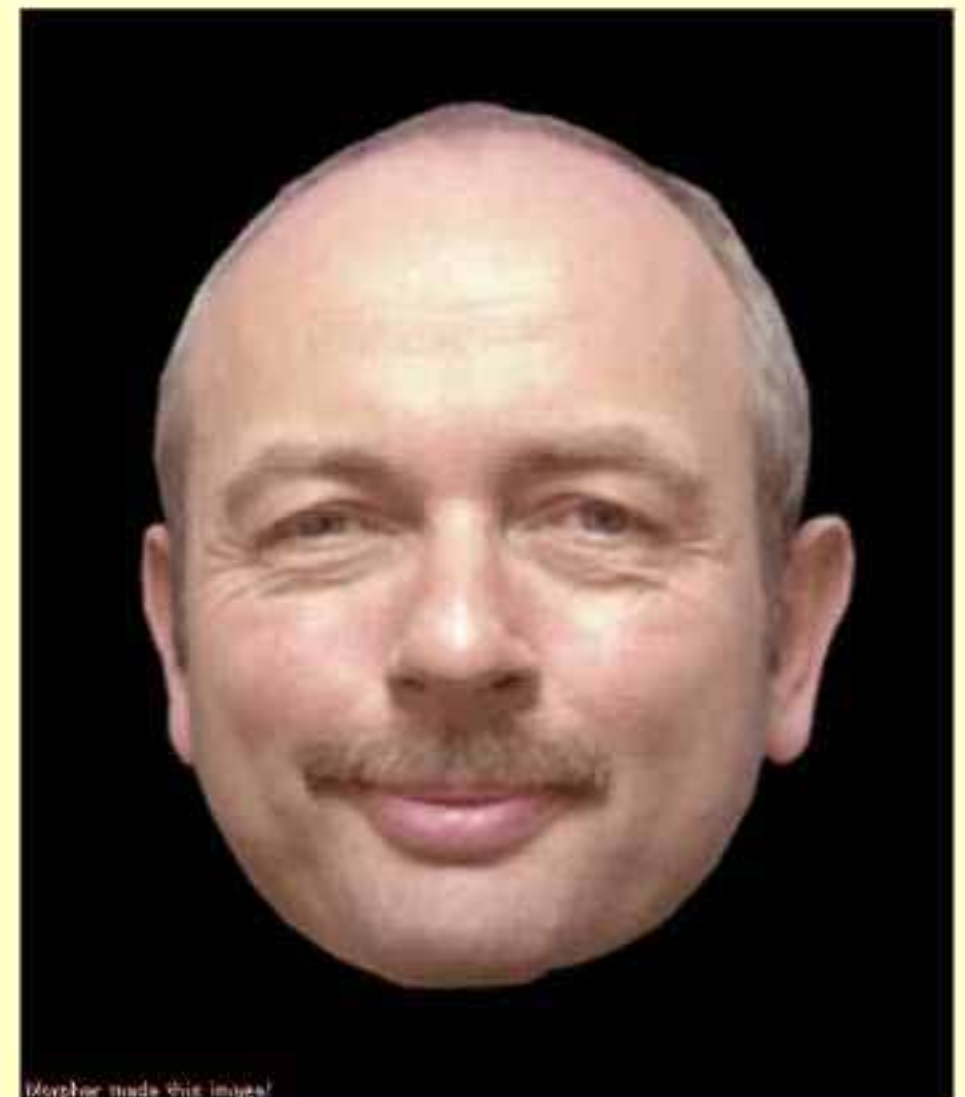
thinker made this image

The human brain, self-recognition and theory of mind

- The frontal cortex and amygdala are important
- Damage to these regions also may promote impulsivity, aggression and poor interpersonal skills
- Right hemisphere self-recognition advantage

