

# Hacking the stress system: the stress response as an adaptive trait that can work for or against you

I - Introduction to the course and the evolutionary basics of stress



# Course: Performing under Pressure

- ▶ Faculty of Sports Studies
- ▶ Schedule
  - ▶ **Every Tuesday at 9:00**
- ▶ Lecturer
  - ▶ David William Mac Gillavry
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  - ▶ Office hours – upon request

# Who am I?

- ▶ Religious studies (UvA / MUNI)
  - ▶ Cognitive science of religion
  - ▶ Western esotericism
  - ▶ Secrecy dynamics
- ▶ Military Management (UNOB)
  - ▶ Stress & PTSD
  - ▶ Leadership
  - ▶ Nutrition
  - ▶ Social conformity & in-group dynamics



# My current research University of Defence

- Stress resilience under extreme conditions
- Leadership & combat leadership
- In-group dynamics & moral behaviour under extreme conditions
- Preparation for high-stress experiences





# Course specifics



- ▶ The course aims to provide students with a comprehensive understanding of the evolution and function of the stress response, as well as practical methods to optimise this response for better performance. Students will learn that the stress response is a double edged sword that can be incredibly harmful to both short-term performance and long-term health, or a tool with which to tackle complex problems under time pressure. After successful completion of the course students will have a both a theoretical basis and a set of practically applicable techniques, with which the stress response can be optimised for performance in both oneself and others.



# Syllabus



Lecture	Topic	Seminar
1	Introduction to the course and the evolutionary basics of stress	Your stress in a wider context
2	Social stress, reproduction and hierarchy	
3	On the genetics and epigenetics of stress resilience / sensitivity	
4	On the intersection between culture and stress	
5	Why stress makes you stupid, most of the time	What stresses you and why?
6	Depression, PTSD and anxiety	
7	On the psychology of lying, deceit, and how stress makes it all much worse	
8	Lifestyle and stress I: Nutrition & Sleep	How can you optimise resilience?
9	Lifestyle and stress II: Sport & Social connections	
10	Optimising the stress response for greater performance	Practical solutions for stress management




# Course requirements



- ▶ Be here, be active & be prepared
- ▶ **A term paper**
  - ▶ Min 5 pages (2.0 spacing)
  - ▶ Proper bibliography and referencing (preferably APA)
  - ▶ Subject of your choosing as long as it relates to stress and peak performance




# Stress in an evolutionary context

- ▶ Stress evolved to protect the organism from (often life-) threatening stimuli.
    - ▶ Other species (who wish to eat you)
    - ▶ Infections (bacterial and viral)
    - ▶ Parasites
    - ▶ Injury
    - ▶ Out-group members (struggle over resources)
    - ▶ In-group members (struggle over position)
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# Specific solution for a specific problem

- ▶ Evolution usually endows us with specific solutions for specific problems.
  - ▶ The stress response, however is a single solution to a host of different unpleasant stimuli.
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# Nature selects for speed


- ▶ Speed over accuracy
  - ▶ It matter less where you run than that you run as quickly as possible
- ▶ Limited time frame (5 min)
  - ▶ Most negatives effects of stress are the result of turning on the system for way longer than the approximately 5 minutes it usually takes.

Sapolsky, R. M. (2004). Why zebras don't get ulcers: A guide to stress, stress related diseases, and coping. In *Natural History*. <https://doi.org/10.1002/cir.3880060119>

Heitz, R. P. (2014). The speed-accuracy tradeoff: History, physiology, methodology, and behavior. *Frontiers in Neuroscience*, 8(8 JUN), 1–19. <https://doi.org/10.3389/fnins.2014.00150>



# Both the lion and the gazelle need the same acute processes to survive

- ▶ Energy (fuel + oxygen)
  - ▶ Hyper cognitive focus on the task at hand
  - ▶ Down-regulation of non-essential processes
  - ▶ Upregulation of the immune system
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# One major issue to address

- ▶ The point of this course is **NOT** [sic!] to reduce or eliminate stress! If you are in a situation that requires a functional, focused and quick response, you had better get stressed like any other mammal!
  - ▶ Stress management
  - ▶ (Genetic) disorders that impair the stress response
    - ▶ Psychopathy
    - ▶ Addison's disease



# An easy conceptualisation of the different neurotransmitters involved

- ▶ Noradrenaline (movement)
  - ▶ Blood pressure / heart-rate
  - ▶ Respiration rate
  - ▶ Task related focus and memory
- ▶ Cortisol (energy)
  - ▶ Release glucose (fuel) from glycogen stores
  - ▶ Suppress inflammation
  - ▶ Blood pressure
- ▶ Dopamine (direction)

Schultz, W. (2002). Getting formal with dopamine and reward. *Neuron*, 36(2), 241–263. [https://doi.org/10.1016/S0896-6273\(02\)00967-4](https://doi.org/10.1016/S0896-6273(02)00967-4)

Ross, J. A., & Van Bockstaele, E. J. (2021). The Locus Coeruleus- Norepinephrine System in Stress and Arousal: Unraveling Historical, Current, and Future Perspectives. *Frontiers in Psychiatry*, 11(January), 1–23. <https://doi.org/10.3389/fpsy.2020.601519>



# Stress as a promotor of peak performance

- ▶ Without stress you'd get bored! Nothing would get done, and you would probably die off as a species.
- ▶ Stress facilitates / supports
  - ▶ Movement
  - ▶ Progress
  - ▶ Community
  - ▶ Human excellence against all odds