OASID

Observation of Autism spectrum disorder in people with Sensory and Intellectual Disabilities

English manual for OASID: Observation of Autism spectrum disorder in people with Sensory and Intellectual Disabilities

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Preface

Observation of Autism spectrum disorder in people with sensory and intellectual disabilities, OASID, was developed as part of the PhD research project of Gitta de Vaan. This study was aimed at finding differentiating characteristics of Autism Spectrum Disorder (ASD) and intellectual disabilities combined with sensory impairments. This research was done between 2011 and 2016 at Radboud University, Nijmegen, the Netherlands (de Vaan, 2019).

The Dutch Psychiatric Association [Nederlandse Vereniging voor Psychiatrie] advised to use the ADI-R and ADOS as instruments when diagnosing ASD. This was described in their guidelines for diagnosis and treatment of ASD in children and youth. Both instruments are suitable for children aged 24 months and older (Nederlandse Vereniging voor Psychiatrie, 2009).

However, people with multiple disabilities sometimes never reach the point in their development where they possess the skills that typically belong to someone with a developmental age of 24 months, or they develop these skills at a much later age. For this reason, and a lack of norms for people with multiple disabilities, the ADI-R and ADOS cannot be administered and interpreted validly in people with multiple disabilities. In people with combined sensory and intellectual disabilities, with suspected ASD, OASID can help as a part of the diagnostic process. Using a play session and observation, OASID can be used to assess the presence and severity of symptoms that could be a sign of ASD. The strength of OASID is that it takes into account symptoms and behaviour that could be a consequence of a sensory or intellectual disability instead of ASD. OASID never replaces the full diagnostic process, but it complements anamnesis, analysis of client's history, observation and conversations with parents or caregivers.

This manual is intended for clinicians who work with persons with combined sensory and intellectual disabilities. When you wish to use OASID it is important that you study the manual and that you are experienced with the target population and the diagnostic process. For more information on using OASID, or to discuss the possibilities for planning a workshop or lecture, you may contact Gitta de Vaan.

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1. Background OASID

1.1 Motivation for OASID

The diagnostic process for people with combined intellectual disabilities and sensory impairments (in this manual: Multiple disabilities) is challenging. Experts in the field of these impairments are often consulted about the interpretation of behaviour within this population. A frequently asked question is whether the behaviour of a person with multiple disabilities could be part of an Autism Spectrum Disorder (ASD).

Autism Spectrum Disorder (ASD) is characterised by impairments in social communication and interaction, and the presence of repetitive or stereotyped behaviour (American Psychiatric Association, 2013).These impairments include, amongst others, problems in reciprocal communication, deficits in developing or maintaining relationships, having difficulties with changes and the presence of stereotyped motor movements. Many of these impairments are also prevalent in people with multiple disabilities, regardless of the presence of ASD (De Vaan, Vervloed, Knoors, & Verhoeven, 2013; Evenhuis, Sjoukes, Koot, & Kooijman, 2009; Hoevenaars-van den Boom, Antonissen, Knoors & Vervloed, 2009). This overlap in behavioural characteristics can lead to an unfair diagnosis of ASD in some individuals, because their behaviour is in fact caused by their multiple disabilities (Andrews, & Wyver, 2005; Cass, 1998). Similarly it is possible that a person with ASD is not diagnosed as such because their behaviour is unfairly attributed to their multiple disabilities (Carvill, 2001).

The overlap in behavioural characteristics between ASD on the one hand, and multiple disabilities on the other, makes it difficult to determine whether someone from this target population has ASD. In order to diagnose ASD, a clinician would normally use diagnostic and screening instruments. However, for this population, existing instruments to diagnose ASD are not suitable. This was the result from a study in which different screening and diagnostic instruments were reviewed on the presence of norms for this population and the appropriateness of test items (De Vaan, Vervloed, Hoevenaars-van den Boom, Antonissen, Knoors & Verhoeven, 2016). From this study, it appeared that widely used instruments to diagnose ASD are usually not developed specifically for people with sensory impairments and therefore also lack norms for the population of people with combined sensory and intellectual disabilities. Additionally, it appeared that many items on these instruments are often not valid to use or interpret for people with multiple disabilities. This was often related to the sensory impairments. An example is ‘not making eye contact’; a test item is that is widely used in ASD assessments. However, within the current population, the absence of eye contact does not indicate an inability to develop interpersonal relationships or to read feelings from others, but it is a direct consequence of the visual impairment. An overview of all of the reviewed instruments and their usability in people with multiple disabilities can be found in Table 1.

