

Automated Stroop Colour-word Test as a tool for assessment of executive Control in MND

Assessment Of Executive Control In Motor Neuron Disease Using An Automated Version Of The Shortened Stroop Colour-word Test

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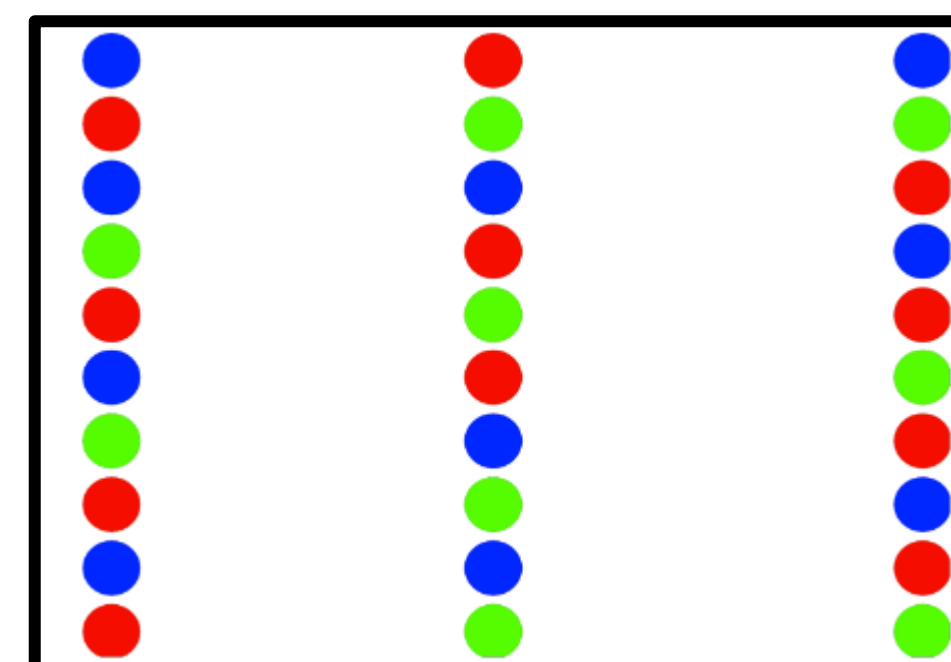
Background

- The Stroop Colour-word Test (SCWT) is an established tool for assessment of executive function in patients with dementia and frontotemporal dementia (FTD)
- It is increasingly accepted that there may exist a disease continuum between motor neurone disease (MND) and certain FTD phenotypes
- To our knowledge, the use of the SCWT in MND has thus far been limited.
- In this study, compared a **shortened and automated version of the SCWT** to the “Edinburgh Cognitive and Behavioural ALS Screen” (ECAS), a pre-existing validated assessment of cognitive impairment in MND
- The ECAS utilises alternative tests of executive function (e.g. sentence completion)

The Shortened Stroop Colour-word Test

- Participants are asked to read complete three tasks as accurately and quickly as possible
- Task one: read thirty “colour” words
- Task two: report the colour of thirty red, green or blue dots
- Task three: state the incongruent font colour in which thirty colour word are printed
- Total **errors** and **time** taken to complete the task are used as measures of executive function

