Autism Research

A white paper by Noldus Information Technology

AUTISM RESEARCH

Research on Autism Spectrum Disorder (ASD) has increased enormously over the years, and has resulted in new understanding of how to set up different types of therapy, detect ASDs early in life, stimulate developmental processes, and so much more.

Autism affects approximately one out of 160 children around the world [1], including girls and boys of all races and in all geographic regions. It has a large impact on children, their families, communities, and societies. Caring for and educating children and young people with this condition places challenges on health care, education, training programs, and research.

Knowledge is the key to developing a better understanding of autism. In this paper, we will describe how and why observational research methods are used in autism research worldwide and thus try to answer two questions: why should we observe behavior, and how can we observe behavior in a structured way?

WHY SHOULD WE OBSERVE BEHAVIOR

To find answers to their research questions, a large number of researchers often compare the behavior of typically developing (TD) children to that of children with ASD.

The early detection of autism is a subject under discussion amongst many scholars from different disciplines. To find answers to their research questions, a large number of researchers often compare the behavior of typically developing (TD) children to that of children with ASD.

Some researchers are interested in repetitive behaviors or restricted interests in early developmental stages, while others look at how infants interact with peers, or at their play behavior. They often observe a test participant for several minutes while the participant performs a task or is confronted with changing circumstances. For instance, some situations researchers might observe include an infant being presented with novel objects, a toddler being asked to finish a difficult task, and an adolescent being brought into contact with both familiar and unfamiliar adults.

Below, you can read some examples of research in which researchers observed the behavior of people diagnosed with autism alongside caregivers or (para)professionals. They all made use of observational research tools.

SOCIAL COMMUNICATION IN CHILDREN WITH ASD

Take for example the study that Qualls and Corbett (2017) [2] carried out – it included the Peer Interaction Paradigm (PIP) to observe social exchanges between children with ASD and two typically developed children, during an informal play. Play is extremely important, since it allows children to develop new skills through trial and error.

Thirty children with ASD (eight – 12 years old) participated in the study, which took place in a naturalistic playground setting. The researchers used the variables verbal bout (reciprocal verbal exchange between two or more children), and self-play (independent play with a toy or object alone but in the presence of others) to determine social communication and interaction.

PATTERNS IN BEHAVIOR

An increased frequency of repetitive movements has been widely described in neurodevelopmental disorders. One of the core symptoms of Autism Spectrum Disorder (ASD) is the frequency and persistence of repetitive and stereotyped movements during toddlerhood, together with restricted interests and activities. When diagnosis is possible at an early age, therapeutic behavioral

interventions can start early and might provide a more effective therapy for potentially autistic children.

The purpose of the study of Purpura et al. (2018) [3] was to verify if a higher frequency of repetitive movements (described through their rate and duration) could differentiate infants with ASD from infants with Developmental Delay (DD) and Typical Development (TD), analyzing the age range between six and 12 months. In addition, they described the repertoire of these movements analyzing both the body parts involved and their symmetry.

The researchers conducted a retrospective analysis of video clips taken from home videos recorded by parents. Home videos have the advantage to capture infants in their natural environments and the behaviors that regularly occur within them. They found that frequencies and durations of bilateral repetitive movements with arms, hands, fingers, and lower limbs were significantly higher in ASD than in the other two groups. The researchers point out that greater attention should be given to repetitive movements as specific risk markers for an early diagnosis of ASD.

Home videos have the advantage to capture infants in their natural environments and the behaviors that regularly occur within them.

RESEARCHING EYE CONTACT IN DIFFERENT INTERACTIVE CONTEXTS

Making eye contact is an important skill infants develop during the first year of life. However, when infants show atypical social-communicative behavior, this may serve as a marker of ASD.

The team of researcher Gangi (2017) [4] examined prospectively infant gaze behavior at six, nine, and 12 months of age in infants who were later diagnosed with ASD, as well as low- and high-risk infants without autism spectrum disorder outcomes. They investigated whether gaze behavior was associated across two interactive contexts:

1. Structured testing with an unfamiliar examiner
2. Semi-structured play interaction with a parent

The intention was to determine whether the behavior that infants showed during context 1 did in fact predict behavior in a more naturalistic context, with familiar people. This seemed the case for infants who were nine and 12 months old.

HOW TO OBSERVE BEHAVIOR IN A STRUCTURED WAY

Researchers often observe and code behavior in combination with other methods such as questionnaires or parental interviews to be able to understand, recognize, and explain specific behaviors that are linked to autism. The combination of observations and questionnaires allows researchers to detect specific verbal and non-verbal behaviors that may be indicators of autism.

