Tools for infant studies

A white paper by Noldus Information Technology

TOOLS FOR INFANT STUDIES

In infancy, you can observe an explosive growth in development. Therefore, many researchers choose to focus on this age group. For instance, they try to understand how infants move in order to behave in an adaptive and functional way to get things done and learn what they need to learn.

Today's researchers have developed a large number of tests and experiments to get a good impression of developmental processes in infancy. Studies aimed at finding out more about language development, attention, controlling movements, social interactions, or learning behaviors in infancy are often carried out using audio and video recordings. That is where Viso and The Observer®XT come in handy, as these are the right tools to capture infants' behaviors and reactions to stimuli. To gain deeper insights into the emotions of infants, Baby FaceReader is available.

NATURALISTIC OBSERVATION OF INFANT BEHAVIOR

An infant will not be able to fill out a long survey or communicate with an interviewer, so that rules out the possibilities for using those types of studies. Therefore, observational studies offer a good alternative. For these studies, observation labs are extremely useful. You can observe infants unobtrusively and in a setting similar to their natural environment.

In the lab, research questions such as the following can be examined:

- How do infants develop the ability to control their arms and legs, and how do they use their motor skills?
- What are the differences in development between typical developing infants and infants with a developmental delay? For example, in gaze behavior?
- How do caregivers and infants interact within the context of pain?
- How do siblings influence each other and how do they socially interact?
- How do infants learn from different individuals?

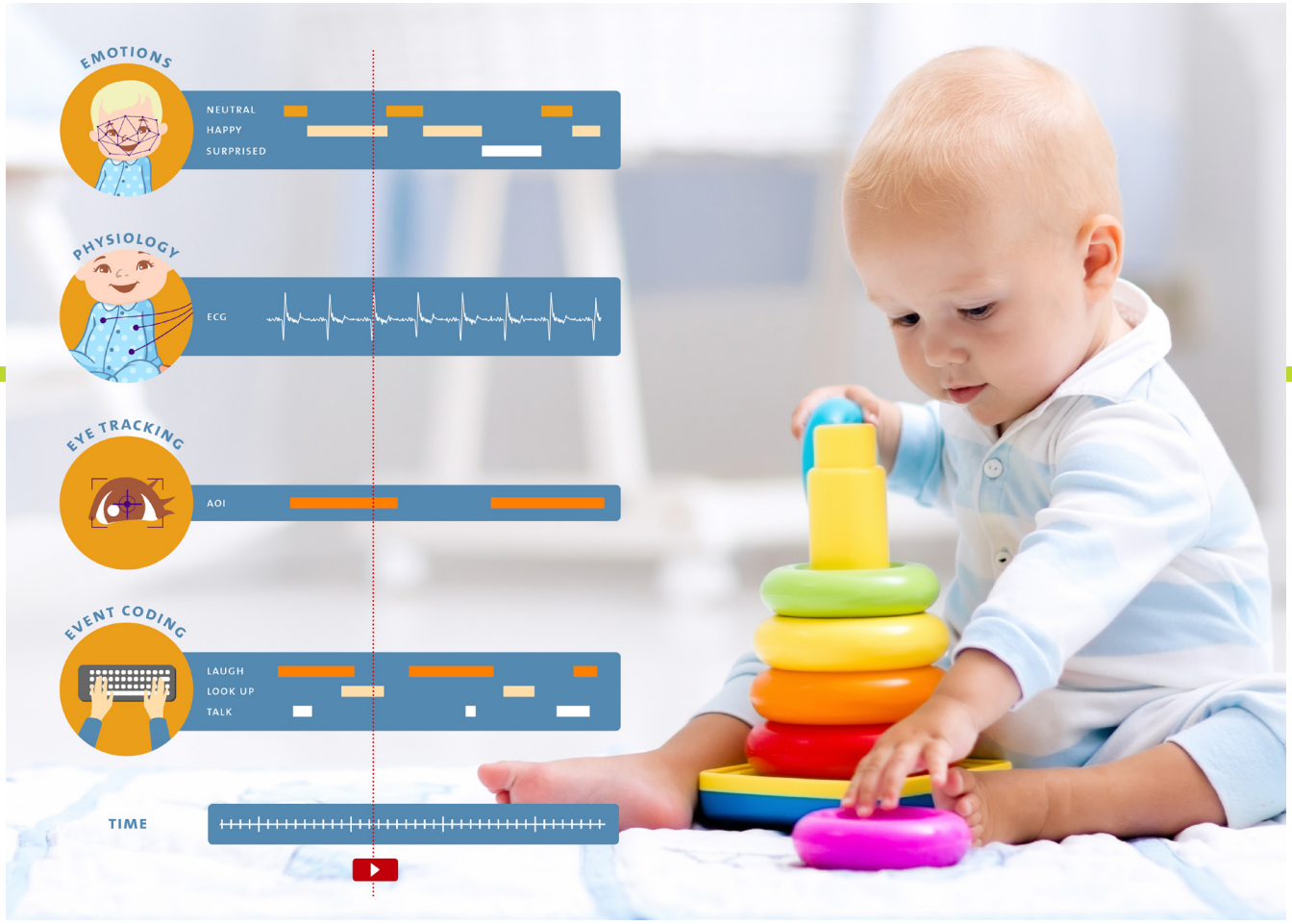
Puppet shows, showing videos or images, (interactive) games or tasks can be used to examine research questions.