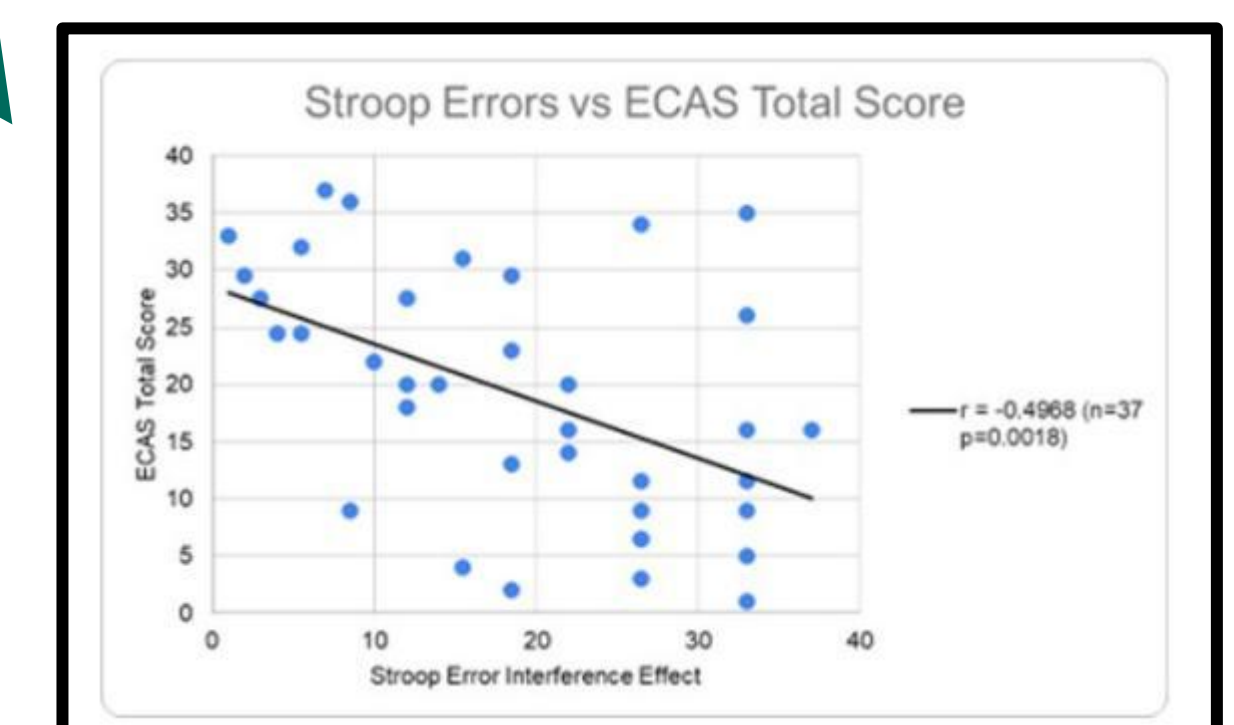
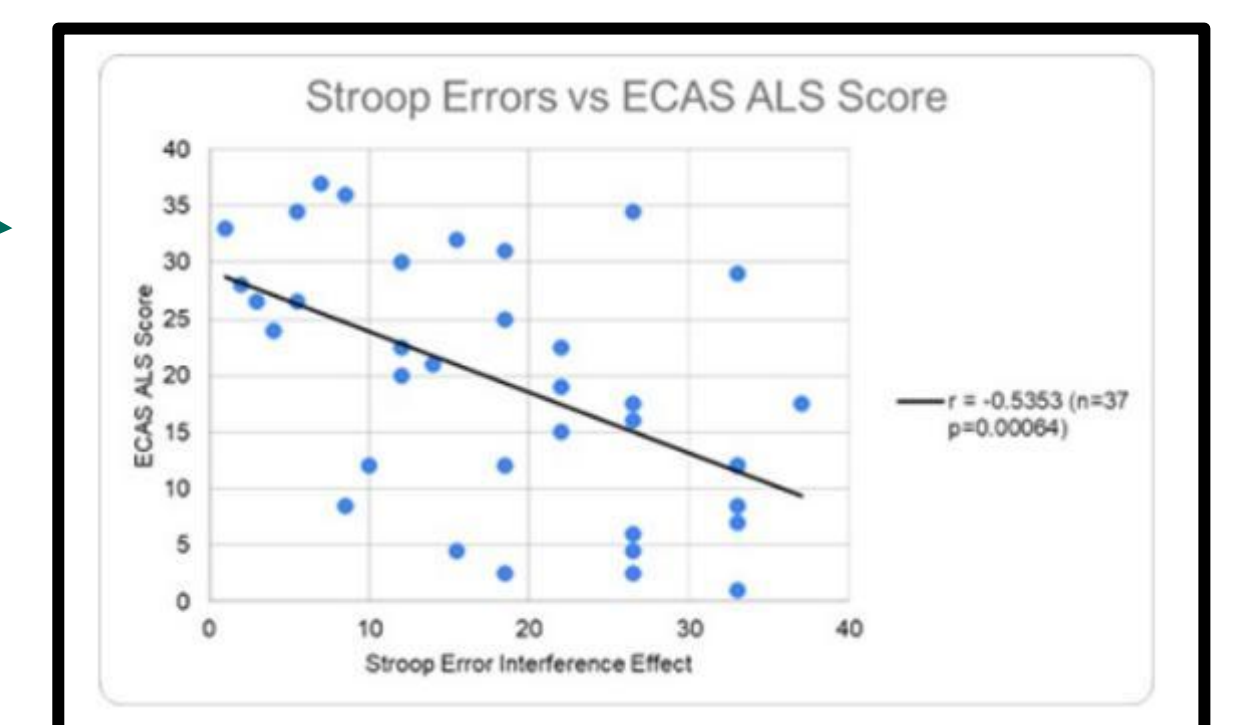
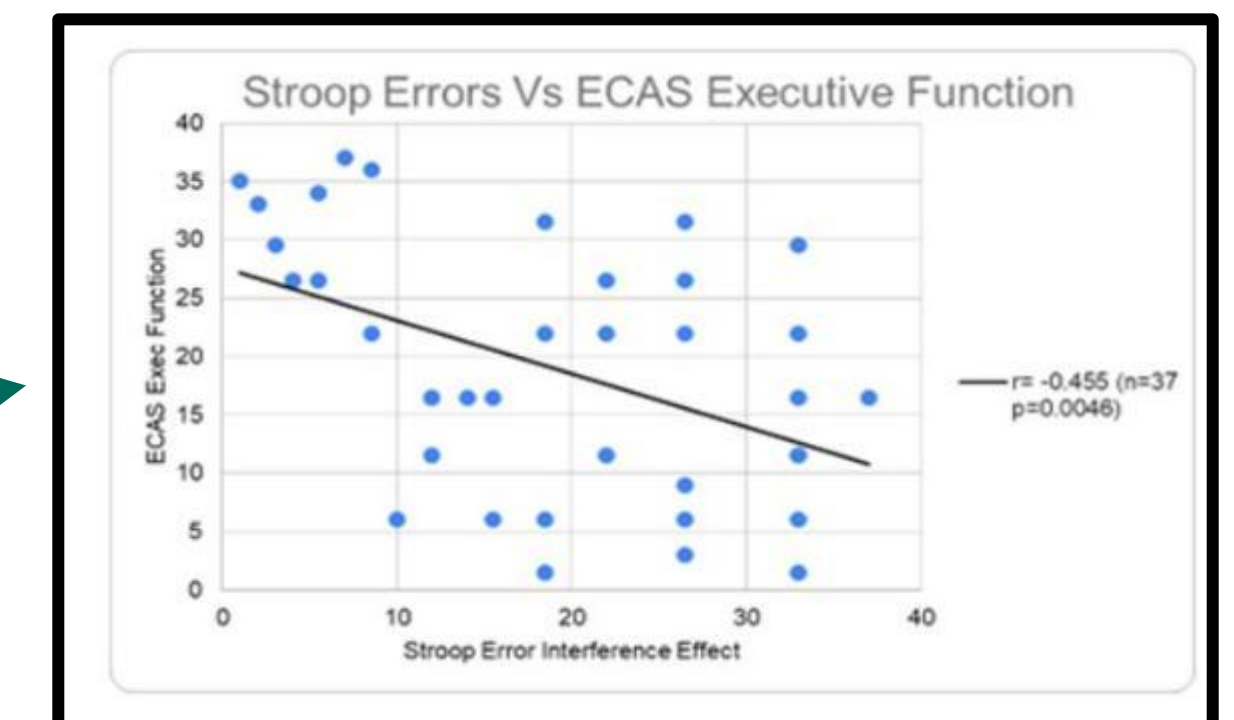
GREEN	BLUE	GREEN
RED	RED	BLUE
BLUE	BLUE	GREEN
RED	GREEN	BLUE
GREEN	RED	RED
BLUE	BLUE	GREEN
RED	GREEN	RED
GREEN	RED	BLUE
RED	BLUE	GREEN
BLUE	RED	RED



