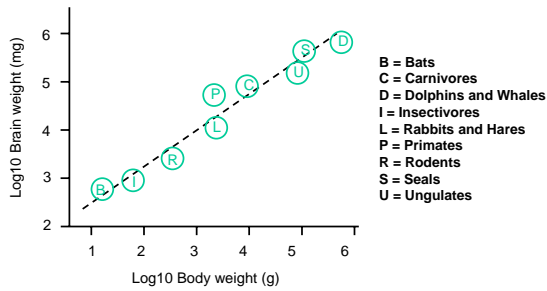


Stress and its impact on behaviour and cognition

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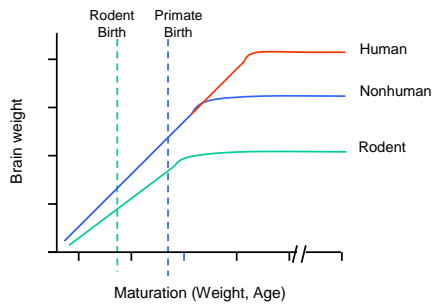
Average log values for brain and body weights in adult mammals



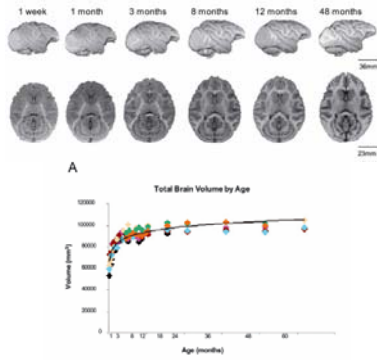
RD Martin (1990) Primate Origins and Evolution

Fetal and postnatal increase in brain weight in relation to body weight

- Rodent: short gestation followed by continuation of rapid CNS growth postnatally
- NHP: long gestation period with rapid CNS growth followed by slowing postnatally
- Human: long gestation period with rapid CNS growth that continues postnatally



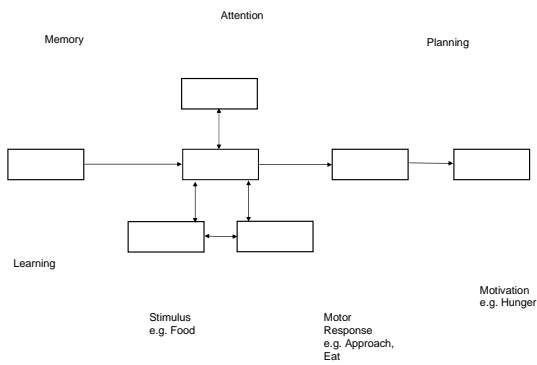
Longitudinal magnetic resonance imaging study of rhesus macaque brain development

