

## Current research in the area of Autism and Savant Syndrome

---

**Robyn Young**

Department of Psychology, Flinders University [robyn.young@flinders.edu.au](mailto:robyn.young@flinders.edu.au)

*In 1990 I met my first savant – he was a 12 year old musician with severe Autism. His name was Trevor and I decided to make him the focus of my PhD thesis. His story, and that of his family, became the first chapter of my PhD dissertation and the catalyst for a body of research that involves both persons with savant syndrome and those with autism. This original work has had two main research spin-offs; the documentary and Autism diagnoses. This presentation outlines current research in the area of Autism and Savant Syndrome by presenting the original study and this latest work.*

In 1990 I met my first savant – he was a 12 year old musician with severe Autism. His name was Trevor and I decided to make him the focus of my PhD thesis. His story, and that of his family, became the first chapter of my PhD dissertation and the catalyst for a body of research that involves both persons with savant syndrome and those with autism. In order to appreciate his story I probably need to clarify some terminology.

### **WHAT IS A SAVANT?**

A savant is an individual demonstrating exceptional skills despite an overall low level of general functioning. Savant Syndrome refers to observable behavioural characteristics rather than to a diagnostic classification and the term therefore incorporates all types of intellectual disability or mental retardation including autism.

### **Savants can be categorised according to level of ability**

The first are prodigious savants. Such individuals show skills that are not only remarkable in contrast to their low general level of functioning, but also to levels beyond the accomplishments of most people in the general population.

The second are talented savants where the skills are beyond the range predicted by a generally low level of intelligence, but are not exceptional in the "prodigious" sense because they might be expected to occur at similar levels among nondisabled persons.

Finally, we have those individuals showing splinter skills. Such individuals show levels of interest and competence appreciably above their general level of functioning and are more common among the autistic population.

Despite the array of skills available to human savant skills come from a discrete range of abilities. These are:

- musical precocity
- arithmetic (usually only multiplication)

- calendrical calculations
- verbal representations
- highly developed sensory discriminations
- artistic ability
- mechanical dexterity
- memory for facts.

### **THE ORIGINAL STUDY**

My original thesis comprised of three studies. Study 1 examined a musical savant and his family. Study 2 looked at a savants ability to conduct calendar calculations and Study 3 involved psychometric evaluation.

#### **Study 1 – The examination of a musical savant and his family**

Findings:

- musical ability among available members of the savant's family
- perfect pitch
- memory for music was well organised and structurally based
- some cognitive functions may be independent from a general capacity.

#### **Study 2 - Calendar Calculation**

Findings:

- savants were aware of the 14 calendar configurations
- not reliant on mathematical algorithms
- calendar calculations become "automatic processing",
- calendar calculations are rule-based
- result from intense practice and rote learning of rules.

#### **Study 3 – Psychometric Evaluation**

Findings:

- Significant correlations between skill level and IQ suggested that the extent to which the ability is developed, reflects more sophisticated cognitive processes and is IQ dependent.
- Mean IQ of immediate family members supports the predisposition of savants toward higher levels of intelligence.

### **Overall Findings**

I believe that savant skills are suited to the individuals who develop them because:

- (i) they are highly dependent on some preserved neurological ability (perhaps declarative memory),
- (ii) they require little higher order manipulation of cognitive stimuli,

- (iii) they can occur in the absence of a high general level of intellectual functioning, and
- (iv) the processes involved can be developed further with practice.

The existence of savants is consistent with a theory that some skills are based on relatively well-differentiated neurological capacities; the skills developed by savants are generally rule-based, rigid and highly structured, lacking critical aspects of creativity and cognitive flexibility - abilities generally considered to reflect intelligence.

In summary, my studies suggest that a savant is a neurologically impaired individual with idiosyncratic and divergent profiles of intellectual ability and language and intellectual impairments consistent with autism, who has an intense interest and preoccupation with a particular area of skill. These circumstance, together with the necessary preserved neurological capacity to process information in a manner relevant to their skill (probably sequential), a well-developed memory, probably declarative, a familial predisposition toward high achievement (possibly innate), and adequate support, encouragement and reinforcement, provide the necessary climate for savant skills to develop.

### **OUTCOMES FROM THE STUDY**

This original work has had two main research spin offs, the documentary and work into Autism diagnoses.

