Status Syndrome

Professor Ian Robertson
Course Outline

• Control: definitions and development
• Learned helplessness, depression and control
• Status Syndrome – socioeconomic factors in health
• Cognitive control – mechanisms of attentional control
• Neuroimaging and neuropsychological correlates of control
• Neurochemistry and neurophysiological covariates of control
• Molecular genetics and evolution of control
• The biology of social dominance
• Implicit processing in dominance hierarchies
• Lifespan development and control
• Control and personality
Richard Burton and Charlton Heston
Richard Burton

- 7 Oscar Nominations between 1952 and 1977
- Best paid Hollywood actor in fifties
Charlton Heston

- 4th choice for leading actor in Ben Hur 1959.
- 1 ever Oscar nomination
Richard Burton and Charlton Heston

7 Oscar nominations, 0 Oscars

Born 1925: Age of Death 59

1 Oscar nomination, 1 Oscar

Born 1923: Age of Death 84
Winners had 25% lower mortality rate than nominees with all other relevant factors partialled out.

Winners lived an average of 3.6 years longer than nominees.

Winners of Nobel Prize lived for an average of 1–2 years longer than Nominees.

Wealth (size of prize) had no effect on longevity.

- *Journal of Health Economics 2008*
Lower grade in civil service, higher death rate

Chaturvedi et al 1998 BMJ
Low Control in workplace increases blood pressure

Steptoe et al
‘For people above a threshold of material wellbeing, another kind of well-being is central. Autonomy – in how much control you have over your life – and the opportunities you have for full social engagement and participation are crucial for health, wealth and longevity… Degrees of control and participation underly the status syndrome.’

Michael Marmot *The Status Syndrome* (Page 2)
People not only value living well but having control over their live’

Amartya Sen

*Development and Freedom.*
THE HPA AXIS

Hypothalamus

Releasing factor

Anterior pituitary

ACTH
(through blood)

Adrenal cortex

Cortisol
PATHOPHYSIOLOGY OF STRESS

CORTISOL

ADRENALINE

INCREASED BLOOD SUGARS
Fig. 2. Physiological correlates of the more stressful social rank. [Image credit: Bayard Colyear, Stanford Visual Arts Services]
Science 308, 648 (2005);
Robert M. Sapolsky, et al.
The Influence of Social Hierarchy on Primate Health

Fig. 1. (A and B) Affiliative behavior among subordinates can reduce the effects of stress. (A) Chimpanzees engage in social grooming. (B) A female tamarin monkey cares for another’s young while the mother feeds. (C and D) Stressful dominance behavior may take physical or psychosocial forms. (C) Male savanna baboons may fight over a kill. (D) A dominant male baboon intimidates a subordinate. [Image credit: Carin Cain/Science]
Table 1. Influence of societal characteristics on stress experienced by high- and low-ranking individuals. An asterisk indicates no rank-related trend.

<table>
<thead>
<tr>
<th>Societal characteristic</th>
<th>Individuals experiencing the most stress</th>
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<tbody>
<tr>
<td><strong>Dominance style and means of maintaining despotic dominance</strong></td>
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<tr>
<td>Despotic hierarchy maintained through frequent physical reassertion of dominance</td>
<td>High-ranking</td>
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<tr>
<td>Despotic hierarchy maintained through intimidation</td>
<td>Low-ranking *</td>
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<tr>
<td>Egalitarian hierarchy</td>
<td></td>
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<td><strong>Style of breeding system</strong></td>
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<tr>
<td>Cooperative</td>
<td>High-ranking</td>
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<tr>
<td>Competitive</td>
<td>Low-ranking *</td>
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<tr>
<td><strong>Stability of ranks</strong></td>
<td></td>
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<tr>
<td>Unstable</td>
<td>High-ranking</td>
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<tr>
<td>Highly stable</td>
<td>Low-ranking</td>
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<tr>
<td><strong>Availability of coping outlets for subordinates</strong></td>
<td>*</td>
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<tr>
<td>High availability</td>
<td></td>
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<tr>
<td>Low availability</td>
<td></td>
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<tr>
<td><strong>Ease with which subordinates avoid dominant individuals</strong></td>
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<tr>
<td>Easy avoidance</td>
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<tr>
<td>Difficult avoidance</td>
<td>Low-ranking</td>
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<tr>
<td><strong>Availability of alternative strategies to overt competition</strong></td>
<td>*</td>
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<tr>
<td>Present</td>
<td></td>
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<tr>
<td>Lacking</td>
<td>Low-ranking</td>
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<td><strong>Personality</strong></td>
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<tr>
<td>Dominants perceive neutral interactions as challenging; subordinates take advantage of coping strategies</td>
<td>High-ranking</td>
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<tr>
<td>Dominants are adept at exerting social control and highly affiliative; subordinates are poor at exploiting opportunities for coping and support</td>
<td>Low-ranking</td>
</tr>
</tbody>
</table>
Dominance Hierarchy Influences Adult Neurogenesis in the Dentate Gyrus

Yevgenia Kozorovitskiy and Elizabeth Gould

The Journal of Neuroscience, July 28, 2004 • 24(30):6755–6759
Research Article

Social-Evaluative Threat and Proinflammatory Cytokine Regulation

An Experimental Laboratory Investigation

Sally S. Dickerson,¹ Shelly L. Gable,² Michael R. Irwin,³ Najib Aziz,⁴ and Margaret E. Kemeny⁵

In summary, research with nonhuman animals demonstrates that social threat increases proinflammatory cytokine activity and alters the ability of glucocorticoids to regulate this response.

Fig. 1. Mean tumor necrosis factor-α (TNF-α) production at baseline, posttask, and 40-min recovery for participants in the social-evaluative threat (SET) and non-SET conditions. Error bars represent standard errors of the mean.
mesolimbic dopamine release to aversive stressful stimuli.

in animal studies, disruptions of the mother–infant relationship long-lasting effects on the mesolimbic dopamine system and the HPA axis.

Dopamine release to stress in humans wrt relationship to early life parental care.

Five students from the top end and five students from the bottom end of the parental care distribution PET and psychosocial stress task.
Stress challenge

• Mental arithmetic, with performance displayed on screen
• Told the average college student reaches 80–90% correct answers.
• Designed so average performance was only 20–30%.
• Also given negative verbal feedback for 2 min after each 6 min session, telling them that they needed to improve their performance to reach minimum performance requirements.
Figure 1. Statistical parametric map showing the t-statistic for a reduction in [11C]raclopride BP in the stress condition compared with the rest condition for all subjects.

stressor caused a significant release of dopamine in the ventral striatum - reduction in [11C]raclopride binding potential in the stress versus resting condition

significant decrease BP during the stress condition in the low, but not high, maternal care group

salivary cortisol response to stress correlated with the reduction in BP in the ventral striatum consistent with a facilitating effect of cortisol on dopamine neuron firing.
Low Perceived Control affects stress response

• mental stressor – arithmetic tasks under time pressure.

• For half produced tasks easy to solve (success condition), half difficult (failure condition).

• groups of ten subjects – After each of three sets of arithmetic tasks, individuals had to report their performance in front of the group.

Self-esteem, locus of control, hippocampal volume, and cortisol regulation in young and old adulthood

Jens C. Pruessner, a,b,* Mark W. Baldwin, c Katarina Dedovic, b Robert Renwick, b Najmeh Khalili Mahani, a,b Catherine Lord, b Michael Meaney, b and Sonia Lupien b