

## **Autism Researchers in the Faculty of Health**

### **Dorota Crawford**

Autism may affect various aspects of development, learning, and adaptation to the community. Parents are usually the first to notice unusual behaviours in their child. When an affectionate toddler suddenly becomes silent, withdrawn, something is wrong. Currently there is no medical test to identify autism and there is no effective treatment. The research in my lab aims to change this. The focus of our research is to identify genes and environmental factors underlying causes of autism. Our multidisciplinary research program integrates genetics, and molecular and cellular neurobiology approaches, in order to study the link between the causative biological factors and behaviour. With the advances of our research, we might be able to examine a genetic sample from a patient and possibly discover the causes for the symptoms of autism. Our goal is to develop proper diagnostic tools, and ultimately an effective treatment for autism.

### **Jennifer Steeves**

My area of expertise is the clinical study of vision; in particular I am studying the consequences of selected clinical visual disorders on face, form and motion processing, in order to better understand these functions in the normal brain. My research examines patient groups including people who have lost one eye early in life, rare neurological patients, and I have begun to study individuals with Asperger syndrome, a type of autism. This work will have implications for developing models of how the different aspects of faces are coded in the brain and could possibly direct therapeutic intervention in Asperger syndrome. I employ several techniques including fMRI, psychophysics, transcranial magnetic stimulation and eye movement measurement.

### **Mazyar Fallah**

Recent evidence has shown that people with autism have abnormal object processing: they have superior abilities in processing local features, but are impaired in global processing (weak central coherence). It can literally be called the inability to see the forest for the trees. This is most evident for faces. It may be that the impaired ability to construct faces leads to deficits in social development.

There are two possibilities that may cause this abnormally. The first is an impairment in feature binding. Feature binding is the way the brain puts together different parts of an object, building up a whole. It would be like having a Mr. Potato Head and all the pieces of the face, but the impairment would prevent putting them together.

An alternate hypothesis suggests that feature binding is intact, but the impairment is in attending to objects. In this case, the Mr. Potato Head has the potato, 2 eyes, a nose, a mouth and 2 ears, a total of 7 items put together into another object, the whole face. A deficit in object attention would mean that the individual would not be able to hold their attention on the whole face, as it is only one of 8 objects they see.

My laboratory investigates both feature binding and object attention. By understanding how these processes work, we can improve rehabilitation and intervention techniques.

### **Kari Hoffman**

Among the most debilitating symptoms of autism are the difficulties processing social and communication signals. Our limited knowledge of social cue processing by the brain tells us *where* these cues are likely to be processed, but not yet *how*. This is akin to knowing that an oven is the proper kitchen appliance to bake a cake, with no knowledge of the ingredients or procedures needed to make the cake batter. My research attempts to understand the neural 'recipe' that leads to our exquisite abilities to process social signals such as facial expressions, gaze and vocalizations. By understanding how each node of the social brain network contributes to the whole, we can form better therapeutic strategies when a subset of those nodes is not performing optimally, as is thought to occur in people with autism.

### **Jim Bebko**

Children with autism characteristically display impairment in language, imitation, pretend play, and the ability to use and comprehend gestures. Research in my lab primarily deals with improving language and communication skills among children with autism.

Many children with autism who have limited language use a communication system based on pictures. One area of my research is to examine whether children with autism are able to use pictures as symbols and an informative guide to action. And if children with autism are unable to use pictures as symbols then a need for alternative augmentative communicative systems will have been identified.

Another area of my research is to determine if children with autism or intellectual disabilities without autism have difficulty coordinating what they see with what they hear in speech, compared to typically developing children. This research will help the development of learning techniques tailored to a child's individual learning style. A long term hope is that this research might enable the development of very early screening devices to determine if children are at risk for developing autism.

### **Adrienne Perry**

My lab's autism research focuses on four areas — child, family, intervention and outcome — and the interconnections between these areas.

In the area of child research, our studies focus on gender differences in autism, and on assessment and diagnoses measures used in clinical practice.

In the area of family research, our studies focus on the positive and negative impacts on families of children with developmental disabilities or autism (particularly mothers, fathers and siblings). Our lab studies such things as family stress, the concept of emotional intelligence as a coping style, and the effectiveness of sibling support groups for siblings of children with autism.

In the area of intervention research, we study the quality of intervention programs for children with autism. I was integrally involved with the Ontario government in the design of the early Intensive Behavioural Intervention program for children with autism and published an article on the underlying research and background.

When studying outcomes, our lab examines and evaluates various types of treatment programs, following up with adolescents and adults with autism.

### **Jonathan Weiss**

My research focuses on the prevention and treatment of mental health problems in people with developmental disabilities, autism or intellectual disabilities, across their lifespan. When these individuals develop a mental illness or significant challenging behaviours, they often require specialized mental health services. I am interested in developing empirically validated treatments, such as psychotherapy, designed to reduce mental health problems in people with this dual diagnosis. Related to this, I conduct research on the benefits of Special Olympics, and on the health services that people with developmental disabilities need to stay healthy. I also study ways to support families of individuals with developmental disabilities. It is integral that research be directed toward supporting parents of individuals with developmental disabilities, as they are significant agents in maintaining the mental health of their children across the lifespan.