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# Physiological Reactions to Stress Induced by Gaming

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## **Worksheets for Multimodal Perception and Cognition**

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# Chapter 1

## Physiological Reactions to Threats

In this chapter, we will discuss the physiological reactions happening in the body and mind when put in a stressful situation. The chapter begins with a section about the perception of threats and how the autonomic nervous system reacts to the perceived threat. The next section will describe the cognition related to the perception of threats, and the last section will go through the motor reactions related to this.

### 1.1 Perception of Threats

Animals as well as humans have a build in sensor system to perceive threats to their survival. The sensor system uses the senses of the body as well as the mind in its aspect of memorizing a similar situation and the evaluation of the magnitude of the threat. We humans have through the years developed a much more detailed sensor system, and we are able to use it not only to perceive situations threatening our survival, but also recognize situations which might compromise even just our social status. The most common way of experiencing the evolved sensor system, is when being put in a stressful situation, as this would activate the autonomic systems of the body in a physiological reaction. These situations could be forgetting to deliver a report at work and be pointed out by your boss, or just general being stressed because of the current workload.

#### 1.1.1 Changes in Behaviour due to Perception

It is believed that emotions have been developed to affect our behaviour when put in a stressful situation for better identification and reaction to a perceived threat increasing our survival rate. Ev-

idence show that emotions can change our behaviour in a positive or negative direction dependant on the situation. This also gives us the opportunity to prepare for stressful situations by training the control of our emotional response to a threat. A reaction to the current situation can this way be altered by past event, which could be the aforementioned training of emotional control or recall of a similar situation. As the action or motor performed by the individual is directly linked to the emotional state, which is dependant on our past memories or physiological reaction. The reaction time in humans is directly related to how we perceive a emerging threat. If the threat is pointed towards us as for a gun pointed towards the viewer, our reaction time is slowed, as where a gun pointed towards another person will increase our reaction time compared to a neutral state. This gives evidence of our perception of the threat changes how the body reacts to the situation. [1]

### **1.1.2 Bodily Changes as Result of Threat Perception**

When a threat is perceived, the first reaction of the brain is to activated the amygdala part, which processes emotions, memory and decision-making. The information about the situation is send to hypotalamus, which creates Adrenocorticotropt hormon (ACTH). This makes the production of the stress hormone cortisol and adrenaline making the body respond by increasing heart rate, blood pressure, decrease the immune system functionality and other negative changes also making a constant stressful environment harmful to the health. If the amygdala is constantly negatively stimulated, it can lead to depression and other anxiety, altering the reaction to stressful or harmful situations. Depression can in this sense also be helped by changing the way the amygdala reacts to stressful situations as it has a direct relation to the information send further to the autonomic nervous system (ANS) regulating the autonomic body functions. One of the primary parts of the ANS is the sympathetic nervous system, which is sometimes referred to as the fight or flight system, as it automatically alters the autonomic body functions to create a sense of anxiety or aggression. The anxiety or aggression creates a bias for what action is made in a stressful situation, and the next section will further dig into the action taken dependant on the physiological changes in the body when put into a stressful situation.[4] [2] [3]

## **1.2 Cognitive Respond to Threats**

Evaluating the physiological changes (evaluating anxiety and aggression) After the physiological changes in the body because of the perception of a situations, a reactions is created corresponding

to fight/flight, and as further research has shown, freeze, fright, faint and tend/befriend. Even though we are not often in survival threatening situations, which is where the fight/flight reaction comes from, we are still reacting according to this in stressed situations, as someone attacking us, but also when we are taking a test we didn't prepare for, or another individual didn't make his part of a presentation you were working on together.

Cognition depends on your perception and recognition of the situation, fire alarm example. The fight/flight is though also dependant on how we recognize the situation from a similar past event, as described in section 1.1. For instance, if we hear a fire alarm, our first response is a threat to our survival, as we are near a fire. This information is automatic, but we still evaluate dependant on the current situation. The alarm could have been started by a steam from a shower or because you were cooking, creating non harmful smoke and we would evaluate the situation as non-threatening becoming less stressed or anxious.

Could be dependant on the situation as the exam/presentation examples. It could also depend on how the situation played out last time it happened. For instance if we are late for a class and we see everybody getting ready for a test you did not know you had, you would get anxious because you forgot to study, but if you know the teacher regularly give out random tests, or you are well known to be smart within the subject, you might not get that anxious, remembering the past event. An example of aggression can be easily described as, if you are working in a pair group with a presentation, and the other person in the group did not do his part, you might be more biased towards aggression, as you believe it is not your fault, but if you forgot to tell him to do it, as he was sick the day the exercise was given, you might become anxious instead.

Reaction according to fight/flight. The two main reactions we get from the physiological body reactions, is the anxious and aggressive states. These have been described as reactions of fight or flight, which in short is the anxious act of fleeing the scene, or the aggressive act of trying to solve the problem through anger. In newer research other reactions have started to show, the freeze (immobility or being passive), the fright (being afraid of the situation), faint (the bodily reaction of becoming unconscious), or the tend/befriend (trying to give social support before solving the situation). These will all be further described in the following sections, with relation to how they

would surface through stress induced gaming.

## Bibliography

- [1] Orlando Fernandes Jr., Liana C. L. Portugal, Rita C. S. Alves, Rafaela R. Campagnoli, Izabela Mocaiber, Isabel P. A. David, Fatima C. S. Erthal, Eliane Volchan, Leticia de Oliveira and Mirtes G. Pereira. *How you perceive threat determines your behavior.* Journal, Frontier in Human Neuroscience, 2003.
- [2] Ned H. Kalin. *Perspectives in the Management of Anxiety Disorders.* Session of Char Summit; Master Class for Neuroscience Professional Development, 2014.
- [3] Arthur S. P. Jansen, Xay Van Nguyen, Vladimir Karpitskiy, Thomas C. Mettenleiter and Arthur D. Loewy. *Central Command Neurons of the Sympathetic Nervous System: Basis of the Fight-or-Flight Response.* Magazine, Science, Vol. 270, No. 5236, 1995.
- [4] Gilian Pocock. *Human Physiology.* Oxford University Press, 2006.