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An evaluation of P50 suppression methodologies

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An evaluation of P50 suppression methodologies

Abstract

'P50 suppression', an index of sensory gating, has demonstrated utility in schizophrenia research. It is widely reported that P50 suppression is deficient in schizophrenia patients and an endophenotypic marker for the disorder. However, unresolved methodological issues including the unestablished reliability of the measure, unknown effects of time-on-task and long protocol undermine its usefulness. In order to address these methodological issues, twenty healthy participants' P50 suppression was measured in a long P50 paradigm. This enabled the measurement of within-session reliability, temporal course of P50 suppression, and effects of the inter-pair interval parameter. Results indicated good within-session reliability for P50 suppression (ICC = .668); changes in P50 suppression across the session (a 31% increase over the 78 minute recording); and comparable P50 suppression at long (9 s) and short (3 s) inter-pair intervals. It is concluded that given appropriate conditions, P50 suppression can be measured reliably within-session. Further, time-on-task effects need to be taken into account when measuring P50 suppression in a long paradigm or calculating reliability. Lastly, the inter-pair interval can be substantially shortened in studies with healthy participants allowing for an appreciable reduction in P50 suppression recording time.

Keywords

methodologies, evaluation, p50, suppression

Disciplines

Arts and Humanities | Life Sciences | Medicine and Health Sciences | Social and Behavioral Sciences

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Psychophysiological Changes Associated With Gambling Behaviour on Electronic Gaming Machines: the Effects of Gambling Outcome, Betting Stakes and Personality

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It has been argued that electronic gaming machines (EGM) are extremely addictive, often described as the "crack cocaine of gambling". Little research has been conducted on the psychophysiology of gambling behaviours. This study used state-of-the-art technology to investigate the effect of gambling outcome (wins and losses) and betting stake (high and low) on physiological responding. HR and SCL were recorded on a second-by-second basis to win and loss events in high and low stake conditions while healthy controls (N=43) gambled on an EGM. The relationship between personality (impulsivity and reward/punishment sensitivity) and physiological responding to wins and losses were also investigated. Results indicated that psychophysiological measures were sufficiently sensitive to detect subtle changes in physiological responding. Wins resulting in SCL and HR increases, this pattern was amplified during the higher betting stake condition, for SCL only. Personality traits failed to demonstrate a relationship with physiological responding. The current study demonstrates that physiological changes associated with gambling on an EGM can be measured reliably, and are sensitive to gambling outcome and stake manipulations. The present study is an essential first step in determining whether problem gamblers can be identified by a physiologically distinctive pattern of responding to events on an EGM. Email: kbaudinette@gmail.com

Effects of Resistance and Flexibility Exercise Interventions on Balance and Related Measure in Older Adults

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Healthy aging is associated with changes in balance. This research explored the balance benefits to untrained older adults of participating in community based exercise training. In a randomised cross-over trial, 32 older adults [mean=66.9 years] participated in resistance exercise (RT) training and flexibility exercise (FLX) training for 16 weeks each. Sway velocity was recorded using a force platform. Lower limb strength and functional balance were measured. Significant improvements in both intervention groups were seen in the parameters of sway velocity with eyes open (RT 14%, $p=0.02$; FLX 20%, $p<0.001$) and closed, (RT 16%, $p=0.05$; FLX 14%, $p<0.001$) but not while performing a mental dual task activity. Similar improvements were seen with Timed up and Go, (RT 14%, $p=0.006$; FLX 12.4%, $p<0.001$), Ten times sit-to-stand (RT 24.7%, $p<0.001$; FLX 20.5%, $p<0.001$) and Step test (RT 34.4%, $p<0.001$; FLX 30.1%, $p<0.001$); with no significant differences between the two groups. Significant increases in strength were observed following resistance training (11.9 %, $p<0.001$) but not flexibility training. Both resistance training and standing flexibility training programs lead to significant improvements in balance performance in healthy untrained older adults, however further investigation is required to determine the mechanisms responsible. Email: birdm@utas.edu.au

Effects of Arousal State on Readiness Potential

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Voluntary movements are preceded by pre-movement cortical activity associated with the planning and readiness for action. Previous studies have suggested that movement-related brain activity is affected by higher cognitive functions such as attention and motivation. In this study, we investigated the effect of arousal on pre-movement activity by examining the Readiness Potential (RP) under conditions of relatively high and low physiological arousal. Eighteen participants performed a Readiness Potential paradigm in which they executed self-paced voluntary movements approximately every 4-5 s. The arousal state was manipulated by the experimenter through interaction with participants during rest breaks. 64 channels EEG, skin conductance level and heart rate were recorded. Skin Conductance level was significantly different between high and low arousal conditions, showing that the experimental manipulation effectively altered arousal state. The RP amplitude was significantly higher under conditions of low arousal compared with high arousal, with no change in the RP scalp topography. However, this effect was restricted to the late component of the RP immediately preceding the movement. Results suggest that Readiness Potential and arousal are not linearly related. Therefore neural mechanisms associated with increasing arousal are unlikely to directly influence the premotor pathways important for the preparation and readiness for action. Email: m.bortoletto@uq.edu.au

Cognitive Coherence in Learning

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Disciplines of the brain as an organ fail currently to connect with the models of cognitive sciences, and these both remain disconnected from meta-cognitive concerns of the mind. The circle of interlinked disciplinary explanation has three prominent gaps: i. (between the brain and the experience of consciousness) how to naturalise consciousness in the brain; ii. (between neuro- and cognitive-psychology) how to understand the brain as a coherent processor of learning; and iii. (between logic and the mind) how to explain the acquisition and "inhabiting" of an objective self-model from within subjective experience. All three puzzles must be jointly addressed for a coherent and competent theory of human higher brain function.