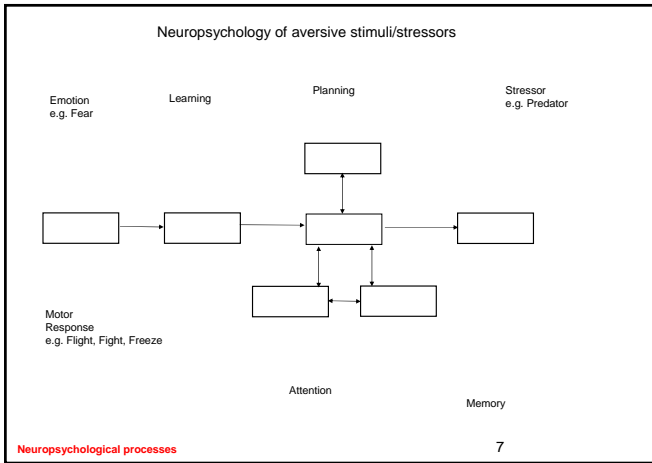


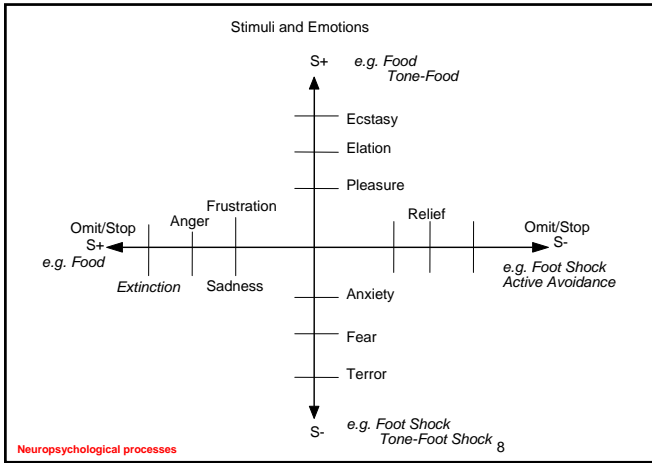
Stress and its impact on behaviour and cognition in primates

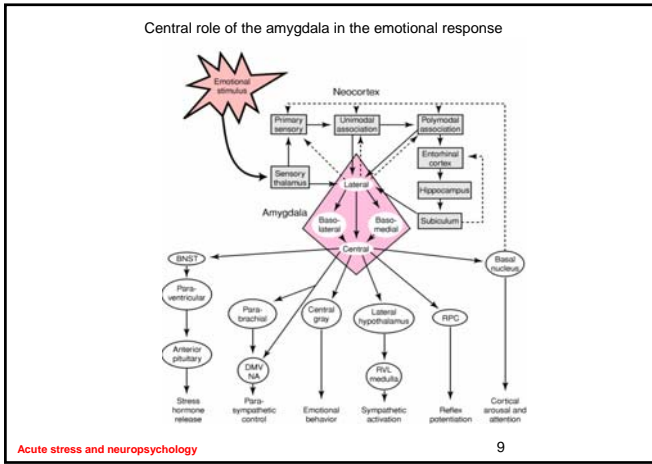
- Neuropsychological processes
- Acute stress and neuropsychology
- Neuropsychological testing
- Chronic stress and neuropsychology

Neuropsychology of rewarding stimuli

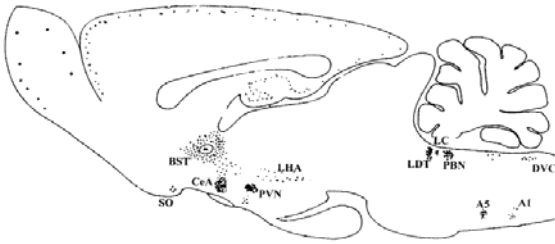






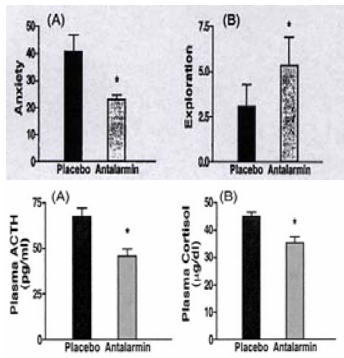


Distribution of corticotrophin releasing hormone/factor in the rat brain



BST = bed nucleus of the stria terminalis; CeA = central nucleus of the amygdala; LHA = lateral hypothalamic area; PVN = paraventricular nucleus of the hypothalamus; LC = locus coeruleus; A1, A5 = noradrenergic cells

Reduction of social anxiety and HPA activity in rhesus macaques by CRF receptor antagonist



Relationships between stress, learning and memory



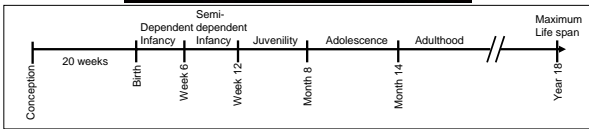
CANTAB Translational study potential



Visual stimuli on Touch sensitive computer screen

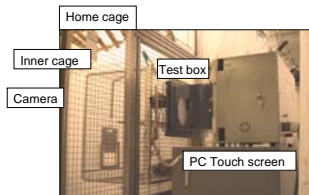
Comparable human and monkey neuropsychological testing, in order to further understanding of the causation and therefore treatment of human cognitive function and disorders