Table 1: Review of existing instruments for screening or diagnosis of ASD (based on De Vaan, Vervloed, Hoevenaars-van den Boom, Antonissen, Knoors & Verhoeven, 2016).

Name of instrument, authors and year of publication	Purpose	Number of items	Administration (in minutes)	Method	Target population	Norms for people with sensory and intellectual disabilities	Non-applicable items†
ABC Autism Behavior Checklist Krug, Arick & Almond (1978)	Screening	57	10-20	Checklist	18 months - Adulthood	Yes	1/3
ADI-R Autism Diagnostic Interview-Revised Rutter, Le Couteur & Lord (2003)	Diagnosis	93	90 – 150 (including scoring)	Interview	Early child – adulthood, mental age above 2 years.	No	2/3
ADOS Autism Diagnostic Observation Schedule, module 1 Lord, Rutter, DiLavore, Risi (1999)	Diagnosis	37	30 – 60	Assessment +Observation	Children and Adults; 15 months and older (module 1 = preverbal)	No	1/2
ASAS Australian Scale for Asperger Syndrome Garnett & Attwood (1993)	Screening	25	10-15	Questionnaire	Primary school children	No	2/3
ASQ Autism Screening Questionnaire. Also known as SCQ, Social Communication Questionnaire Rutter, Bailey, Lord (2003)	Screening	40	10	Questionnaire	Children 4 years and older	No	2/3
AUTI-R Van Berckelaer-Onnes & Hoekman (1991)	Screening	51	-	Interview / Questionnaire	Verbal and non-verbal children from 10-155 months.	No	1/2
CARS Childhood Autism Rating Scales Schopler, Reichler & Renner (1988)	Screening	15	30-60	Observational assessment	Children, two years and older.	No	2/3
DISCO Diagnostic Interview for Social and Communication Disorders Wing (2003)	Diagnosis	105 items assessing history 206 items assessing current behavior	3 hours	Interview	Children and Adults	No	History: 1/5 Current: 1/3
ESAT Early Screening for Autistic Traits Buitelaar et al.(2009)	Screening	14	-	Interview / Checklist	Children under 20 months	No	1/3
M-CHAT-R/F Modified – Checklist for Autism in Toddlers – Revised with Follow Up Robins, Fein & Barton (2009)	Screening	20	5	Checklist	Young children	No	3/4

PDD-MRS (AVZ-R) Pervasive Developmental Disorder in Mental Retardation Scale Kraijer (1999)	Screening	12	10-30	Checklist	Children and adults with intellectual disabilities; aged 2-70 years	No	1/3 . This does not influence total score according to manual
PDD-ST-II Pervasive Developmental Disorder Screening Test (second edition) Siegel (2004)	Screening	12-22 items	10-20	Checklist / Interview	Children between 12-48 months	No	1/2
SRS Social Responsiveness Scale Constantino & Gruber (2005)	Screening	65	15-20	Checklist	Children 4-17	No	2/5

This study shows that currently existing instruments are not suitable to use in people with multiple disabilities. Observation of Autism spectrum disorder in people with Sensory and Intellectual Disabilities (OASID) was developed to make it easier to diagnose ASD in people with combined sensory and intellectual disabilities, and to prevent over- and underdiagnosis as much as possible. Overdiagnosis, or unfairly diagnosing ASD, is often the result of unjustly attributing behaviour to the most dominantly present disorder. In the example of not making eye contact, this behaviour is attributed to ASD, while the possibility that it is the direct result of a visual impairment is missed. Attributing behaviour to the disorder that is perceived as most dominant, and therefore missing possible alternative explanations, is called diagnostic overshadowing (Reiss, Levitan & Szyszko, 1982). This can lead to an overdiagnosis of ASD, as well as an underdiagnosis, dependent on which disorder is seen as most dominant. Especially in people with a profound intellectual disability this forms a great risk. Behaviour is likely to be attributed to the intellectual disability, and the possibility that behaviour is caused by a sensory impairment or ASD is missed. This could therefore also lead to an underdiagnosis of ASD.

