

## On Lions, Zebras, and Pink Elephants – stress in competition

Everyone who has ever competed knows how stressful this can be. However, while some athletes break under the pressure and nerves, others thrive, climbing better than ever. This article is about why this happens, what goes on in your body in a stressful situation, how this influences your ability to perform in a competition, and finally how to better deal with it.

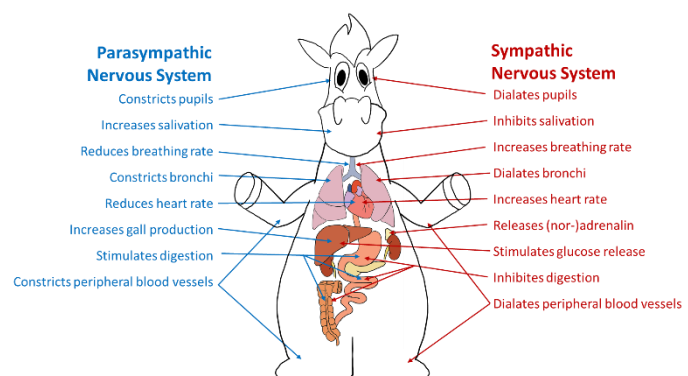
### Some Definitions

The term “stress” is a little unfortunate as it is used for both cause and reaction. To avoid confusion, researchers have switched to the term stressor for the cause (in this case, the competition) and stress response for the reaction. Another important concept is the term “arousal”, which refers to a state of wakefulness, vigilance, and activation. On a physiological level, arousal corresponds to the activation of the sympathetic nervous system (see next paragraph). It is minimal during sleep, an extremely high level of arousal, on the other hand, is found during a panic attack.

### What happens

On a physiological level, a stress response is first and foremost the sympathetic nervous system in action. The sympathetic nervous system is a part of the autonomous nervous system, which regulates all bodily functions which are autonomous (surprise!), meaning they happen without us having to voluntarily control them. These include, for example, our heartbeat, breathing, digestion, and metabolism. In case of a stressor, the sympathetic nervous system releases adrenaline and noradrenaline (also known as epinephrine and norepinephrine) which causes all of these bodily functions to adapt in a way that helps deal with the stressor. If the sympathetic nervous system had a motto, it would probably be “Live (and preferably run) as if there is no tomorrow, because otherwise there probably won’t be one.” It is wasteful and doesn’t care about the long-term consequences of its actions. The only thing that matters is dealing with the current situation right here and now. Everything else can be dealt with later. The antagonist of the sympathetic nervous system is the parasympathetic nervous system, which deals with recovery and the long term. It is resourceful, works sustainably, and ensures that things that secure survival months and years from now are getting done.

A look at a lion that chases a zebra across the savanna illustrates the tasks of the sympathetic nervous system, as the stress response in mammals is geared towards dealing with all sorts of stressors through the “fight-or-flight”-response. For one, activity of the cardiovascular system increases, meaning heart rate, breathing rate, and blood pressure increase. Furthermore, energy, mostly in the form of glucose, is mobilized to provide fuel for the upcoming race. On the other hand, processes that are geared towards the long-term preservation of the organism, like digestion, healing, and growth are put on ice. To quote Robert Sapolsky: “You have better things to do than digest breakfast when you are trying to avoid being someone’s lunch.” Furthermore, extreme stress can inhibit the perception of pain, a phenomenon called stress-induced analgesia. This too makes sense from an evolutionary perspective, as pain is a warning signal that is supposed to keep us from doing things that harm us. In a situation of extreme stress, there is probably nothing so harmful, that we shouldn’t get out of the situation before dealing with it. As a zebra trying to escape the lion, it would not be a very



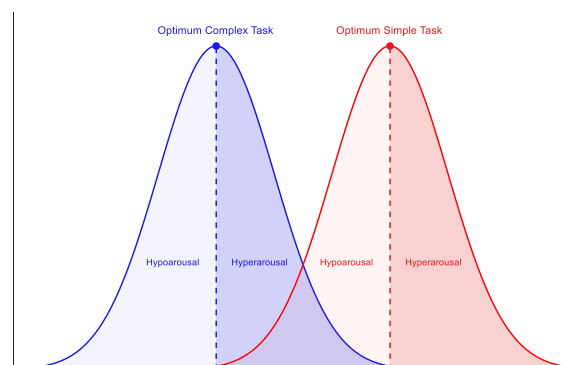
good idea to protect a sprained ankle by limping. The sympathetic nervous system further has a number of influences on our perception and cognition. For one, our senses become sharper. That is the reason why the cracking of a branch might startle us when we walk through the streets alone at night although we wouldn't even have registered the same sound during daytime. Furthermore, our attentional focus narrows, our thinking becomes less flexible and there is a tendency to stick to habits and rituals. This, too, is evolutionarily plausible: The escape from a lion might not be the best moment to test whether zebras can run backward.