Development in the common marmoset



Experimental Facilities and CANTAB Study Design

- Male-female pairs of marmosets + offspring
- Large cages, controlled breeding
- Trained marmosets maintained in male-female pairs or family groups
- Home cage training and testing
- One neuropsychological task per study



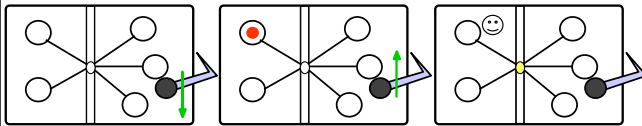
Cognitive neuropsychological processes

Attention: The cognitive neural processes via which the most important stimulus in the environment becomes the focus of behaviour and stimulus processing, including:

- maintenance of alert state to detect rare stimuli (sustained attention, vigilance)
- simultaneous monitoring of two or more important stimuli (divided attention)
- maintaining focus in the presence of distracting stimuli (selective attention)

Working memory: The short-term retention of visual and spatial information over periods of seconds, in contrast to long-term retention and then recall across time periods of minutes, weeks, years.
Working memory is used to hold information on-line in the service of cognitive activities such as comprehending, reasoning, and problem solving

Attention: 5-choice serial reaction time task



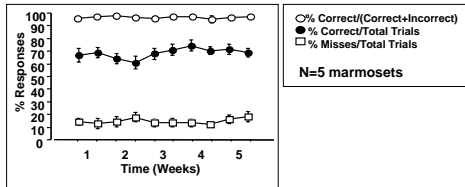
Independent parameters:

- 45-60 trials/session (20 min)
- Lever press duration: 0.1-1.0s
- Stimulus duration: 0.1-1.0s
- Reward: 8s banana milkshake
- Punishment: 4s time out
- Inter-trial interval: 4s

Dependent measures:

- %Correct/Total trials
- %Accuracy (Correct/Correct+Incorrect)
- Response omissions
- Release lever too soon
- Lever release latency
- Screen response latency

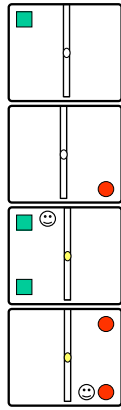
Attention: 5-choice serial reaction time task



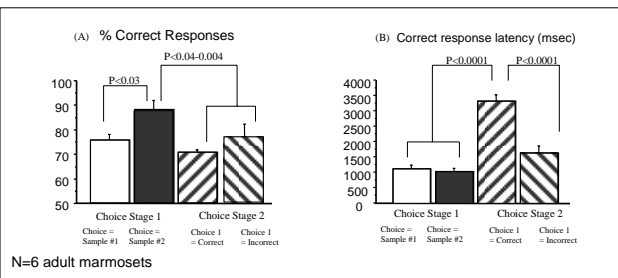
	Stimulus Duration		
	0.1 s	0.5 s	1.0 s

% Correct/Total Trials	54.1 ± 8.7	77.0 ± 2.0	78.5 ± 5.2
% Correct/Total Responses	67.6 ± 9.1 <i>a</i>	93.6 ± 4.1 <i>b</i>	96.0 ± 0.8 <i>b</i>
% Misses	11.1 ± 5.9	7.4 ± 0.7	6.7 ± 1.3
% Release Lever to soon	9.6 ± 2.7	9.6 ± 5.8	11.8 ± 5.8
Lever Release Latency ms	524.1 ± 77.9	458.7 ± 61.5	505.1 ± 41.9
Screen Response Latency ms	1743.8 ± 207.2	1808.9 ± 99.7	1817.8 ± 93.7

