Quantifying neural complexity from EEG through q-statistics in mental disorders

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Studies have shown changes in neural complexity (NC) in mental disorders. We're presenting NC from typical children and those with attention-deficit/hyperactivity disorder (ADHD), by a qS approach.

From the EEG of 15 typical children and 15 with ADHD (recorded during an attention task), we extracted the time regularity of the signal, when amplitudes surpassed -1 std.dev. The inter-event intervals yielded an empirical probability distribution, fitting it a q-exponential whose parameter "q" quantifies NC.

We found that q(typical) > q(ADHD) ($p < 0.001$), and correlated with the individual DSM-IV* criteria for ADHD diagnostics ($r = -0.47$, $p > 0.001$). The q-statistics seems to be sensitive to NC from subtle differences between typical and ADHD minds, at least under task demands.

(*) Diagnostic and Statistical Manual of Mental Disorders, 4th Edition.