

Neuropsychological Analysis of an  
Idiot Savant

Antonio E. Puente

Stephanie Heller

Department of Psychology

University of North Carolina at Wilmington

Wilmington, North Carolina 28403-3297

USA

Running head: IDIOT SAVANT

Presented at the annual European meeting of the International  
Neuropsychological Society in Barcelona, Spain on July 2, 1987.

## NEUROPSYCHOLOGICAL ANALYSIS OF AN IDIOT SAVANT

A paucity of information as well as numerous myths pervade the literature on idiot savants. These so-called "children of God" are grossly retarded but possess unusual skills usually in the area of music, art, and calendars (see Scheerer, Rothmann & Goldstein, 1945). Despite their unusual abilities, idiot savants are essentially incapable of learning by traditional methods of instruction (Scheerer et al., 1945). Organic etiologies and diffuse anatomical changes have been provided as plausible explanations for these unusual behaviors (Brink, 1980; Bunding, Sappington & Mead, 1985; Steel, Griffit, Gorman & Flexman, 1984; Steinkopff, 1973). However, no formal neuropsychological explanation or evaluation of idiot savants is found in the literature. In this case study, we will complete a neuropsychological evaluation/description and explanation of a calendar type idiot savant.

R. W., a 33 year old, black right handed male, was referred by a federal agency to determine the extent of brain dysfunction. Both the patient and his family were interviewed on three separate occasions. A wide variety of neuropsychological tests were administered over a span of one year.

The diagnosis of idiot savant was obtained using a series of informal tests. Based on the long-standing reports provided by the family and school that he "spends most of his time in his room thinking about calendars" a perpetual calendar was used to

question potential calendar abilities. He was able to name the day of the week with 100% accuracy from the year 1920 to 2010 in over 200 separate trials. Response time usually did not exceed 5 seconds. He did not provide any answers for dates prior to 1920 or after 2010 opting to say "those dates confuse me." Several psychologists then provided a series of informal tests using both coded and uncoded, random and non-random, Arabic and Roman numerals, as well as meaningful verbal and non-verbal stimuli. In no case was R. W. able to retain more than 2 digits, sounds or words at any one time. No recall was obtained with or without interference for intervals of 30 seconds and above.

To further investigate R.W.'s special talent with regards to calendars, 1,000 additional trials of dates were administered. Ten sessions of approximately 1 to 1 1/2 hour each were completed over a span of two months. In each case 100 dates randomly obtained from a perpetual calendar between 1900 and 2010 were individually administered. Dates were recorded along with the appropriate day of the week. R. W. was instructed to verbalize the day of the week along with the date after each presentation with the responses recorded adjacent to the appropriate date. This was completed since it appeared during the preliminary trials that R. W. provided the day of the week he gave incorrect dates for. In other words, this procedure assured that he provided the day to the exact date presented. Upon completion of the 100 trials (which were numbered), the experimenter re-read each of the dates which

resulted in an incorret response. This was done continuously so that the incorrect dates appeared to be dates at the tail-end of the testing sessions. This procedure was repeated once more for any dates yielding an incorrect response.

Of the 1000 trials, R. W. exhibited the following performance;

<u>Type of Error</u>	<u>Number of Errors</u>	<u>Percentage Correct</u>
Initial trial	59	94.1%
Second trial	6	99.4%
Third trial	5	99.5%

Thus, a 94.1% initially correct percentage was obtained. If given the chance to correct himself, without the benefit of any feedback, this percentages was raised to 99.4%. Subsequent trials did not appear to increase the percentage of correct responses.

Finally, R. W. had no recollection of any dates provided. Essentially, there was no recall of a date once that date had been solved.

Several neuropsychological tests were administered over a period of one year. Initially tests were compelted intermittently while during the last three months, R. W. was tested approximately two hours every Wednesday afternoon. The results of testing are arranged by general category:

I. Self-Report of Symptoms.

A Test: Neuropsychological Symptom Checklist  
(Psychological Assessment Resources, 1983)

Results: olfactory, gustatory, visual, auditory, memory,  
reading, verbal comprehension

II. Motor.

A Test: Harris Test of Lateral Dominance (Hamis, 1974)

Results: hand preference = 100% right  
foot dominance = 100% right

B Test: Lateral Dominance Examination (Reitan, 1985)

Results: hand preference = 100% right  
foot dominance = 100% right

(e.g., writing right = 70%, left 120%)

C Test: Manual Finger Tapping Test (Reitan, 1985)

Results: left hand average = 12 (range = 11-13)  
right hand average = 10.8 (range = 8-13)

III. Visuo-Motor.

A Test: Bender Gestalt (Bender, 1934)

Results: angulation, time; overall, WNL

B Test: Trial Making (Reitan, 1985)

Results: Part A = 152"

Part B = 416"