OBSERVATION LABS AS LOCATION

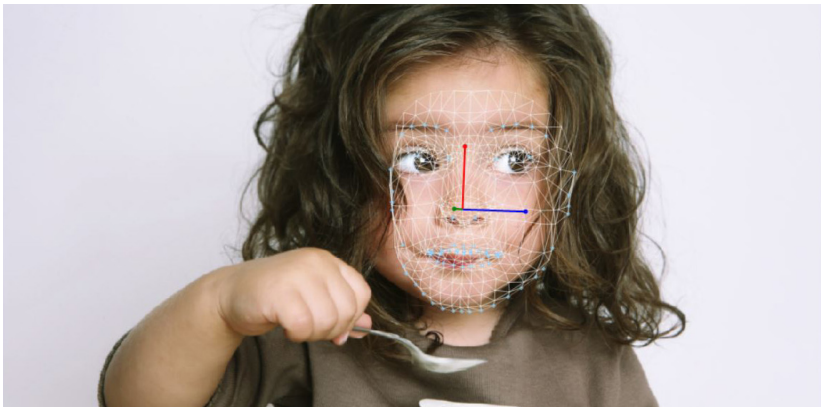
Research is often done in an observation lab in order to observe subjects unobtrusively. In a lab, you can integrate behavioral coding with emotional and physiological measurements as well as eye tracking technology. In living rooms at participants' houses or in classrooms, researchers can use mobile observation tools such as Pocket Observer on a smartphone or handheld computer.

By observing behaviors of infants, toddlers, and older children, it is possible to get more insight into successful interventions and in behavior that is indicative for autism or other developmental disorders.

FACIAL EXPRESSION ANALYSIS

Many individuals with ASD show impairments in processing faces. They show impaired sensitivity to social communication cues conveyed as, among others, difficulties with non-verbal communicative behaviors and deficits in expressing and recognizing facial affect.

Facial expression analysis software can provide direct feedback about a facial expression to the test participant.



Facial expression analysis software can provide direct feedback about a facial expression to the test participant. When a person with ASD sits in front of a camera and is asked to show certain emotions, the computer can provide direct feedback. When they think they show a happy face, they might just be showing a neutral or even a sad face!

FaceReader™ is software specially developed to automatically analyze facial expressions and can provide direct, unbiased feedback. It tells you if you are looking sad, happy, disgusted, angry, surprised, neutral, or scared. Imitating emotions is one of the many social strategies which can help people with ASD to be more socially accepted and communicate better with the people around them. Not only will they become better at showing their emotions, they will also be able to recognize emotions shown by others.

A lot of researchers are interested in the sequence, frequency, duration, or which event triggered specific behavior.

RESEARCH SOFTWARE

Many researchers use The Observer® XT research software to collect and analyze behavioral data. With The Observer XT, it is easy to compare different behaviors. By coding these behaviors, researchers can get insight into the order of events. A lot of researchers are interested in the sequence, frequency, duration, or which event triggered specific behavior.

For example, the research team of Purpura discovered that the rate per minute and percentage duration of Repetitive Movement Episodes, which were automatically generated by The Observer XT, proved to be a useful measure for the occurrence and prevalence of target behaviors within observations with a variable duration.

The researchers Qualls and Corbett used The Observer XT to complete the analysis of the interaction observation data and conduct reliability analysis. Using the software tool, behaviors of multiple subjects were coded simultaneously with temporal accuracy down to a hundredth of a second.

Feel free to contact us or one of our local representatives for more references, clients lists, or more detailed information about FaceReader and The Observer XT.

www.noldus.com


TIME
BEHAVIOR
COMMEN
47.66 Talk to parent Daddy,
54.87 No verbal
115.95 Other verbal
125.07 Talk to self Mmmm
129.06 Talk to parent Can you
133.03 No verbal
136.19 Talk to parent Daddy.....
138.30 Talk to self What will I do now?
142.19 No verbal
144.11 Talk to self What a sweet barbie
148.58 Other verbal What do you want to wear?
153.17 No verbal
166.54 Talk to parent She looks so pretty
168.93 Talk to self I love that dress
171.35 No verbal
Talk to parent
Talk to self
Other verbal
No verbal
Heartbeat

MORE INFORMATION

Interested in learning more? Contact us directly for additional information or read one of the following articles to learn more.

1 *World Health Organization* (2017). http://www.who.int/news-room/fact-sheets/detail/autism-spectrum-disorders

2 Qualls, L.R. & Corbett, B.A. (2017). Examining the relationship between social communication on the ADOS and real-world reciprocal social communication in children with ASD. *Research in Autism Spectrum Disorders*, **33**, 1-9.

3 Purpura, G.; Costanzo, V.; Chericoni, N.; Puopolo, M.; Scattoni, M.L.; Muratori, F. & Apicella, F. (2017). Bilateral Patterns of Repetitive Movements in 6- to 12-Month-Old Infants with Autism Spectrum Disorders. *Frontiers in Psychology*, **8**, 1168. Doi: 10.3389/fpsyg.2017.01168

4 Gangi, D.N.; Schwichtenberg, A.J.; Iosif A.-M.; Young, G.S.; Baguio F. & Ozonoff, S. (2017). Gaze to faces across interactive contexts in infants at heightened risk for autism. *Autism: the international journal of research and practice.* **(oo)**, 1-6. DOI: 10.1177/1362361317704421.

INTERNATIONAL HEADQUARTERS

Noldus Information Technology bv
Wageningen, The Netherlands
Phone: +31-317-473300
Fax: +31-317-424496
E-mail: info@noldus.nl

NORTH AMERICAN HEADQUARTERS

Noldus Information Technology Inc.
Leesburg, VA, USA
Phone: +1-703-771-0440
Toll-free: 1-800-355-9541
Fax: +1-703-771-0441
E-mail: info@noldus.com

REPRESENTATION

We are also represented by a worldwide network of distributors and regional offices. Visit our website for contact information.

WWW.NOLDUS.COM