Performing under Pressure; on the Biology, Psychology and Sociology of stress in high-performance professions

VII – PERFORMANCE UNDER STRESS

How do you utilise the stress response to facilitate optimal performance?

- Prepare the system for stress (See lecture 6)
- Managing the acute stress response
- Optimising the acute stress response
  - Increase dopamine
  - Increase feelings of control

Almost all of the most effective mechanisms to reduce or control the acute stress response involve feedback loops

- It is hard to control
  - Thoughts
  - Emotions
  - Physiological states
- Behaviour is much easier and that will alter all the above
- Stress often requires an expression to movement (be that physiological or psychological – behaviour is the key!)

Managing the acute stress response

Feedback loops as a means to manipulate the stress system

- Neurotropic substances
  - Benzodiazepams
- Behavioural manipulations
  - Breath work
  - Visual system control
  - Visualisation

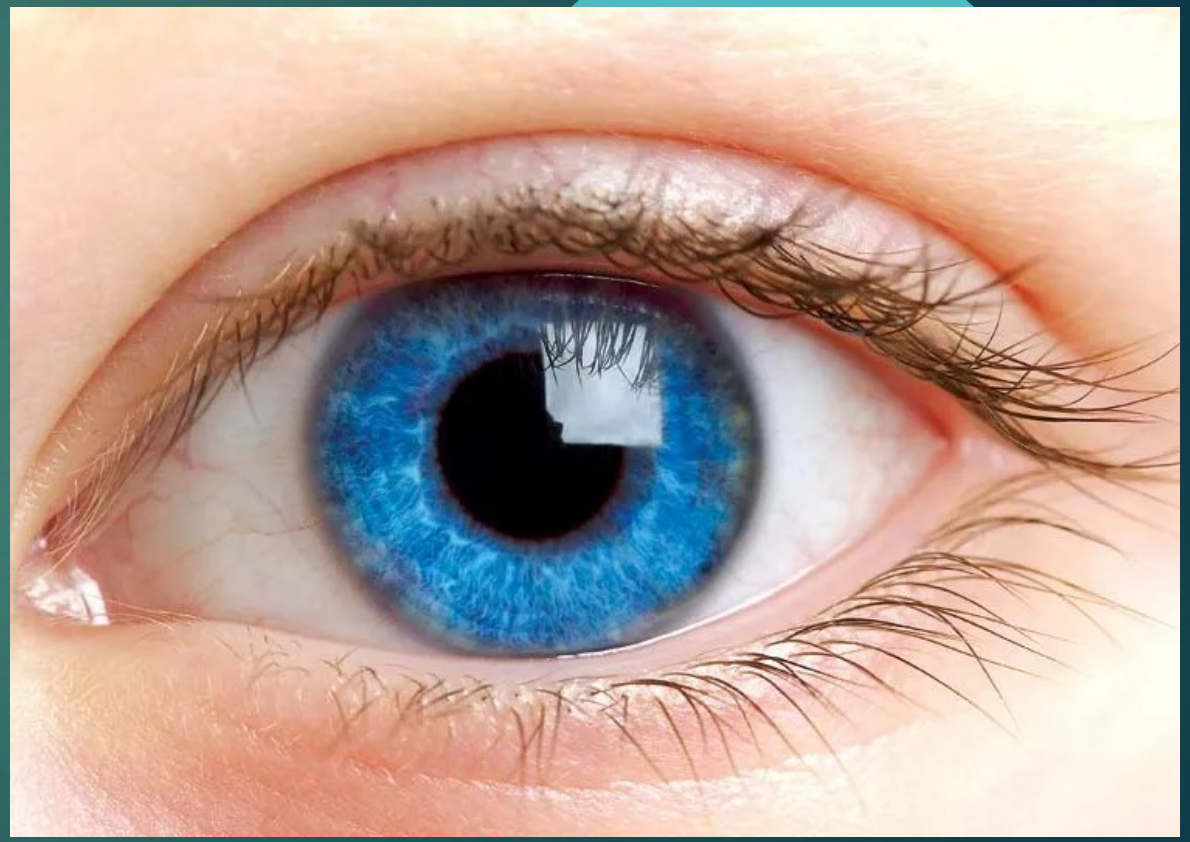
Breath work

- Double sigh
  - Off load much more carbon dioxide
- Respiratory sinus arrhythmia
  - Inhales: diaphragm moves down, more space for the heart, brain sends a signal to speed up to keep blood pressure steady.
  - Basis for Heart Rave Variability (HRV)

Feldman JL. Neurobiology of breathing control. Where to look and what to look for. Advances in experimental medicine and biology, 1995.