All kinds of methods can be used to examine these questions. For example, puppet shows, showing videos or images, (interactive) games or tasks. By observing the performance of these methods, the development of the infants can be captured.

PERFORMING OBSERVATIONS ON-SITE

In some cases, researchers want to know how infants behave when they are in their own environment. After all, infants feel most comfortable in their own house, with their own toys, their own chair, and their own play mat. Besides, it is not always possible to have the research take place in a lab. This creates a strong argument for researchers who study behavior influenced by environmental factors to carry out their research on-site. It enables to observe activities and behaviors that are not preconceived, but occur naturally.

For example, a study performed by researchers of the University of Utah and the University of North Carolina at Chapel Hill, USA. This research was about sensory and repetitive behaviors among children with autism spectrum dis-



order (ASD) and involved video recording observations of children with ASD, going about activities within their own homes.

Such a study can be performed with a portable lab. It contains all the equipment you need to make live behavioral recordings in a natural context, including a laptop and two video cameras. Once you have arrived at the observation site, you can start recording quickly! A Noldus portable lab is set up in less than 10 minutes.

Another possibility is to code behaviors on a handheld device, such as a tablet or a smartphone, using the software of Pocket Observer. This offers you maximum freedom in moving around the scene and observe the infants unobtrusively.

WHICH SOFTWARE TOOLS ARE AVAILABLE

OBSERVATION MADE SIMPLE WITH THE OBSERVER XT

Using The Observer XT ensures that your data is coded accurately and efficiently. Your options for coding behavior are limitless. Each code is used to mark the occurrence of a specific behavior or a set of behaviors.

Designing a coding scheme is a crucial step in behavioral research. The coding scheme is the actual measuring instrument. Choices made at this stage determine what you can do with your data at later stages. A coding scheme helps you:

- Describe complex phenomena in a few keystrokes. The coding scheme has a powerful syntax.
- Record social interactions, group processes, and other complex behaviors with a minimum of different codes, minimizing learning efforts and errors.

In the White paper '7 tips to set up a coding scheme' you can read more details about working with a coding scheme.

After collecting the data, the analysis of data often begins with visualizing data streams. In The Observer XT all data streams are displayed alongside and play in perfect sync. Visualization creates a direct reference between video, audio, and other data. With drag and drop, you can easily build filters based on combinations of independent variables, behaviors, physiological data, and time criteria, such as behaviors being active, or select subjects by independent variable.

For example, the Centre for Infant Cognition (CIC), at the University of British Columbia, in Vancouver, Canada, used The Observer XT for detailed behavioral coding in combination with eye tracking. The researchers looked at minute (small/precise) eye gaze changes, hand gestures, and emotions of infants while they are observing a moral dilemma or social interaction, which is usually depicted in a puppet show. The purpose of their research is to understand how infants reason about their surrounding environment.