In other words, the stress response, that is brought on by the sympathetic nervous system is extremely well suited to deal with the typical prehistoric stressor. As a competition demands maximal physical performance as well, the changes brought about by the stress response would appear to be helpful rather than harmful and this is indeed the reason why some athletes perform better in competition than in training. However, why does the exact opposite happen to some athletes? Two theories can help us understand this phenomenon. Both of these have not gone without criticism and have their weaknesses, however, in my opinion, they are still useful to understand what is going on in situations where you or one of your athletes struggles under pressure.

## Yerkes and Dodson and Schachter and Singer

Robert Yerkes and John Dillingham Dodson developed the Yerkes-Dodson-Law at the beginning of the last century. It states that the relationship between arousal and performance is best described by a bell-shaped curve. This means, that performance initially increases with increasing levels of arousal. However, past a certain point, the relationship reverses and further increases in arousal lead to a decrease in task performance.

Furthermore, the optimum differs between different kinds of tasks. It is lower for more complex and cognitively demanding tasks, while it is higher for straightforward and overlearned tasks. An example of the former in climbing is an onsight attempt in a delicate slab. The best example of the latter in climbing is speed (which might explain, why athletes post PBs in competition quite regularly).

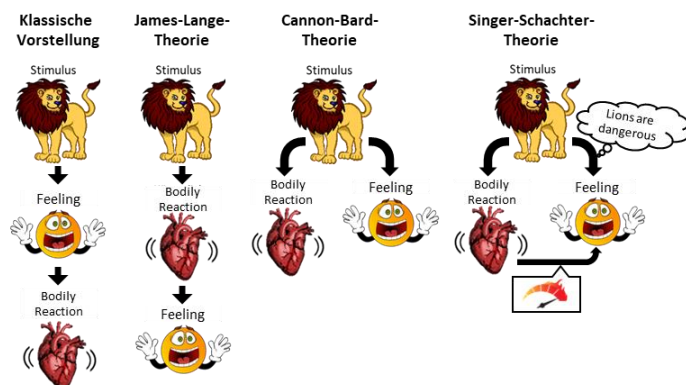


However, a redpoint attempt in a well-known and relatively straightforward boulder problem will most likely benefit from high levels of arousal as well. This association between optimal arousal and task type is mainly due to the aforementioned fact, that we tend to stick to our habits in stressful situations and save the thinking for later. The zebras that stopped and thought about whether there might be another option than running away were eliminated by evolution rather quickly. However, many of the tasks we are confronted with in our modern lives and during competitions demand that we think before we act. Another thing that can lead to a detriment in performance at very high levels of arousal is, that, in an extreme situation, the fight-or-flight response might be replaced by "freezing". This is evolutionary speaking, the last resort. If fighting is impossible and it is too late to flee, freezing is the best thing left, since it at least doesn't draw extra attention to oneself through movement. However, this is obviously not very helpful in a competition (and most other tasks humans are confronted with in everyday life).

Stanley Schachter and Jerome Singer were two psychologists, who (amongst other things) researched the emergence of emotions and developed the so-called two-factor theory, today often known as the Schachter-Singer theory. The idea most people have of how emotions work is that the perception of a situation gives rise to certain feelings (I see a lion -> I feel scared) which in turn can

affect our bodily functions (I feel scared -> My heart is beating faster, I am sweating, etc.). The first psychological theory about emotions, the James-Lange theory named after their developers William James and Carl Lange, turned this idea on its head, claiming that the perception of a situation directly affects bodily processes, which are the basis for feeling a certain way. In other words, your heart isn't beating fast because you are scared, you are scared because your heart is beating fast.

However, this theory has some very substantial problems, so Walter Cannon and Phillip Bard developed the Cannon-Bard theory as an alternative (yes, there is a certain pattern to theory naming in psychology...). It proposes, that both



feelings and bodily changes derive independently from perceptions of the situation (I see a lion -> I feel scared AND my heart is beating faster). However, this ignores all interactions between the body and how we feel, which is what Schachter and Singer tried to remedy in their theory. They proposed that the level of arousal, indicated by our bodily state determines the intensity of our emotion, however, which emotion we feel (sadness, fear, anger...) is determined by our cognitive construal of the situation (I see a lion -> Lions are dangerous -> I must be scared -> My heart beats fast -> I must be really scared). It follows from this, that the way in which someone construes a situation and labels their feelings has a huge impact on the way they experience this very same situation. Someone who interprets the typical signs of arousal in a competition as signs of anticipation and excitement will likely have a very different experience from someone who interprets them as signs of anxiety and helplessness. If arousal is attributed to a non-emotional source (e. g. an adrenaline injection), even high levels of arousal might not cause feelings of any kind. As physical activity itself increases our level of arousal, parts of the arousal during competitions are due to the activity during the warm-up and the climbing itself. If athletes are not aware of this, they might falsely attribute this arousal to their nervousity and anxiety, potentially escalating the situation further.