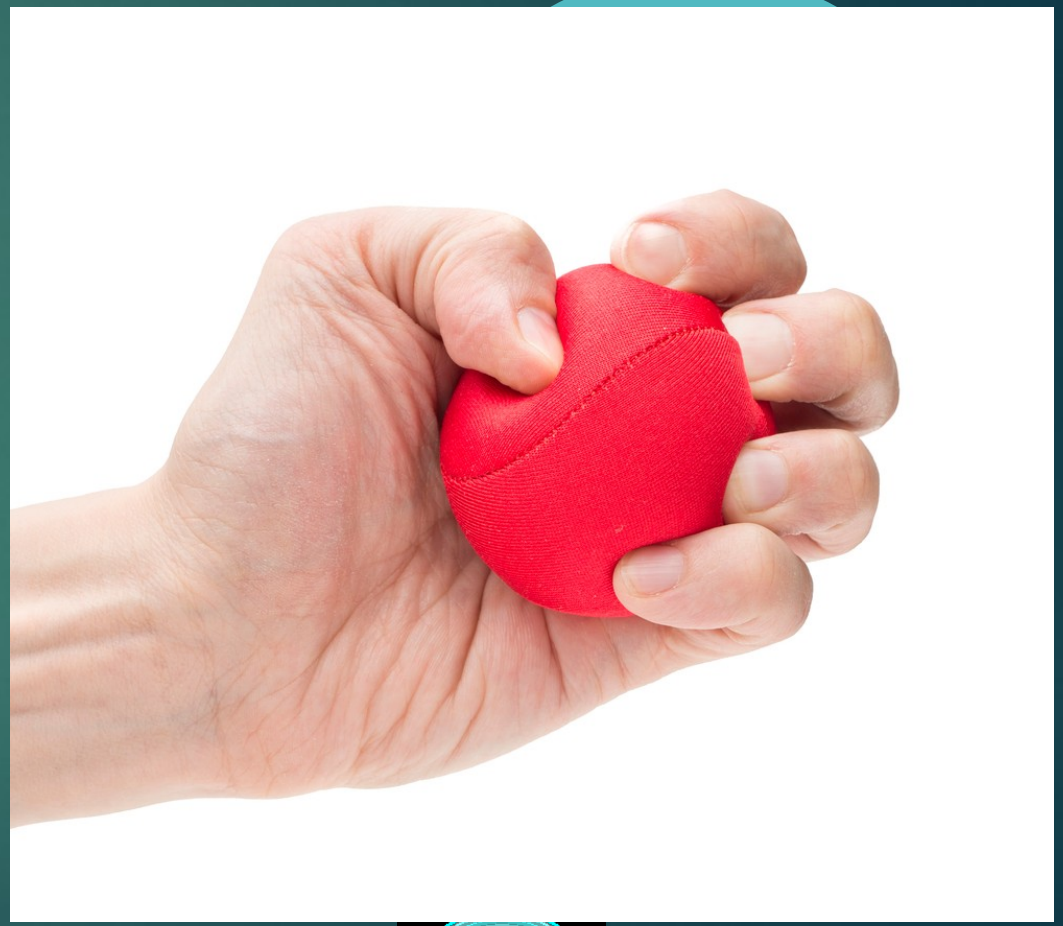
Visual control: Can you use the eyes to control stress?