COLLECT EYE MOVEMENT DATA FROM INFANTS

From a very early age, we use our gaze to communicate with others. Gaze is involved in predicting intentions, understanding emotions, and directing someone's attention. Furthermore, this non-verbal behavior provides clues on how we feel and what we're interested in.

Researchers use eye tracking to study perceptual, cognitive, and social emotional development. Using an eye tracker, researchers can gather data about how children interact with the people and the world around them. For example by presenting something that is cognitively challenging or surprising to an infant, you can record the surprise reaction within the infant just by recording fluctuations of the pupil.

Eye tracking data can help explore infants' ability to categorize visual, linguistic, and auditory events, and scan dynamic human faces. It provides insights how infants evaluate things, and how they see things as they occur in real time.

Remote eye tracking devices and screen-based eye trackers are stationary and very suitable for this purpose.

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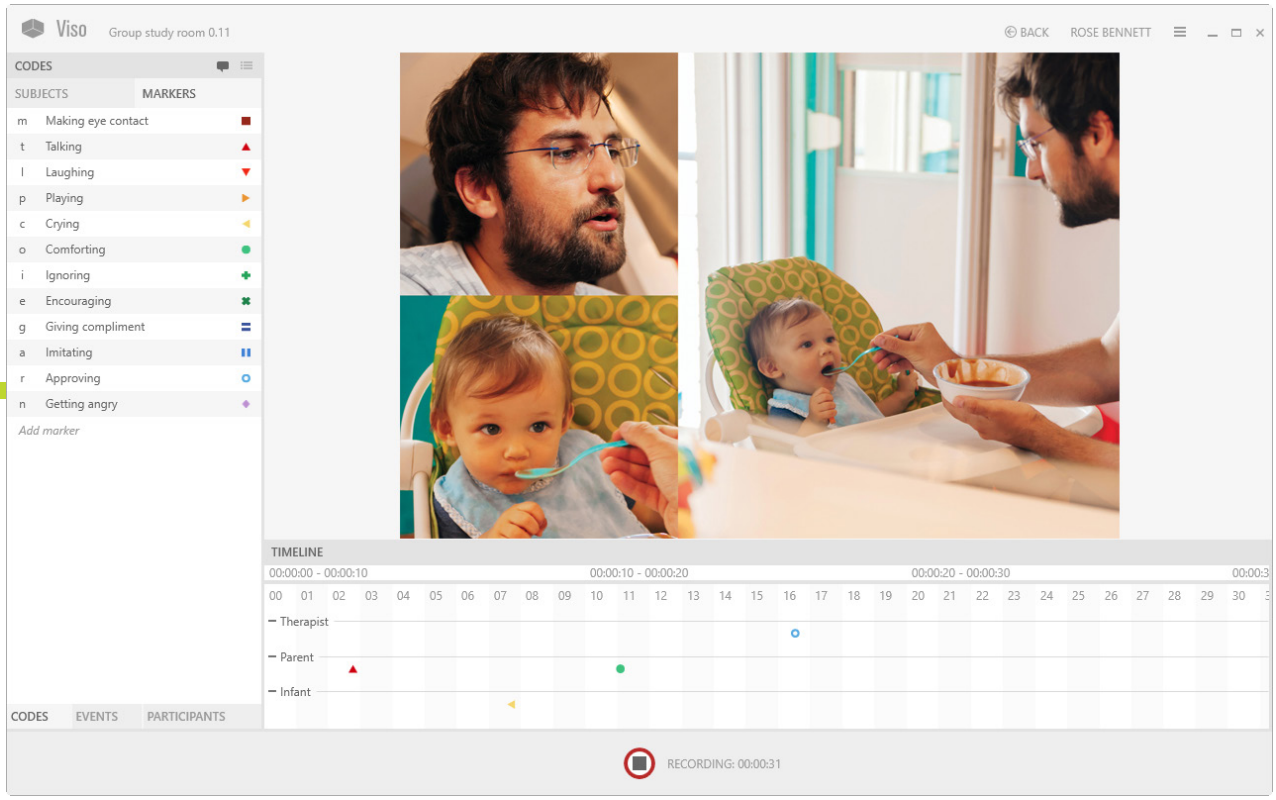
CAPTURE INFANTS' BEHAVIOR USING VISO

Understanding behavior, for example during an interaction, becomes much easier with video observations. Using video ensures a non-invasive form of observation and enables to capture the (inter)actions without the presence of an outside person in the room. The infants can act freely, while you record and observe them.

