

# The Effects of the Muscarà Rehabilitation Method for Stuttering (MRM-S) on Cognitive Control Mechanisms

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**Abstract**— The Muscarà Rehabilitation Method for Stuttering (MRM-S), hinges on an increased awareness and ability to monitor all types of movements involved in speech utterance.

In the present study we investigate the relationship between stuttering and cognitive control mechanisms, such as monitoring and inhibitory control, using the Attentional Network Test (ANT) in a group of 16, young adults, people who stutter (PWS). PWS subjects were tested in a follow-up design before (T0) and after a 1-week period (T1) of intensive, daily treatment using MRM-S.

Comparing subjects performance at T0 and T1, results showed i) a significant RT (i.e. reaction time) decrease on incongruent trials, which require an higher degree of cognitive control paralleled with a significant decrease in response accuracy on the same trial type; ii) a significant decrease in the Interference effect, which measures the difference in RTs between incongruent and neutral trials, where no flankers of either type (i.e. incongruent or congruent) are present.

Overall, these results suggest a key influence of the MRM-S treatment on cognitive control mechanisms. Namely, PWS show a tendency to increase speech accuracy, which leads to blocking. After MRM-S treatment we see that on trials which require more monitoring (i.e. incongruent) reaction times decrease, but accuracy decreases as well meaning that the training tunes the monitoring system in the sense of relaxing both the timing and the accuracy threshold criteria in order to respond as quickly as possible in accordance with task goals. Critically, this behavior mimics PWS observed language-related behavior after the MRM-S treatment, where speech is released faster and with significantly less blocks.

**Keywords**—Language, Stuttering, Speech-Rehabilitation, Cognitive Control.

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