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Fachbereich Psychologie & Salzburger Gesellschaft für Psychologie
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Fetal Alcohol Spectrum Disorder - task-related reactivity of EEG rhythms within the alpha and beta frequency bands

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There are relatively few publications on task-related EEG studies in children with Fetal Alcohol Spectrum Disorder (FASD) (D'Angiulli et al., 2006). The few studies that have been conducted analyse event-related potentials only; there have been no studies investigating task-related reactivity of EEG rhythms within the alpha and beta frequency bands. We analyse event-related desynchronisation (ERD) and synchronisation (ERS) spatio-temporal patterns in a response inhibition task in FASD children and age-matched controls.

Results from eight right-handed children with FASD (11.4 ± 1.6 years) and eight non-exposed controls (11.5 ± 1.5) will be presented. The children performed a visually-cued Go / No Go task and responded with right index finger movements for the Go event, and withheld the response on the relatively rare No Go event. EEG was recorded from 32 electrodes and current source density (CSD) derivations computed. Event-related relative power time courses were calculated in the upper and lower alpha band. Analysis of variance was performed on the relative power values in each frequency band, with variants Group, Condition, Hemisphere, Region and Time Period.

In the Control group, a short-lasting lower alpha band ERS, occurring approximately 300 ms after stimulus onset, was observed in both the Go and No Go condition. Spatially, this frontal ERS was bilateral and circumscribed around Fz for the Go condition, and had a right-sided lateralisation for the No Go condition. In the FAS group, a frontal ERS was also found, but the spatial distribution of the ERS was more widespread over frontal and fronto-central regions; bilaterally for the Go condition and with right hemisphere lateralisation for the No Go condition. Classical upper alpha band ERD patterns were found in the Control group for the Go condition, showing contralateral desynchronisation (C3) followed by bilateral desynchronisation with movement onset (C3, C4) (Andrew and Pfurtscheller, 1997). In contrast, only contralateral (C3) blocking occurred in the FASD group.

Event-related potential studies with Go / No Go paradigms are characterised by a fronto-centrally localised N2 peak, larger in the No Go as compared to the Go condition (Fonaryova Key, 2005). Investigations of re-

sponse inhibition using fMRI (Horn et al., 2001) have shown activation of prefrontal cortical structures, with right-sided lateralisation during the No Go condition. Alegre et al. (2006) have reported on a frontally-focussed beta ERS occurring after stimulus onset in a Go / No Go task. They interpret the ERS as indicative of an activated cortical region (as opposed to the traditional inactive 'idling' area interpretation), related to the decision to move (or not). The interpretation of alpha ERS reflecting top-down inhibitory control processes has been put forward by Klimesch et al (2007) in their inhibition-timing hypothesis. Under this interpretation, the more spatially widespread ERS found in the FASD children suggests the engagement of more wide-spread cortical structures of the frontal region in controlling the execution of the response and withholding the response in the No Go condition. Further motor task studies will need to be conducted to investigate the significance of the unilateral desynchronisation during movement found in the FASD group.