Another possible cause of the underdiagnosis of ASD is diagnostic underrepresentation. This refers to the phenomenon where people have a too limited behavioural repertoire in order to diagnose validly (Reiss, Levitan & Szyszko, 1982). In people with multiple disabilities this occurs frequently, especially in those with a limited behavioural repertoire due to cognitive and physical disabilities. When someone has limited possibilities to make contact because of their disabilities, not making social contact is not seen as atypical behaviour.

1.2 Purpose and procedure of OASID

This manual is intended for clinicians who work with persons with combined intellectual and sensory disabilities. When you wish to administer OASID it is important to study this manual thoroughly and that you are experienced with the target population of people with multiple disabilities and making diagnostic assessments.

Because of the risk of under- or overdiagnosis we recommend to always perform the diagnostic assessment for ASD in this target group with a team of multiple professionals with different areas of expertise (for example: ASD, intellectual disabilities or sensory impairments). At this moment, no certificate or training is required to administer OASID. Any behavioural scientist with sufficient diagnostic experience can perform the assessment. In order to obtain the most accurate results from OASID it is important to use the same material as described in this manual, or material that is very similar. Additionally, all tasks must be performed following the steps as described within this manual. OASID has been validated with the material and steps as described in this manual (De Vaan, Vervloed, Peters-Scheffer, et al., 2016; 2018). If OASID is used in a different way, it cannot be guaranteed that results can be interpreted exactly as described in this manual.

An important advantage of OASID is that it is specifically developed for the complex target population of people with combined sensory and intellectual disabilities. OASID estimates the amount and severity of ASD typical behaviours. However, OASID is not developed to replace the full diagnostic assessment procedure for ASD. It is always recommended to integrate OASID within a wider diagnostic assessment, using multiple tests, behavioural observations, multiple informants and a multidisciplinary assessment team (Carnaby, 2007; Oosterling, et al., 2010).

OASID is developed for both adults and children, and has been studied within a chronological age range between 6 and 60 years. OASID is intended for persons with a moderate, severe or profound intellectual disability, combined with a visual impairment or deafblindness. The intellectual disability follows the criteria by the American Association on Intellectual and Developmental Disabilities (AAIDD, 2013), American Psychiatric Association (APA, 2013) and the World Health Organisation (WHO, 2016). The visual impairment follows the criteria of category 1 through 5, as described by the WHO (2016), see Table 2. Deafblindness is defined as any visual impairment combined with hearing loss of 35 decibel or more (following the definition of doofblind.nl, 2017).

Table 2: Categories of visual impairment (WHO, 2016)

Category	Classification	Criteria
Category 1	Moderate visual impairment	Visual acuity between 6/18 and 6/60
Category 2	Severe visual impairment	Visual acuity between 6/60 and 3/60
Category 3	Blindness	Visual acuity less than 3/60 or visual field less than 10 degrees in the better eye
Category 4	Blindness	Visual acuity less than 1/60, with light perception
Category 5	Blindness	No light perception

OASID is administered in an assessment room with few sensory stimuli and no distraction from other clients, and other toys besides the test material. If necessary, a trusted caregiver or parent is present during the assessment, so that they can comfort the participant when needed or assist in communication. The assessment is fully recorded on video. The scoring of ASD typical behaviour is always done afterwards using the video, not during the assessment.

The duration of the assessment is between 25 minutes and an hour, on average. Within this period pf time, the researcher administers several tasks to the participant. A total of five tasks have been described, each consisting of different toys and games that the researcher plays with the participant. The games are aimed at provoking ASD typical behaviours. If the participant shows clear signs of stress, discomfort, resentment or fear during one of the tasks, that specific task is stopped and the assessment continues with the following task. If necessary, there is room for a short break or the trusted caregiver can be asked for help in comforting the participant.

After the assessment the researcher watches the video and scores the participant's behaviour using 40 three choice questions. There are 29 questions regarding the different tasks, and 11 general questions about the full assessment. The three choices consist of behaviour descriptions matching with 'no autistic behaviour', 'mild autistic behaviour' and 'severe autistic behaviour'. The corresponding scores can be added to form a total score on two scales that match the criteria for ASD as described in the DSM-5. These scales are 'social behaviour and communication' and 'stereotyped and repetitive behaviour'. These two total scores lead to an interpretation about the presence and severity of autistic symptoms, see Chapter 3.

