Serious-Mindedness and the Effect of Self-Induced Respiratory Changes upon Parietal EEG

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The role of serious-mindedness (so-called telic dominance) in regulation of parietal cortex EEG was investigated. Ten telic (serious-minded) and 10 paratelic (playful state-dominant) individuals were selected on the basis of their responses to the Telic Dominance Scale. They all performed instructed breath-holding (hypopnea) and excessive breathing (hyperpnea) in counterbalanced order. The paratelic individuals yielded relatively high scores of integral EEG power; theta power was markedly increased in the left hemisphere during hyperpnea, and reduced in the right hemisphere during hypopnea. Both hyperpnea and hypopnea were reported to be more aversive to the paratelic than to the telic subjects, but no group difference in respiratory activity was found. The electrocortical and hedonic tone differences between the groups are discussed in relation to the distinction between the prefrontal (dopamine) activation pathway and frontoparietal (noradrenalin) arousal pathway, as well as in relation to changes in cortical blood flow and proprioceptive feedback.

Descriptor Key Words: hedonic tone; hyperpnea; hypopnea; parietal EEG; serious-mindedness.

This is a report on individual differences in capacity for self-regulation of cortical power production. It brings into focus the significance of a goal-directed (serious-minded) life-style, which is contrasted with an impulsive (playful) life-style. The inclination for such life-styles can be empirically as-
sessed by an individual’s responses to the Telic Dominance Scale (TDS; see Murgatroyd, Rushton, Apter, & Ray, 1978, for data in support of the validity and reliability of this scale). Serious-mindedness is the central feature of the goal-directed life-style (see Apter, 1982), which also includes planning orientation and arousal avoidance. Taken together, these three aspects of the goal-directed life-style will be referred to as telic state-dominance. It is contrasted with paratelic state-dominance, which includes playfulness, impulsivity, and arousal-seeking behavior (the latter component being related to the concept of sensation seeking proposed by Zuckerman, 1971). Results from a multimethod validation study (Svebak & Murgatroyd, 1985) yielded clear support of the validity of TDS scores as indicators of individual lifestyle differences in terms of telic and paratelic state-dominance. Walters, Apter, and Svebak (1982) reported validating empirical support for the association of serious-mindedness (playfulness) to planning orientation (impulsivity) and a preference for low (high) felt arousal. Taken together, these validity studies open up a new approach to the study of individual differences in personality factors related to the self-regulation of arousal.

Because psychobiological self-regulation involves the manipulation of bodily arousal, and because cortical arousal, in general, and parietal arousal, in particular, are substrates for felt arousal (proprioceptor; see, e.g., Norton, 1982), self-induced changes in parietal arousal should affect the telic (arousal-avoiding) and paratelic (arousal-seeking) state-dominant individuals in different ways. Self-induced respiratory changes of the kinds referred to as hyperpnea and hypopnea, respectively, are known to exert marked changes in cortical activation, and such respiratory performances were manipulated in the present experiment.

The role of respiratory control and manipulation in human self-regulation has a long history, including ancient meditative techniques (see, e.g., Mumford, 1962) and more recent approaches to behavior modification. Among the latter, Jacobson (1938) made use of respiratory control in his relaxation procedures, and Wolpe (1958) used respiratory exercises in therapy with phobic patients (see also Wolpe, 1982; Orwin, 1971, on so-called respiratory relief therapy in systematic desensitization of phobic disorders).

There has been a substantial revival of interest in the self-regulatory potential of respiration in recent years. This interest has been closely associated with responses to stress and perceived threat (Cappo & Holmes, 1984; Grossman, 1983; Harris, Katkin, Lick, & Habberfield, 1976; Holmes, McCaul, & Solomon, 1978; Svebak, 1982). A related area of recent interest is that of chronic hyperventilation in patients suffering from panic attacks, enduring anxiety, and related psychosomatic symptoms (e.g., Clark, Salkovskis, & Chalkley, 1985; Grossman, DeSwart, & Defares, 1985; Huey & West, 1983). There is a prevailing assumption in these approaches to the mastery