# Effects of different Biofeedback training procedures on quantitative Electroencephalographic parameters of healthy subjects

## Results:

The results show that GSR biofeedback, as compared to SCP Neurofeedback, is easier to learn which confirms the findings from Nagai et al. (2004). Furthermore, SCP-trained subjects show the biggest SCP differentiation as compared to GSR-trained people and GSRtrained people show the biggest GSR differentiation as compared to the SCP trained, which confirms that the primary learning effect can be found in the modality being trained; e.g. if subjects are trained on their SCP, then the differentiation of the SCP is also biggest and increases with training time. No clear differentiation effects were found for the 'other' modality suggesting that training on GSR does not directly affect or modulate SCP's and vice versa as measured with this differentiation method.

No consistent differences were found in the pre- and post QEEG's for both groups. This is in agreement with the study from Kotchouby et al. (1999) who also failed to report consistent changes in the QEEG after SCP Neurofeedback.

The individual correlation analysis revealed no correlations for the GSR Biofeedback group. However, for the SCP feedback group significant correlations were found for both the positivity and negativity conditions. The significant correlations seem to suggest that successful SCP trials are associated with increased arousal. These correlations are probably not related to a functional relation between SCP regulation and GSR regulation – which was the hypothesis to be investigated in this study. In such a case SCP positivity would be related to increased arousal, whereas SCP negativity would be related to decreased arousal or vice versa. Our results suggest increased GSR arousal being related to both training conditions, suggesting a non-specific arousal effect related to degree of success.

## Published Work:

Spronk, D., Kleinnijenhuis, M., Luijtelaar, G., & Arns, M. (2010). Discrete-Trial SCP and GSR training and the interrelationship between central and peripheral arousal. *Journal of Neurotherapy, 14*(3), 217-228.

Comparison of discrete-trial based SMR and SCP training and the interrelationship between SCP and SMR networks: Implications for Brain-Computer Interfaces and Neurofeedback (2007) . Michiel Kleinnijenhuis, Martijn Arns, Desiree Spronk & Rien Breteler. *Journal of Neurotherapy,* **11(4)**; 19-35.

Comparison of SMR and SCP training employing newly developed discrete-trial based biofeedback system (2007) Michiel Kleinnijenhuis, *Doctoral Thesis, Radboud University Nijmegen.*

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