1.3 The development and psychometric properties of OASID

OASID was based on an earlier developed instrument, Observation of Autism in Deafblindness (O-ADB). This instrument focused on diagnosing ASD in people with a profound intellectual disability, combined with deafblindness (Hoevenaars-van den Boom, et al., 2009). The O-ADB was able to distinguish persons with and without ASD. However, the instrument was developed and suitable for only a small target population and merely studied on ten participants. There was still no suitable tool to differentiate between people with and without ASD for persons with milder types of intellectual disability or persons without auditory impairments. In addition, the ease of use of the OAD-B was relatively low and it consisted of many tasks which made the total duration of an assessment too long. As this could be potentially stressful or unpleasant for participants, the OAD-B was found to be not ready to use in clinical practice.

The development of OASID started with a literature study and a review on different instruments that are used for screening and diagnosis of ASD. Professionals who work in the care for people with multiple disabilities and with experience in diagnosing ASD were consulted. Persons with multiple disabilities were also observed. Findings were compared the diagnostic criteria for ASD as described in the DSM-5 (American Psychiatric Association, 2013). Inspired by the O-ADB, these criteria were converted to testable items that were suitable for persons with a combined sensory and intellectual disability. A first version of OASID was tested on eighteen participants, but the results showed an unsatisfactory interrater reliability. Therefore the behavioural descriptions that were part of the questionnaire were made more specific by the authors (De Vaan, Vervloed, Peters-Scheffer, Van Gent, Knoors, & Verhoeven, 2016).

In a pilot study the psychometric properties of OASID were studied, based on eighteen participants. These participants were aged between 11 and 55 years, and all had an intellectual disability combined with a visual impairment or deafblindness (De Vaan, Vervloed, Peters-Scheffer, et al., 2016).The pilot study showed that OASID was able to differentiate between people with and without ASD. Additionally, the study showed that OASID had a good interrater reliability and an excellent internal consistency of scales. The content validity was also demonstrated and construct validity was moderate to good (De Vaan, Vervloed, Peters-Scheffer, et al., 2016). The construct validity was demonstrated by lack of a correlation with the list of behavioural signs of disturbed attachment (Boris & Zeanah, 2005), and a correlation with the Pervasive Developmental Disorder in Mental Retardation Scale (PDD-MRS; Kraijer & de Bildt, 2005).

Further research on sixty participants revealed similar results concerning the reliability and validity of OASID. An excellent intra-rater reliability was found, a good interrater reliability, and a good to excellent internal consistency. The criterion validity was demonstrated by a correlation between OASID scores and judgments concerning the presence of ASD by independent experts from the field. The good construct validity that was previously found was also confirmed (De Vaan, Vervloed, Peters-Scheffer, Van Gent, Knoors, & Verhoeven, 2018). In addition to the PDD-MRS, the Childhood Autism Rating Scale was also taken into account (CARS2; Schopler, Van Bourgondien, Wellman, & Love, 2010). See Table 3 for an overview of psychometric properties as found in the pilot study and the follow-up study.

Tabel 3: Psychometric properties of OASID

	Pilot (2016)	**Follow-up study (2018)**
Interrater reliability		
Percentage of agreement	77.8%	-
Cohen's Kappa	0.65	-
Weighted Kappa	0.75	0.63
Intraclass Correlation Coefficient (ICC)	0.69	0.60 - 0.64
Correlation between raters	-	0.82 - 0.93
Intra-rater reliability	-	
Percentage of agreement		89.3 - 89.4
Weighted Kappa		0.89 - 0.90
Internal consistency		
Cronbach's Alpha Scale A	0.94	0.91
Cronbach's Alpha Scale B	0.79	0.85
Construct validity (correlation)		
Divergent validity attachment list	0.46, $p = 0.57$	
Convergent validity PDD-MRS	0.40, $p = 0.049$	0.243, $p = 0.038$
Convergent validity CARS-2, rater 1		0.652, $p < 0.001$
Convergent validity CARS-2, rater 2		0.801, $p < 0.001$
Criterion validity	-	
Correlation with judgments of experts		0.67, $p < 0.001$

Both studies revealed that OASID was capable of making a distinction between participants with and without ASD. Based on this distinction, reference points were established for scores that are indicative for the presence and severity of ASD. The gold standard for the presence of ASD was determined by the judgments of two experts from the field of diagnosing ASD within this target population. Both experts assessed whether ASD was present based on video images of the participants. They did this independent from the OASID scores and without consulting each other. Only when the two experts reached consensus about the presence of ASD, this judgment was used for determining reference points for OASID (De Vaan, Vervloed, Peters-Scheffer, et al., 2016; 2018).