## Strategies to regulate arousal

### Acceptance

The first step in regulating your arousal and nervousity is accepting it and viewing it as something potentially helpful. As described above, the stress response is designed to facilitate peak performances. It only becomes a problem, if athletes are afraid of being nervous, so they don't just get nervous and stressed by the competition they also get nervous and stressed by being nervous and stressed. This creates a vicious circle and the arousal rises to a level, that is not conducive of performance anymore. As a reaction, athletes often try to calm themselves down by telling themselves to not be nervous. That is, however, about as effective as trying to not think about a pink elephant by thinking about not thinking about a pink elephant. In other words, it's probably the worst thing to do.

### Distraction

Everyone that has ever been confronted with the pink elephant probably knows, that there is only one real possibility to not think about the elephant: Distracting yourself with other thoughts. Similarly, it makes sense to distract yourself from your nervousness by focusing your attention on something else. For waiting periods before and during the competition, this could be anything from

reading a book or watching a movie to learning for an exam. It should, however, be cognitively demanding enough to capture your full attention. During the warm-up etc. the most sensible thing is to focus on what you are doing and doing it as well as possible. This has the additional advantage of ensuring that you warm up properly. However, you shouldn't assume, that you won't get nervous as a consequence of doing this. The pink elephant will show itself occasionally. But as long as you don't feed it by stressing out about being stressed, it will not trample the whole place down.

### Habits

Competitions, at least in part, are stressful because they are unfamiliar and unpredictable. In all of this chaos, habits and rituals can provide safety. Habits might be anything from the complete warm-up program to small rituals prior to an attempt, like patting off chalk on your pants or taking a deep breath. These habits work because you're essentially signaling to your brain: I know how this works and I know what to do. Thus, it makes sense to establish such habits and routines in training early on so you can fall back on them during competitions. You should, however, be careful to only choose habits that are viable in competitive situations. This can be especially tricky in regard to the warm-up, as the warm-up facilities are often much more restricted in competitions than it is in everyday training. Therefore, you should think about which routines are feasible early on and consistently practice them in training. As mentioned earlier, under stress we tend to do what we always do anyway. Therefore, good habits are doubly helpful, since they eliminate the need to continually override any bad habits we may have acquired.

### Preparation

Competitions are indeed unpredictable to a degree (hello, last-minute changes to the schedule...), however, they are not completely random. Therefore, it makes sense to reduce unnecessary uncertainty by being well-prepared. That means, for example, when the competition begins (for you), knowing how long it takes you to warm up and consequently when you have to start warming up. Ideally, you can find out what warm-up facilities are available beforehand. If this isn't possible you should at least have plans for how to warm up in different circumstances. The basic principle is always that all decisions and preparations that can be made beforehand should indeed be made beforehand. A packing and to-do list as well as a schedule can be very helpful for doing this.

### Breathing

Breathing is a special case of the functions controlled by the automatic nervous system because unlike the others we have some degree of voluntary control over it. We can hold our breath, but not our heartbeat. However, as the connections from our body to our brain are bi-directional, we can influence our autonomic nervous system and thereby our level of arousal by consciously controlling our breathing. As the sympathetic nervous system is activated by breathing in, we can heighten our level of arousal by focusing more on inhaling. On the contrary, our parasympathetic nervous system is activated by breathing out, therefore we can lower our level of arousal by focusing more on exhaling. (If you want concrete instructions, there are literally hundreds of videos on YouTube, that will guide you through breathing exercises, however, there are no magic numbers you have to adhere to.)

### Physical activity

(Intense) physical activity is a great way to increase your level of arousal. This can be especially useful at the beginning of the warm-up, especially if a competition starts very early or in cases where there is a long break between rounds and the body has essentially "shut down" again. From experience, I have found that physical activity is also a good outlet for excessive arousal, especially in

the time between warm-up and the start of the competition. By moving and being active during this time you can essentially give your brain an alternative way of interpreting the arousal, namely as a consequence of the activity and not as nervousness or anxiety.

For parents, coaches, etc.

If you're not an athlete yourself but a "support person", there are also a few things you can do to help.

Do not show your own stress

The first couple of times I was at a competition as a coach, I was so nervous, I felt like I was about to have a heart attack and many other parents and coaches have probably had similar experiences. The problem is that these feelings can transfer to the athletes. Those first couple of times I probably did more harm than good. However, by now I have (mostly) learned to not show the stress and anxiety I feel. The emphasis really is on "not show" because ultimately all that matters is what the athletes perceive, not how you really feel. You don't have to climb after all. For parents that might even mean, removing themselves from the competition altogether.

Support

As mentioned, being well prepared helps enormously to deal with the stress of competing. You can help athletes to do so by aiding them in their preparations and doing as much as possible for them. For example, you might do the registration for them, remind them how much time is left to the start and at what point they have to start warming up, remind them to eat and/or drink and get them the stuff they need. However, you should talk about who does what and what they want and don't want help with beforehand, otherwise, the result is probably more chaos and stress.

For anyone, who is interested in this topic further, and especially the biological basis of stress, you might want to check out the book "Why zebras don't get ulcers" by the aforementioned Robert Sapolsky. As you may have guessed from the book's title, he coined the lion-zebra-metaphor. The book goes into the biological mechanisms of stress and its short- and long-term consequences in great detail. However, it is still written in a way that is understandable to anyone who hasn't studied biology or psychology.