

Mapping the Sympathetic Nervous System: Performance Anxiety

Susan Franzen

In the process of researching performance anxiety for this paper, I have asked a number of people for stories related to this problem; almost everyone has a personal anecdote, or knows of at least one. Performance anxiety is therefore not unusual or even abnormal, but it is highly undesirable because it can interfere with the performer's musical intentions. In this paper I will examine the kind of pre-performance disturbances people speak of, with attention to what might underlie them and what can possibly help.

The physical signs we usually associate with performance anxiety are functions of the nervous system, or more specifically the *sympathetic* part of the *autonomic nervous system*, which controls our visceral functions. The autonomic nervous system is activated by centers in the brain stem, spine and hypothalamus. Important for our understanding of pre-performance symptoms, we should also note that the cerebral cortex can transmit impulses to the autonomic activation centers. In other words, our thinking, perceiving brain can stimulate the autonomic nervous system and the body functions it controls.

The fibers of the sympathetic nervous system originate in the spinal chord between T-1 and L-2. From here, nerve fibers run up to the head and down to the legs. The fibers from T-1 go up to the head, the fibers from T-2 go to the neck, T-3 through T-6 go to the thorax, T-7 through T-11 go to the abdomen, and T-1, L-1 and L-2 go to the legs. The fibers of the sympathetic nervous system are not the same as skeletal motor nerves. Skeletal nerves secrete the neurotransmitter acetylcholine, which activates the muscles. Sympathetic nerve fiber endings

secrete norepinephrine, or adrenalin, which activate organs. When the sympathetic nerve endings in an organ are stimulated, vesicles at the ends of the fibers which contain norepinephrine release it into the fluids of the organ. Certain sympathetic nerve fibers end in the adrenal glands, in the adrenal medulla, and stimulate cells which also secrete norepinephrine into the bloodstream.

The effects of sympathetic stimulation on the organs of the body can be dramatic. Sympathetic stimulation dilates the pupils, constricts the glands of the eyes, nose, mouth, and causes sweat glands to produce sweat, and the apocrine glands to produce the odoriferous secretions we associate with sweat. Sympathetic stimulation makes the heart beat harder and faster. It dilates the bronchi, it causes the liver to secrete glucose and constricts the blood vessels of the skin, resulting in pallor. In the brain, it causes a state of increased mental activity. Here we are, then, backstage, our eyes, wide, our mouths dry, our blouse wet, our heart beating furiously, breathing heavily, feeling over-energized, our mind racing.

In considering how to manage these symptoms it is valuable to understand that they are a *normal* consequence of sympathetic nervous system – SNS -- stimulation and that they have a function beyond just that of making performers miserable. SNS stimulation is often called the “alarm reaction,” or the “flight or fight” response. SNS activity provides energy for the body beyond its normal output. It is designed to give us the chance of outrunning our adversaries, or of overpowering them if need be. Perhaps this has little relevance to the performance of music, but it is important to understand that these responses are part of how we are designed; we could no more rid ourselves permanently of SNS symptoms than we could change the basic structure and operation of any other physiologic systems, like circulation or digestion or respiration.

But because of the detrimental effects of shaking and feeling panicky, of course we want to try to minimize SNS *overstimulation* when it is a problem. There are three basic approaches, all with the same goal: psychological intervention, medical intervention and the personal routines that incorporate features of these two approaches.

Psychological intervention in the form of cognitive-behavioral therapy has been shown effective in reducing performance anxiety. Kendrick et. al. studied a group of 53 pianists with serious symptoms. Those in the treatment group were taught a set of behaviors over a period of three weeks, with the expectation that the new behaviors could supercede the anxiety-based reactions. The new behaviors included performing ~~exclusively~~ in front of a non-threatening and friendly audience, exclusively positive feedback following the performances, and gradual exposure to increasingly anxiety producing performance situations balanced with performance experiences that would provide assured success. Formulas were devised for this study to measure the level of performance anxiety in the treatment group before and after the three week training, and these were compared to measurements of a non-treated control group. The formulas measured performance efficacy in terms of number of errors and a rating of observed tension (trembling, stiffness, moistening lips and facial expression) and in terms of monitored heart rate. The authors of this study found that the cognitive retraining that occurred in the course of the three week treatment significantly reduced performance anxiety according to these measures. It is not known how lasting the results were, and it is difficult to imagine that a lifetime of problems with performance anxiety could be overcome in three weeks. Yet, for whatever benefit there is, the insertion of positive experiences into the horror of pre-performance negativity could hardly be anything other than reassuring. If the function of SNS activation is to prepare for stressful situations, it is understandable that feeling reassured would to some extent obviate the alarm reaction.

A study by Steptoe and Fidler highlights one serious source of the stress that results in performance anxiety. Their study of 146 musicians found that the most powerful stressor in performance anxiety is a behavior known as “catastrophizing.” Subjects developed the idea that they might faint, or that they would make a mistake or series of mistakes, or that something else quite awful would occur. If the source of the stress is in our own ideation, that is, a product of our cerebral functioning, cognitive refocusing or redirecting would seem to hold promise for the

relief of that stress. The cognitive-behavioral approach is designed to address just such specific stressors as catastrophizing by changing the statements one makes to oneself from negative, such as “ I will make a huge mistake,” or “I will forget my music” to something more positive, such as “ I can do well,” or “I know I am prepared.” In fact, in a study of athletes with performance anxiety, Hanton et.al. found that ideation and statements (“self talk”) that supported the athletes’ sense of self confidence were helpful in moderating anxiety. One drawback of the cognitive-behavioral approach is that it tends to seem oversimplified to people who are accustomed to a certain level of cognitive complexity – such as musicians. Other forms of therapy may work equally well, but for some reason, perhaps having to do with its quantifiable simplicity, cognitive-behavioral therapy is the only psychotherapeutic approach with a decent body of published intervention and outcome studies.

In addressing performance anxiety as a psychological matter, some thought should be given to the performer’s whole life and the intricate interplay of anxiety and other emotional disruptions. In other words, some performance anxiety may be situationally based, but there may be instances in which it is more complicated. For example, there is the special problem of children who are considered prodigies from an early age. These children develop spectacular techniques early on and are assumed to have brilliant futures in music. Some of them do, but others come to despise performing; their behavior before a recital -- even as adults -- may resemble physiologic anxiety but in fact be more accurately assessed as a type of temper tantrum, or impulse control disorder. It is also possible to imagine that other types of psychological problems may be heightened by, *but not caused by* an upcoming performance. A realistic assessment of psychologically based performance anxiety should address whether treatment beyond the temporary relief of SNS symptoms would benefit the performer in such instances.

Medical treatment of the symptoms of performance anxiety addresses the actions of the sympathetic nervous system specifically. In the late 1960’s medicines known as *beta adrenergic blocking agents* became available. Beta blockers are substances which attach to the