An important aspect in the development of OASID was that it should not be stressful for participants. Further research that used OASID showed that OASID did not cause additional stress in participants as compared to a typical day. In this study, stress was measured using salivary cortisol, a stress hormone. Saliva was collected three times on the day of the assessment: before, during and after OASID. In addition, the same was done on a typical day for the participant. No differences were found in cortisol values between the two days. This indicates that OASID is not stressful for participants (De Vaan, et al., 2019).

2. Assessment manual

2.1 Preparation

The 'OASID preparation from' is used to prepare for the assessment. This form can be found in Appendix 1. The purpose of this preparation phase is to gain information about the participant prior to the assessment, and to explain the procedure to a familiar caregiver of the participant. This caregiver will also be present during the assessment. This person may be a familiar group worker, personal caregiver, mentor, parent or other family member.

2.1.1 Participant information

Prior to the assessment it is important to collect information about the participant. As an assessor, you need to know who the participant is, what their impairments are, how they communicate and how they cope with stress. With this information you can adjust communication and play level to the individual participant during the assessment. The following topics are important to discuss with a familiar caregiver:

1. **Communication**: During the assessment the researcher will interact with the participant. It is therefore necessary to know how the participant communicates, and which form of communication the participant understands. This may include the use of symbols, spoken language, sign language or any other form of augmentative or alternative communication. Ask how objects should be presented to the participant: is it possible to talk about the object, should the object be handed over or should hand-under-hand or hand-over-hand communication be used? Figure 1 shows an illustration of hand-under-hand communication, in which the hands of the researcher move underneath the hands of the participants to guide their hands towards an object.
   It is important to know if the participant can use multiple senses at once (touch, sight, sound) and how the participant processes information from these senses. Determine which intensity and amount of repetition is necessary to bring across a message.

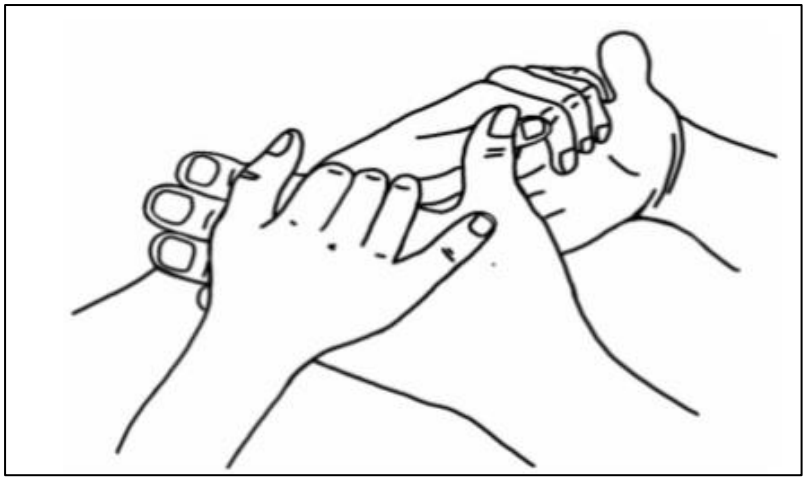

Figure 1. Hand-under-hand communication (Bartiméus, 2019)

2. **Sensory Impairments**: OASID allows for the presence of sensory impairments. Communication and the level of the tasks can be adjusted to the sensory impairments. It is therefore important for the researcher to know what and how much the participant can see and hear. Regarding to sight, it is important to know what the smallest details and shapes are that the participant can visually distinguish, if the visual field is limited, what their preferred posture is to see properly and how much and which form of lighting the participant needs. Concerning their hearing it is important to know which frequencies the participant can hear and at which volume, whether the participant can understand words and sentences, and how much they can express verbally. Also determine whether the person's hearing and sight can be addressed at the same time or should be addressed subsequently.
3. **Intellectual disability:** OASID is suitable for participants with different levels of intellectual disability. The play level can be adjusted to the cognitive possibilities of the participant. For example, when playing the puzzle, four different options are given for how the puzzle can be played, dependent on the intellectual disability and motor abilities of the participant. Always check the level of intellectual disabilities prior to the assessment and explain about the tasks that will be done. During the assessment, level of play and communication can be adjusted to the level that is necessary, but it is always best to start at a realistic level.
4. **Physical and motor impairments:** Generally, the OASID tasks can be done at a table. However, this is not possible for every participant. Sometimes the tasks need to be done at the wheelchair table or on the floor. It is also useful to know how the participant's motor abilities are developed. This will give an idea about the play behaviour that can be expected. Every toy that is included in OASID can be played with using fine motor skills, but can also be used when the participant is limited to more gross motor skills. For example, the car from task 1 allows for the wheels to be rotated and objects to be placed in the back of the car. If this is not possible, the car can be used to move back and forth.
5. **Stress:** OASID generally does not induce stress within participants. However, it may occur that a participant feels uncomfortable or tense during a specific task. It is therefore important to know how stress can be recognized within the participant and how you should handle these situations. Explain that the caregiver can intervene whenever they sense that the stress level of the participant is too high.