RED	RED	BLUE
BLUE	BLUE	GREEN
RED	RED	BLUE
GREEN	BLUE	BLUE
RED	GREEN	BLUE
GREEN	RED	RED
BLUE	BLUE	BLUE
GREEN	GREEN	GREEN
RED	RED	RED
GREEN	BLUE	GREEN

Results

- Age adjusted SCWT error interference effect was **moderately to strongly correlated** with impaired executive function relative to ECAS scores ($r=-0.4553$, $p=0.001763$).
- The results **correlated moderately to strongly** with markers of ALS ($r=-0.5353$, $p=0.00064$) and total ECAS scores ($r=-0.4968$, $p=0.001763$).
- Within our data, **three phenotypes emerged**. Those with error interference >1.5 SDs of the mean ($n=8$) but normal time interference, those with both ($n=5$) and participants with neither.
- Time interference effect showed minimal correlation with ECAS score and was not statistically significant.



Methods

- Thirty-Seven patients ($n=37$) aged between **35-85 years** with **known MND** were recruited as a part of a larger project within the CognoSpeak group at The University of Sheffield
- A **digital version** of Venneri et al's (1993) SCWT was delivered to participants alongside other tasks including the “Edinburgh Cognitive and Behavioural ALS Screen” (ECAS)
- Audio recordings were processed using Audacity and PRAAT software to determine time taken to complete the task and errors made.
- An “interference” effect (task three score minus the mean of task one and two scores) was calculated for both time taken to complete the task and errors made.
- Existing age controlled normative data were used to determine abnormal performance (i.e. >1.5 standard deviations, SD, from normative sample mean).
- Correlation between SCWT results and ECAS scores was determined using Spearman's rank.

Discussion

- Error interference in this shortened digital version of the SCWT appears to **correlate well with existing validated assessments** of executive function within a moderate sized MND cohort.
- The presence of separate phenotypes raises the possibility of using the SCWT to detect differences in disease process.
- Additional research is required to validate further our findings. In particular, a larger sample size with comparison to a greater variety of validated metrics of executive control and cognitive function in general.