Autistic Savants and prime number identification

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Abstract

Autistic Savants are proven to be differently abled, in this short publication on prime detection mental exercises as cognitive learning and as mathematics therapy. Mathematics, namely number theory is proven therapeutic and even natural to autistic patients, we prove the hypothesis that number theory as mathematical therapy is effective in improving coordination and beneficial in treating ASD symptoms.

Keywords: ASD, prime number determination, autistic savants, mathematical testing, Alexa Skills, learning and Cognition.

Autistic Savants and prime number identification

(Treffert, 2009) describe five prominent savant capabilities in music, arts including sculpture and drawing, calendar calculations, mathematical capabilities, in number theory and prime number determination and extraordinary spatial and mechanical skills, including Lego and brick based building.

Autistic savants have displayed a spectrum of other skills such as precise timing of the passage of time, without clocks, precise measurements of distances, and excel in domains like neurophysiology, statistics, navigation and cartography. Extrasensory perception, with keen smell, taste or sight are other abilities. Hyperlexia, with a hyper-preceptory to symbols, scripts and patterns is predominant in autistic children.

(*Savant Syndrome and Prime Number*, n.d.) Yamaguchi, however, disproves mathematical capabilities in autistic savants.

Method

Participants

The author embarks on creating a directory of autistic savants with extraordinary mathematical abilities, verified with quantitative measures similar to IQ tests, but with recreational mental mathematics, in special alexa skills created for a quantification of mental mathematical capabilities.

Assessments and Measures

Web based, html 5 based UI interfaces are created for the evaluation of prime identification as mathematical therapy. The first experience called “small primes”, is a number game where Alexa displays a number between 0 and 100 and the listener is supposed to mentally identify if it is a prime or not. The response times and the number of right answers are used to evaluate savant capabilities and duals as a recreational mathematics.

Design Of Proposed Experiment (D.O.E),

Variables: response time for correct responses, response time for incorrect responses, number of correct responses, number of incorrect responses.

Number of patients and control group.

The control group consists of 100 participants, using this skill as recreational mathematics and as a learning and cognition tool. The tool is also used to detect 'savant' characteristics based on response times and number of correct and incorrect responses.

Instrument Reliability

1. Inter-rater reliability
2. Test-retest reliability

Validity

1. Face validity
2. Construct validity

Use of R and the Laavan software, for the assessment of reliability and validity measures.([No Title], n.d.). We use the Laavan software to determine inter-rater and test -retest reliability and variance based validity measures, of both face and construct validity measures, published when the clinical trials are committed.

Model for the evaluation of primality detection score and reaction times.

("The Development of Mental Arithmetic: A Chronometric Approach," 1982) is epistemological on models of mental arithmetics with a progression from procedural to network models.

Reaction times are proven irrelevant to the quantification of mental arithmetic to indicate 'savantness', however reaction times and statistics are part of the data set collected, for future research in data mined correlations in reaction times. In this publication we use a fuzzy mapping to the primality detection numbers, to measure 'savantness'.

A control score as a comparison on a test of primality detection for all the first hundred integers, is computed from published literature and the use of this test on normal subjects, for a large sample size of at least 100 subjects, for a confidence interval of 95.

Discussion and Future Work.

We have described the use of the Alexa VUI with skills for learning and cognitive quantification with respect to mental arithmetic capabilities, which duals as recreational mathematics. We describe one skill called small primes, for mental arithmetic to determine primality of random numbers less than 100. Based on response times and number of correct and incorrect answers, we quantify a metric for savantness. Larger primes, greater than 4 digits, require special mental tasks and arithmetic capabilities introduced in subsequent skills. This is a topic of future work, where training skills form part of premium content, which is not required if you have savant capabilities.

References.

[No title]. (n.d.). Retrieved August 19, 2020, from

<https://cran.r-project.org/web/packages/lavaan/lavaan.pdf>

Savant syndrome and prime number. (n.d.). Retrieved August 15, 2020, from

<https://goertzel.org/dynapsyc/yamaguchi.htm>

The development of mental arithmetic: A chronometric approach. (1982). *Developmental Review: DR*, 2(3), 213–236.

Treffert, D. A. (2009). The savant syndrome: an extraordinary condition. A synopsis: past, present, future. *Philosophical Transactions of the Royal Society of London. Series B, Biological Sciences*, 364(1522), 1351.