2.1.2 Alignment with familiar caregiver

During the assessment a familiar caregiver of the participant is also present. This caregiver knows the participant well. A personal caregiver, parent or mentor can be appropriate to fulfil this role. Prior to the test, the caregiver is asked to bring a play object that is familiar to the participant. Also, the role of the caregiver during the assessment should be discussed. During the assessment, the caregiver only has a passive role; they will not spontaneously play along, speak to or translate for the participant. The caregiver is present to comfort the participant if this should be necessary or to advise the researcher about communication with the participant or how to interpret behaviour. If the participant experiences stress they can advise on how to handle the situation. If there are communication problems, the caregiver can support the researcher when necessary. Support or assistance is always asked by the researcher.

2.1.3 Preparing the test material

Make sure that all of the test material is present in the assessment room, prior to the assessment. A **case or box that can be closed off** is strongly preferred, so that new test material remains out of sight for the participant. Some electronic materials are used, so make sure that those materials are fully charged or that **spare batteries** are packed. In addition, bring **disinfectant soap** or moist towels to clean the material after the session.

The assessment consists of a play session that is observed afterwards. Bring a camera that is suitable for good quality video material. The camera is charged and the film or memory card provides enough recording space for about 60 minutes of video. A tripod can be useful to place the camera at the correct height, so that the participant can be filmed at eye level. Using a mobile phone as a recording device is discouraged because using a tripod is often impossible, there are limited possibilities for zooming in and out, and because of the recording quality of both video and sound. It is recommended to locate the camera so that the upper bodies of both the participant and researcher are seen on film. Try to prevent that the participant sits in front of a window or alternative light source. This backlight will make it more difficult to see what the participant is doing on the recording.

2.1.4 Preparing an assessment session

1. Collect all information regarding the participant and find out how the assessment should be performed for this person. This information is collected using the preparation form in Appendix 1.
2. Make sure that a caregiver familiar to the participant can be present during the assessment. They can comfort the participant, help with communication, or support the participant if they feel stressed during the assessment.
3. Ask this caregiver to bring a favourite play object or toy. Preferably, this object has multiple parts, or it is an object that can be played with in more than one way.
4. Arrange a room that is suitable for the assessment. This room should not contain many sensory stimulations or distractions. There is enough room for the participant, their caregiver, the researcher, the test material and to place the camera. There is a table with enough chairs in the assessment room. Adjust the lighting in the room to the preferences of the participant, provided that there is enough light for a high quality recording.
5. Make sure to be present in the room before the participant arrives to set up all of the test material. Install the camera in the right place, make sure it is fully charged and tested.
6. When the participant and their caregiver arrive, explain their role to the caregiver: They are not intended to actively participate, only to advise and intervene when necessary.

2.2 Test materials

Several materials are used within the OASID assessment. Below you will find which materials have been used during the development of OASID and the related research projects. Most of these materials are easily obtainable toys that are widely used. Objects that are similar, but not exactly the same, may also be appropriate. Read the descriptions and the assessment manual thoroughly to find out how each object should be used during the assessment.

Toy Car
The size of this car is approximately 30 centimetres. It has big wheels that can spin around. In the back of the car there is room to place in other objects.

Sandwiches
This is a part of plastic toy tableware set. We use a plate with two slices of bread on it.

Toy phone
The buttons on the phone can be pressed to make sounds. Lights also flash when buttons are pushed. The phone can also ring. In this way the phone stimulates touch, sight and hearing.

Doll with hairbrush
The arms, legs and head of the doll can move. The doll has 'real' hair, made from a different material than the body. The dress the doll is wearing is made from yet another fabric. By pressing a button on its necklace, the doll can make sounds; it speaks a few words and can make music.