Working memory: Concurrent delayed matching to position task

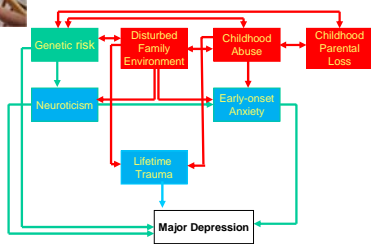


Working memory: Concurrent delayed matching to position task



Neuropsychological testing

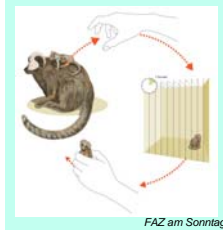
Importance of early-life social stress in depression



Common Marmoset early deprivation (ED)



- Twins (dizygotic)
- Infants aged P2-28
- Isolation for 0.5-2 h per day (ED)
- Time of isolation variable
- Isolation in light/active phase at room temperature
- Comparison group: Brief handling (CON)



FAZ am Sonntag

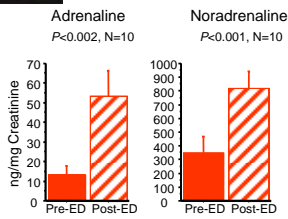


Pryce et al (2005) Neurosci Biobehav Rev 29: 649

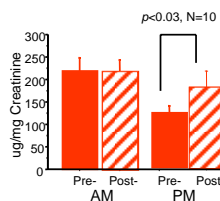
Early deprivation induces acute stress responses



Catecholamines in Urine
Days 2-28



Cortisol in Urine
Days 2-28

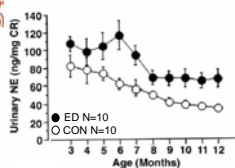


Detting et al. (2002) Biol. Psychiatry, 52: 1037

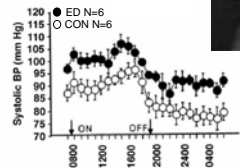
Early deprivation induces long-term effects on basal autonomic nervous system activity



Urinary noradrenaline



Systolic blood pressure via telemetry

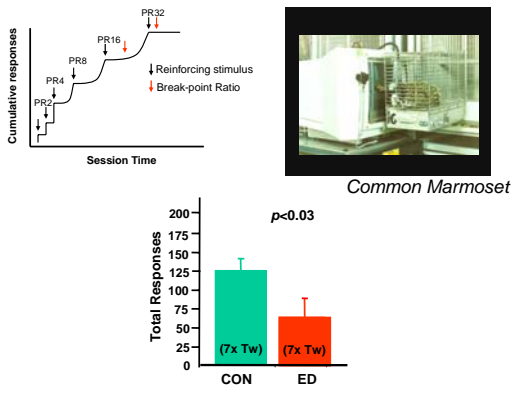


Pryce et al. (2004) Biol. Psychiatry 56: 72

From Depression to Neuropsychology

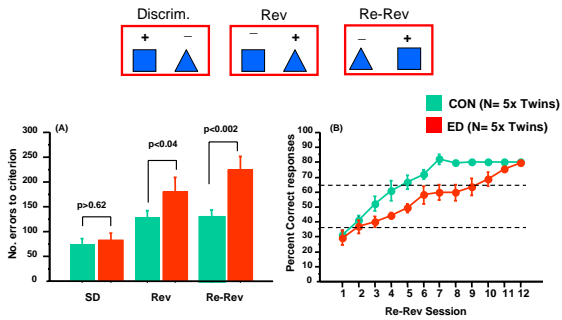
- Sadness or emptiness
 - Reduced interest or pleasure in daily activities
 - Weight loss
 - Insomnia
 - Psychomotor agitation
 - Fatigue or loss of energy
 - Worthlessness
 - Diminished concentration
 - Suicidal ideation or plan
-
- Lack of control/Helplessness
 - Increased sensitivity to negative feedback
-
- * Hyper-sensitivity to negative/aversive stimuli
 - * Hypo-sensitivity to positive/rewarding stimuli

Effects of ED on Reward wanting: progressive ratio reinforcement



Pryce et al. (2004) Biol Psychiatry 56: 72

Effects of ED on negative feedback sensitivity in common marmoset: Increased learned irrelevance?



Pryce et al (2004) Biol Psychiatry 56: 72