The uniqueness of Viso is that you can record in an unlimited number of rooms simultaneously. Viso is a clear and easy-to-use software tool.



Recordings can be made from different angles, allowing to view the scenarios from multiple viewpoints. Simple coding schemes can be used, and the recorded videos are immediately available to be replayed as often as needed.

An example of an infant study in which Viso is used as a research tool, is the study of Umay Suanda, Ph.D. at the University of Connecticut, USA. His focus is on how infants, toddlers, and young children learn words. So much of early learning happens through interactions with others. How do the dynamics of these interactions shape early learning, and how does learning in turn shape those dynamics? The researchers use Viso to capture these interactions.

GAIN INSIGHTS INTO SPATIAL BEHAVIORS WITH TRACKLAB

As soon as infants are able to move by crawling or walking, the scope of the infant to investigate the surroundings becomes much bigger. For example, if a toy on the other side of the room attracts the attention of the infant, he/she probably wants to get there a.s.a.p. Or, to play with siblings or to seek parental attention, the infants will make an attempt to approach them.

To analyze this spatial behavior and gain further insights into social interactions, TrackLab is the complete tracking solution. Furthermore, TrackLab enables you to study place-preferences, spatial memory processes, or walking patterns.

EMOTION ANALYSIS WITH BABY FACEREADER

Baby FaceReader enables you to recognize the facial expressions of an infant automatically! Since young infants are unable to provide verbal feedback, their facial expressions can provide extra insights that help us to understand their emotional reactions. With Baby FaceReader, you can analyze infant responses to taste, odor, and other sensory stimuli, detect the expressive behaviors that occur during parent-child interactions, help address questions in developmental psychology related to affect and developmental disorders, and more.

Baby FaceReader works in an unobtrusive way and captures a positive and negative valence, a set of Action Units – based on the Baby Facial Action Coding System (Baby FACS) - and head orientation of infants ranging in age from 6 to 24 months old. The standard FaceReader is suitable for the older infants and adults.

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MORE EXAMPLES OF INFANT STUDIES

GAZE BEHAVIOR DURING COMPLEMENTARY FEEDING

McNally and her colleagues developed a coding scheme to observe infant gaze behavior and applied it in a study of complementary feeding. The researchers were interested in the way infant gaze changes during meals. Analyses of gaze behavior during meals confirmed the hypothesis that infant gaze changes as a function of satiation. As meals progressed, infants spent less time gazing at food and more time doing exploratory gazing.

COGNITION IN INFANTS WITH DOWN SYNDROM

The research team of Fidler and her colleagues examined cognition in infants with Down syndrome. They argued that it is important to understand delays in early development better, so that preventative care can be improved. Specifically, they focused on the relation between cognitive functioning and early attention, and memory skills. During infancy, these include the ability to sustain and shift visual attention and the ability to temporarily store and retrieve visual information.

Interested in more studies, for example about early detection of autism, gaze behavior, child development, or the impact of sounds on autistic children? Read our blog posts on our Behavioral Research Blog.

THE DEVELOPMENT OF HAND USE

The HANDS lab at Florida International University, Miami, and the Infant Development Center of the University of North Carolina at Greensboro, worked together to study the development of hand use in infants. Eliza Nelson and colleagues used The Observer XT to code the behaviors of young children efficiently and accurately, and explored actions where two hands work together to achieve a goal.

GAZE BEHAVIOR AND AUTISM

The team of researcher Gangi 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 aimed to determine whether gaze behavior shown during a test with an unfamiliar examiner could predict gaze behavior in a more naturalistic context.

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Feel free contact us or one of our local representatives for more references or more detailed information about The Observer XT, Viso, Baby FaceReader, or TrackLab.

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