Tea pot with cups and spoon
This is also part of the plastic toy tableware set. We use the teapot with cups and a little teaspoon. The spoon may be omitted if the fine motor skills of the participant do not allow them to use this small object.

Dog that can be activated
The dog appears to be a stuffed animal. When it is activated it can move and bark as a response to movement or touch. The eyes and the nose are made of hard plastic. The rest of the dog is plush, with a different fabric used within the ears and for the ribbons.

Puzzle level 1 and 2
This puzzle can be used at level 1 by using it as a bucket in which the pieces can be placed.
At level 2 the lid with shapes is placed on top of the bucket and it can be used as a simple shape puzzle. All pieces fit in the puzzle in more than one way.

Puzzle level 3
The shapes of these puzzle pieces are simple, but the puzzle has a round shape. The participant must search more actively to find the right shape. Some of the pieces only fit in the puzzle in one way.

Puzzle level 4
Besides the simple symmetric shapes in the rooftop, around the sides of the puzzle is room for more complex pieces. These pieces only fit in one way.

Translucent box
A translucent box was used, with a lid that can be clicked on. The box was 28 x 27 x 17 centimetres.

Activity centre
In the development of OASID the ‘rol en rol pretpark’ by V-tech was used. The activity centre is about 40 centimetres high and wide. The centre stimulates multiple senses by movement, touch, lights and sounds. It can be used in various ways: several keys can be pressed, the wheel can spin around and balls can be placed in the park in several places.

2.3 Instruction for assessment

2.3. 1 Points of attention

1. Make sure the camera is turned on before the participant enters the room. If you do this, greeting the participant is also recorded. Beforehand, check if the camera is aimed in the correct direction, at where the participant will sit. Check this again when the participant is sitting at the table.
2. Adjust communication and play to the possibilities of the participant. For this, use the information that you have collected prior to the assessment.
3. Make sure all toys and materials are locked in the suitcase or box that you brought. The toys are out of the participant's sight. It does not matter if the suitcase is in line of sight. Make sure the participant cannot reach the suitcase, only the researcher can. Also place the play material that the participant brought with him in the suitcase.
4. Make sure to make physical contact a number of times during the assessment. One of the general questions on the questionnaire is focused on the participant's response to physical contact. This contact can be made when greeting the participant, saying goodbye, rewarding or complimenting, or while giving or taking objects from them.
5. Make sure to say the participant's name a number of times during the assessment, or making their name sign. This can be done when trying to catch the participant's attention, for example.
6. During all tasks, try to make contact with the participant, by communicating or playing together. Also, make sure to give the participant enough time and space to search for your attention, make contact with you or play with you. You can make contact by asking questions while playing, handing over pieces or objects, and presenting your open hands if the participant is playing with something. Make sure not to fully take over and control the play session, but give the participant room to act on their own and search for your attention during the assessment. This means that on occasion, you have to adopt a more wait-and-see attitude.

2.3.2 Task 1

Phone, car, sandwiches

Place these objects on the table. The participant may act freely with these objects. If he spots the objects on his own, don't do anything. If he does not perceive the objects, you may instruct the participant as follows. If the participant understands verbal communication, you can tell the participant that he is allowed to play with the objects or you can ask what he sees on the table. The exact nature of the verbal instruction is not fixed; it depends on the participant, what he understands and what you assess as most appropriate in this setting. If the participant does not understand verbal communication or does not respond, you may offer the objects using hand-under-hand communication. You can instruct the participant up to three times.

If the participant has not acted with the objects after three attempts or if the participant has acted with the objects in multiple manners, you may remove the objects from the table and place them back in the box or suitcase.

Their own object
Take the object that the participant brought to the assessment, and place it on the table. If he spots the object himself, don't do anything. Wait a number of seconds. When the participant does not act with the object, you may give verbal instruction or offer the object using the hand-under-hand method. Do this in a similar manner as in the previous part of this task. You may do this up to three times.

Remove the object if the participant has not acted with their object or when they have acted with it in multiple manners. Removing the object may be combined with signs or verbal explanation.

Doll with hairbrush / tea cups and pot
Place these objects on the table and follow the steps below.