#### **Documentary**

I was told that I would never get access to sufficient savants that would make my study worthwhile. I travelled throughout the USA in a mobile home and located 52 such persons. This makes my study the largest study of its kind in the world. When presenting this work at a conference in NSW I was approached by the ABC to turn this work into a documentary. The result of which was a film called "Uncommon Genius" screened throughout the US, Europe and Australia earlier this year.

#### **Autism Diagnoses**

The second "spin off" from my PhD research was my association with Stanford University. In return for providing me with participants for my study, I became trained in the administration of the Autism Diagnostic Interview. Upon my return to Australia I tested all the multiplex families with Autism - that is, families with two or more children with Autism. The purpose of these assessments was an international collaboration targeting families where genetics seems to be involved in the development of Autism. It was my role to confirm the diagnoses. Subsequent to diagnoses, bloods were drawn and genetic testing was performed. The results of this research are still being analysed.

While doing these diagnostic interviews, however, I became alarmed at the number of anecdotal reports from parents suggesting intervals of often several years between initial concern with their child's development and subsequent diagnoses. To investigate the validity of such claims I conducted some of my own preliminary investigations. This research showed the mean age at which parents first noticed abnormal developmental signs associated with Autism ( $M = 13.18$ ,  $S.D. = 8.21$ ) was significantly less than the mean age at which parents sought professional advice ( $M = 27.69$ ,  $S.D. = 14.21$ ),  $t(76) = 9.92$ ,  $p < .001$ , which in turn was significantly less than the age of diagnosis of Autism ( $M = 48.22$ ,  $S.D. = 26.39$ ),  $t(71) = 6.69$ ,  $p < .001$ .

By this time, and because the course of autistic symptomatology changes with age, the symptoms that a child presents with may not appear at all like the symptoms shown in early infancy. It therefore became my goal to identify these primary or very early deficits and determine how we could better diagnose Autism in very young children.

Because Autism has no biological marker that has been identified, we must diagnose in terms of behavioural criteria. To date we continue to rely upon broadly based behavioural criteria such as those outlined in the DSM-IV-TR or the ICD-10.

These criteria, however, require observation of difficulties relating to language, adherence to routines and rituals and other behaviours that have are not readily apparent in the early stages of the disorder. In fact, some of these behaviours are rarely observed among children under four years.

Unfortunately most professionals that encounter autism at the early stages are not experienced with the disorder and are guided by assessment tools that reflect these latter or secondary behaviours. Most professionals are therefore reluctant to make a diagnosis of very young children as many of the behaviours that are characteristic of the disorder have not yet developed. A need was therefore seemed necessary to develop a tool which:

- focused on pre-verbal behaviour,
- investigated behaviours that are not dependent on receptive language,
- was behaviourally orientated and associated with objective measurement, and
- focused on the core deficit-linked behaviours.

Together with colleagues and students at Flinders we developed a tool now known as the Flinders Observation Schedule of Pre-verbal Autistic Characteristics (FOSPAC). The FOSPAC does all of the above.

Behaviours in the FOSPAC can be classified into three domains:

- disturbance in interacting with others/objects,
- stereotypes and repetitive movements, and
- bizarre responses to environmental stimuli.

Objectives include:

- establish discriminant validity,
- establish temporal stability of measures taken in infancy (18 months), and
- establish the reliability of this instrument via demonstration of acceptable levels of inter-observer agreement and internal consistency.

These objectives are based on the main hypotheses that:

1. Overall FOSPAC scores will predict 12-month follow-up FOSPAC scores of children at risk, and
2. FOSPAC scores will discriminate 'older' children with autism from chronological age-matched, typically developing children and children with a developmental disability.

Eight items were excellent predictors of AD at the 12 month follow-up, and include:

- Response to name
- Gaze - engagement
- Social referencing
- Joint attention
- Reciprocity of smile

- Response to sounds
- Response to verbal command
- Anticipatory posture for being picked up

The current work in progress involves four groups of children (N = 50 per group):

1. children with an existing diagnosis of autism (age = 4-6 years);
2. children (4-6 years) with a developmental disability
3. typically developing children (4-6 years);

Above will be used to address Hypothesis 1.

4. infants (< 2 years) “at risk” for autism

These data will address Hypothesis 2.