-

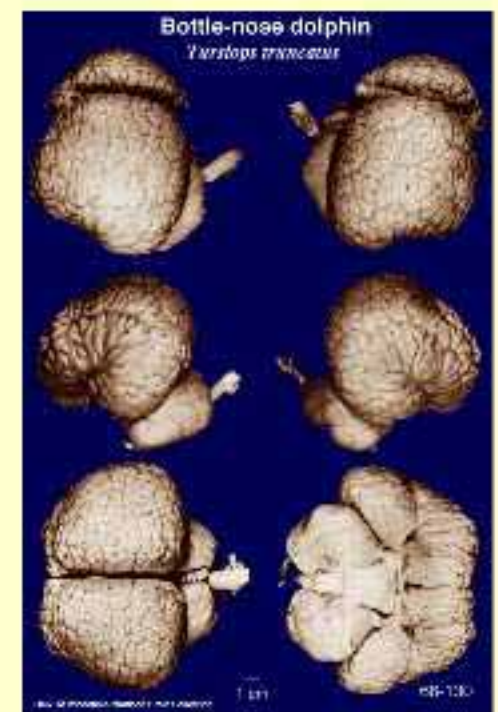
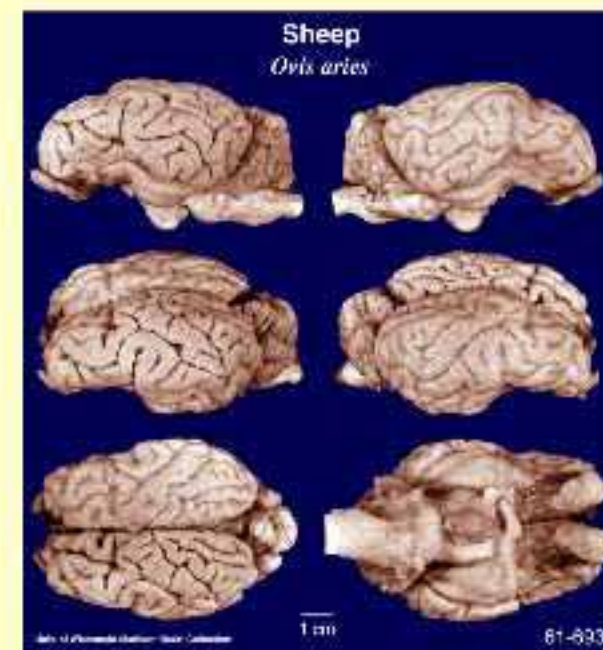
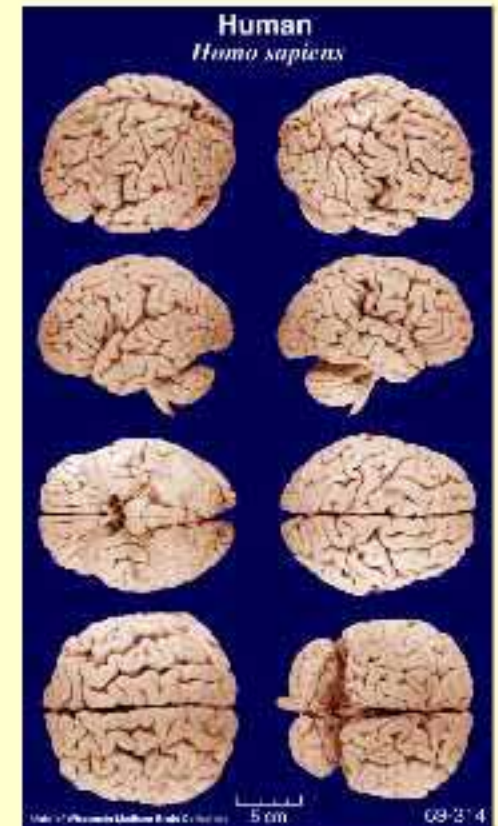
-



Morphe made this image!

The human brain, self-recognition and theory of mind

- The frontal cortex and amygdala are important
- Damage to these regions also may promote impulsivity, aggression and poor interpersonal skills
- Right hemisphere self-recognition advantage
- Other animals have these same brain regions

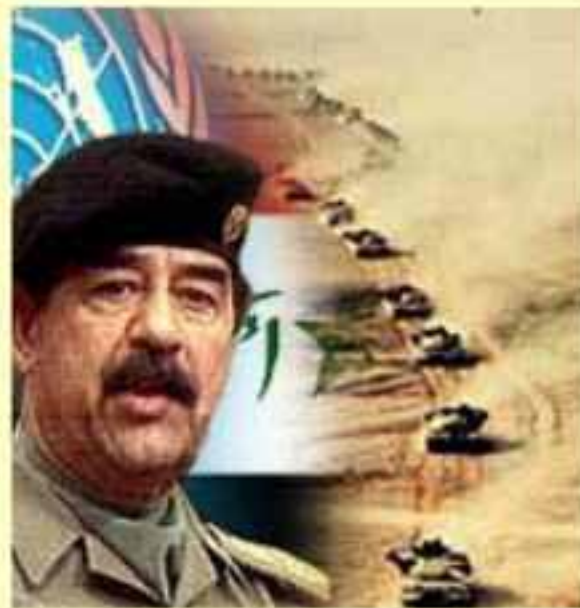


The human brain, self-recognition and theory of mind

- The frontal cortex and amygdala are important
- Damage to these regions also may promote impulsivity, aggression and poor interpersonal skills
- Right hemisphere self-recognition advantage
- Other animals have these same brain regions
- So is it a question of connectivity and language ?

So can other species have an identity crisis ?

- If you have no self-concept or ability to see that things can appear different to others the answer must be no
- Humans may adopt this perspective



So can other species have an identity crisis ?

- If you have no self-concept or ability to see that things can appear different to others the answer must be no
- Humans may adopt this perspective
- Not a permanent limitation

Example where animals do not have an identity crisis

- Being raised by other species



Example where animals do not have an identity crisis

- Being raised by other species
- Preferring other species to your own



Example where animals do not have an identity crisis

- Being raised by other species
- Preferring other species to your own
- Ugly ducklings ✖
- Fish afraid of water ✖
- Owls afraid of darkness ✖

Some final conclusions:

- Limited awareness of self in other animals
- Limited ability to empathise with the thoughts and feelings of others
- Some great apes and dolphins recognise themselves in the mirror
- May represent - 'that is the same as me' rather than 'that is me'
- The human brain is uniquely organised to achieve its theory of mind

Some final conclusions:

- Animals may approximate to this by generating action-replay imagery
- They have retained sophisticated senses for detecting emotional and psychological states in others
- With a limited self-concept or ability to see things from another's point of view they cannot develop an identity crisis