DISSERTATION TITLE : **A Hypothesis for Biofeedback Learning Mechanism**

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ABSTRACT :

The aim of this dissertation is to advance our understanding of biofeedback (BFB) in general and in particular, to answer the following important question:

> To explain the fact that subjects, trained with BFB of a particular autonomic, physiological variable, are later able to control that variable without biofeedback, we *must* postulate that the subject, post training, has some kind of internal access to that variable. The question is, **how does *BFB training* enable the subject to consciously perceive a previously (prior BFB training), imperceptible physiological signal?**

It appears that autonomic physiological signals from our body such as skin temperature lie outside our awareness. Contrary to this, it will be argued here, with support from research on interoception, that we are actually constantly aware of our entire physiological state. But because our attention is usually directed to external stimuli, and more importantly because we perceive this state as an undifferentiated whole, we are not aware of, say, the skin temperature as a distinct signal. Therefore, it is suggested to view BFB training as increasing the subject's awareness of a certain physiological signal rather than promoting her from a state of unawareness to awareness about that signal. More precisely, BFB training alters the subject's perception of her physiological state from an undifferentiated whole to distinctly differentiated parts. I hypothesize that during BFB training, the feedback signal, which is in temporal synchrony with its interoceptive counterpart, causes a perceptual "pop-out" of that part of the complex interoceptive signal that is fed back thus enabling the subject to discriminate it from its complex whole. Prolonged training leads to interoceptive-perceptual learning, increasing the capacity of the subject to differentiate the complex, interoceptive signal. This explains the subject's ability to later alter an autonomic function without feedback. Based on the above hypothesis, I propose a new kind of biofeedback training called EMOTIONAL BIOFEEDBACK, where information about an autonomic signal is fed back to the subject as an emotional stimulus. The motivation to do so is to bring about an in-phase, synchronous, emotional response in the autonomic variable being controlled, such that it effectively amplifies the interoceptive counterpart of the feedback signal thus aiding the subject to discriminate it better. Experiments conducted at our lab, comparing conventional and emotional biofeedback training have yielded positive results, supporting the claim that emotional BFB training leads to faster interoceptive-perceptual learning.