### 11. PERSONALIZING COGNITIVE REMEDIATION INTERVENTIONS: WHAT WORKS AND FOR WHOM?

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The link between cognition and functioning in schizophrenia is well established, and there is a large body of research supporting the efficacy of cognitive remediation (CR) for improving cognitive function in individuals with psychosis. In recent years, the focus of CR research has shifted to better understanding how these interventions work, and factors that influence whether or not an individual is likely to benefit from any such intervention. This line of research is particularly important given the considerable variability in response to this time and labor-intensive intervention, with upwards of 40% of individuals being non-responders. In the current symposium, we present new data exploring specific characteristics of CR interventions, individual participants, and disorder pathology that may influence CR’s impact on outcomes of interest and inform the likelihood of positive response to this intervention.

**Mr. Best** focuses his talk on the impact of differences in CR approaches. He presents data from a trial directly comparing an executive and perceptual skill-focused CR approach. Neurocognitive, symptom, self-report, functional competence and community function outcomes are evaluated, along with their trajectories after the active intervention phase. EEG data is also presented probing the neurophysiological mechanisms underlying specific effects of these two CR approaches.

**Dr. Choi** focuses on how the efficacy of CR delivery methods may be augmented by using neurofeedback. He presents data from a trial examining the impact of augmenting standard performance-based CR with pupillometry, which indexes effort expenditure and task engagement, and may thereby offer a more sensitive measure of parameters relevant to optimizing learning. Effects of CR with and without pupillometric feedback are compared on measures of cognitive function and training motivation, and differences in neurofeedback learning algorithms between individuals with chronic schizophrenia versus first episode and clinical high risk are discussed.

**Dr. Kurtz** focuses on person characteristics that may influence response to CR. He presents data on the influence of demographic factors, cognition, symptoms, and treatment duration/intensity on CR-associated improvements in working memory and functional capacity, and discusses his findings in relation to existing research on predictors of response to CR.

**Dr. Penades** focuses on the genetic contributions to cognition and CR outcomes. He reviews recent literature on the impact of genetic variables on cognitive function and response to CR, presents new data on the impact of two gene polymorphisms (COMT and BDNF) on cognitive function, and discusses how genetic variability may be used to develop predictive models to optimize outcomes of different CR approaches.

### 11.1 EXECUTIVE COGNITIVE TRAINING VS. PERCEPTUAL COGNITIVE TRAINING FOR SCHIZOPHRENIA-SPECTRUM DISORDERS: TREATMENT OUTCOMES AND PREDICTORS OF RESPONSE

**Mike Best**, **Christopher Bowie**

### 11.2 PUPILLOMETER-BASED NEUROFEEDBACK COGNITIVE TRAINING: OPTIMIZING TASK ENGAGEMENT TO ENHANCE LEARNING IN PRODROME, FIRST EPISODE, AND ESTABLISHED PSYCHOSIS

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**Background:** Neurocognitive impairments are the best predictors of community functioning for individuals with schizophrenia-spectrum disorders. Cognitive remediation is a psychological intervention designed to improve neurocognitive abilities and community functioning. However, different theoretical approaches have developed without any studies directly comparing them. Additionally, with a movement towards personalizing cognitive enhancing techniques, greater emphasis is being placed on determining predictors of treatment response. The current study is the first to compare the two dominant approaches to cognitive remediation (training of executive skills and training of perceptual skills) and examine predictors of treatment response.

**Methods:** 70 outpatients with schizophrenia-spectrum disorders were randomized to receive either 6 weeks of executive training (ET) or perceptual training (PT). Electrophysiological activity, neurocognition, functional competence, case-manager rated community functioning, clinical symptoms, and self-report measures were assessed at baseline, post-treatment, and 12-weeks post-treatment.

**Results:** There were minimal differences between groups at the post-treatment visit. PT improved EEG mismatch negativity amplitude significantly more than ET immediately post-treatment (d = 0.64), however, the effect did not persist at 12-week follow-up (d = 0.01). Examining long-term effects, at 12-week follow-up, ET increased EEG theta power during an n-back working memory task (d = 1.01), neurocognition (d = 0.64), functional competence (d = 0.67), and case manager rated community functioning (d = 0.53) to a greater extent than PT. Larger P300 amplitude (B = 47) and theta power during a working memory task (B = 34) at baseline were significantly associated with larger improvements in neurocognition post-treatment. Baseline mismatch negativity amplitude was not significantly associated with treatment response (B = .17), and no baseline EEG measures predicted functional outcomes.

**Conclusions:** Both PT and ET improved neurophysiological mechanisms specific to their domains of intervention, however, only ET resulted in improvement in neurocognition and functioning. Improvements in favor of ET did not appear immediately post-treatment but emerged 12 weeks after the end of active treatment. Training executive functioning may prime further cognitive and functional improvements. Executive functions may be more functionally relevant than other cognitive domains and when addressed in treatment lead to better outcomes. Greater P300 amplitude and theta power may be associated with learning-related processes which are important for acquisition and retention of skills during cognitive training programs.