IV. General Sensory.

A Test: Single and Double Simultaneous Stimulation Test  
(Centrofanti and Smith, 1979)

Results: errors = 50 (displacement, extinction, and  
adjunction)

B Test: Tactile Form Recognition (Reitan, 1985)

Results: errors = right - 1, left - 0  
time = right - 43, left - 26

V. Speech.

A Test: Speech Sounds Perception Test (Reitan, 1985)

Results: errors = 59  
correct = 1

B Test: Reitan - Indiana Aphasia Screening Test  
(Reitan, 1985)

Results: errors = 6  
signs = alexia, agnesia (verbal and body),  
ocalculia

VI. Memory and Attention.

A Test: Wechsler memory Test (Form 1)  
(Wechsler, 1954)

Results: MQ = 54  
deficits = information, mental control, logical  
memory, digits, associate learning

B Test: Memory for Designs (Graham and Kendall, 1975)

Results: errors = 7 (BD range)

C Test: Boston Remote Memory Battery - Recognition Test  
(Albert)

Results: errors = 34

correct = 14

D Test: Knox's Lobe Test (Knox, 1980)

Results: Correct = 1

Age in years = 4 (approximately)

VII. Coding/Learning.

A Test: Symbol Digit Modalities Test (Smith, 1973)

results: errors = 11

B Test: Hooper Visual Organization Test (Hooper, 1966)

Results: correct = 27.5

C Test: Raven Progressive Matrices (Raven, 1947)

Results: Colored; correct = 30

errors = 6

Progressive; correct = 10

errors = 50 (5)

D Test: Minnesota Paper Form Board Test, Revised

(Likert and Quasha, 1970)

Results: MA; correct = 31

MB; correct = 35

E Test: Rosen Embedded Verbal Concept Attainment Test  
(Rosen, 1962)

Results: unable to complete

F Test: Booklet Category Test (Reitan, 1985; DeFilippis  
and McCampbell, 1980)

Results: errors = 146

VIII. General Cognitive.

A Test: Whitaker Index of Schizophrenic Thinking  
(Whitaker, 1973)

Results: Index = 76

B Test: Proverbs Test (Gorham, 1976)

Results: unable to complete

IX. Academic and Intellectual.

A Test: Wide Range Achievement Test, Level 2, Revised  
(Sastak, 1984)

Results:	Test	Raw Score	Percentile	Grade
	Reading	8	.03	1
	Spelling	8	.20	2
	Arithmetic	27	7.00	7 <sub>B</sub>

B Test: BETA-II, Revised (Kellog and Morton, 1978)

Results: Total = 13

Rating = less than 60



C Test: Peabody Picture Vocabulary Test - Revised  
(Dunn and Dunn, 1981)

Results: Raw score = 56  
Age Equivalent = ?

D Test: Otis Self-Administering Test of Mental Ability  
Form A

Results: unable to complete

E Test: Wechsler Adult Intelligence Scale, Revised  
(Wechsler, 1981)

Results:	Tests	Raw Score	Scaled Score
	Verbal Tests		
	Information	3	2
	Digit Span	7	4
	Vocabulary	4	1
	Arithmetic	1	2
	Comprehension	2	2
	Similarities	2	3
	Performance Tests		
	Picture		
	Completion	1	1
	Picture		
	Arrangement	0	1
	Block Design	6	4
	Object		
	Assembly	16	5

Digit Symbol	0	1
Verbal IQ	57	
Performance IQ	57	
Full Scale IQ	54	

X. Social/Personality.

A Test: Vineland Social Maturity Scale  
(Doll, 1980)

Results: Total Score = 65  
Social Quotient = 7.0

B Test: Minnesota Multiphasic Personality Inventory,  
Form R (Hathaway and McKinly, 1970)

Results: Invalid (207 blank responses)

XI. Battery.

Test: Luria-Nebraska Neuropsychological Battery  
(Golden, Hammeke, and Purisch, 1980)

Results: Scale	Raw Score	t Score
Motor Function	42	75
Rhythm	19	100
Tactile Function	6	45
Visual Function	6	45
Recept. Speech	25	80
Expressive Speech	23	61
Writing	20	85
Reading	13	70
Arithmetic	38	120

Memory	26	95
Int. Process	59	100
Pathogn.	32	75
Left hemishpere	4	42
Right hemishpere	10	55
Profile Elevat.	38	120
Impairment	35	87

These findings are clearly preliminary. They offer an initial view into the neuropsychological make-up of an individual with special talents. An overall clinical and psychometric picture of dysfunction was established. However, it is too early to draw specific conclusions about R.W.'s neuropsychological substrate for his unique talent. We are in the process of shifting to experimental paradigms in order to more accurately assess his ability. We trust that these efforts will help answer a few of the questions raised by Squyres, Rimland, and Gardner (among others) regarding the organic basis of unusual behaviors and talents.