- Eyes – 2 functions
  - Detecting shapes, colours, etc. (vision)
  - Communicate to the brain – active or inactive (Cues about time of day, stressors, etc.) (YES! Another feedback loop!!)
    - Relaxed (panoramic vision)
    - Stressed (focussed vision)



Left-brain / right brain cross talk

- Over activity in the left side of the brain may lead to overthinking
- Activity with the left hand, which cross talks to the right hemisphere, leads to an overall downregulation of brain activity

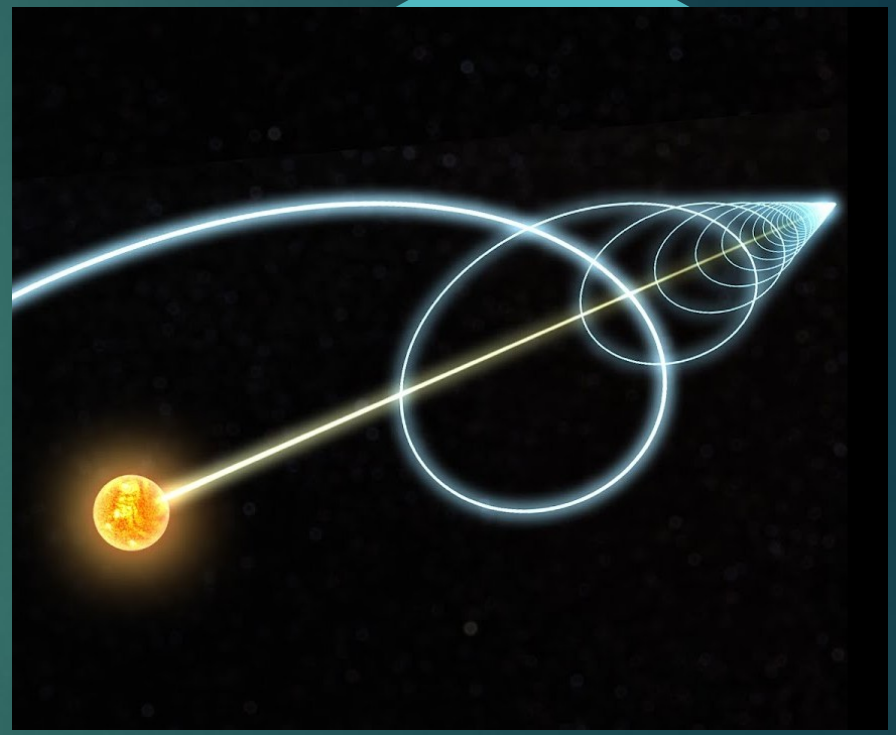


Mesagno, C., Beckmann, J., Wergin, V. V., & Gröpel, P. (2019). Primed to perform: Comparing different pre-performance routine interventions to improve accuracy in closed, self-paced motor tasks. *Psychology of Sport and Exercise*, *43*(January), 73–81. https://doi.org/10.1016/j.psychsport.2019.01.001
Mesagno, C., & Beckmann, J. (2017). Choking under pressure: theoretical models and interventions. *Current Opinion in Psychology*, *16*(June), 170–175. https://doi.org/10.1016/j.copsyc.2017.05.015

Optimising the acute stress response

Forward movement: The nucleus reuniens

- A small nucleus in the thalamus
- Secretes dopamine in response to forward movement
- Behaviour effects
  - In rats it increases willingness to fight harder
  - In people…



Zimmerman, E. C., & Grace, A. A. (2016). The nucleus reuniens of the midline thalamus gates prefrontal-hippocampal modulation of ventral tegmental area dopamine neuron activity. *Journal of Neuroscience*, *36*(34), 8977–8984. https://doi.org/10.1523/JNEUROSCI.1402-16.2016

Nutrition

- Certain foods stimulate the endorphin and dopamine systems.
  - Sugar
  - Alcohol
  - Cacao
  - Etc.
- Careful! Many have a secondary detrimental effect.

Internal reward

- External rewards seem to be transient and unreliable. There is significantly greater value in internal rewards

- Slice time to fit your motivational needs
- Connect reward to accomplishment not something you get upon finishing
- Don't engage in too many behaviours that release dopamine for little effort

Altruism: just a strange observation

- I have no data to support this, but there seems to be a strong link between resilience and altruism. Individuals who take up the responsibility to pull others through appear better at handling extreme stress
  - Special forces selection procedures