1. Offer these objects and check if the participant prefers one of the objects. Always give the participant enough time to explore the objects first. Offer the objects up to three times using the hand-under-hand method or verbally. These three attempts may be separated by a short break of a few seconds.
2. Try to evoke functional play. This is done by using the toys in the usual manner, dependent on the function of the object, for example by drinking from the cup or brushing your hair with the hairbrush. Show the participant how you play with the objects up to three times in sight of the participant, verbally, or using the hand-under-hand method.
3. After this, combine functional acts using multiple objects, for example by brushing the hair of the doll, or stirring the spoon in the cup. Show this to the participant, also up to three times, in sight, verbally or using the hand-under-hand-method.
4. Finally, do the same as in the previous step, only by playing in a symbolic way, for example by pretending to drink a cup of tea together, or making tea without play material such as an imaginary tea bag.

If the participant performs any of these steps on his own, you may continue with the next step directly. When the participant does not follow a certain step after the required attempts, or when the participant has successfully finished the final step, the objects may be removed. Removing the objects may be combined with signs or verbal explanation.

2.3.3 Task 2

Dog that can be activated: before the task
Place the dog at least at an arm's length away from the participant, but close enough so that he can still perceive the dog. If the participant's visual impairment prevents him from seeing the dog at an arm's length, the dog can be placed closer by. If the participant is blind, the dog can be placed in front of the participant. If the participant directly notices the dog or asks for the dog before the first step, please continue with the steps under 'activate'.

Seeking attention
Perform each step below up to three times. If the participant notices the dog before you are finished with the steps, asks for it or grabs it, the following steps can be skipped. For example: Begin with step

1 and repeat three times or until the participant notices the dog. If the dog is asked for by the participant, steps 2-4 can be skipped. If he doesn't notice the dog, continue with step 2, etc.

1. If the participant uses sight, make eye contact, then look at the dog and back at the participant. If the participant does not use sight, take their hands and bring them toward the dog using the hand-under-hand method. Touch the dog yourself, but don't let the participant touch the dog. Keep your hands at the dog for about five seconds and then bring them back.
2. If the participant uses sight, repeat step 1, combined with an obviously surprised look on your face (eyebrows up, mouth open as if saying "ooo"). If the participant does not use sight, repeat step 1, but after returning, you present your hands open to the participant so he knows he can grab them.
3. If the participant uses sight, repeat step 2, combined with pointing at the dog. If the participant does not use sight, repeat step 2, but now actively pet the dog without letting the participant touch its fur. It is not a problem if the participant accidentally makes contact with the fur.
4. Grab the dog and act with the dog yourself. Or, if the participant does not use sight, repeat step 3, but now you can let the participant touch the dog by slowly removing your own hands or switching to the hand-over-hand method. It is okay if the participant removes their own hands if they show signs of fright.

Activating the dog

The participant now holds the dogs or acts with the dog, because he grabbed the dog himself or after one of the steps above. If the participant still hasn't made contact with the dog, you may hand over the dog to the participant. Give the participant some time to act freely with the dog. After this, grab the dog, activate it and hand the dog back over. Again, give the participant some time to act freely with the dog. When the dog has jumped around five times, turn it off. If the participant stops acting with the dog beforehand, pet the dog yourself a few times until it has jumped around five times.

After this, turn the dog off, and give the participant a few more minutes to act freely with the dog. Then, remove the dog from the table.

2.3 Task 3

In this task we play a physical interaction game. If you notice the participant strongly resents physical contact, it is important to stop this task before the participant experiences too much stress.

The wheels on the bus

Take the participants hands and start singing: "the wheels on the bus go round and round, round and round, round and round; the wheels of the bus go round and round, all through town". While singing you move the participants hands in a circular motion next to your bodies. It is okay if the participant needs help moving their hands in the right way. If the participant's motor skills prevent them from making a perfect circular motion, accept a simple back-and-forth movement of the hands.

Routine

Repeat this song four more times (a total of five), or until you notice the participant understands the

routine. In this case, three times is enough. Some participants may know the song well; other high functioning participants will learn it quickly. The song ends at “all through town”, but for low functioning participants or those who don’t know the song “the wheels of the bus go round and round, round and round, round and round” is enough. This provides them with less new information, and makes it easier to get used to the routine.

Breaking the routine
Break the routine by repeating the act with a clear change in words and movement. Instead of the singing about the wheels of the bus, and making circular movements, sing the second verse of the song: “the wipers on the bus go swish, swish, swish; swish, swish, swish; the wipers on the bus go swish, swish, swish, all through town”. This time, wave the hands in front of the participant from left to right. Repeat the new song three more times.

2.3.5 Task 4
There are three types of puzzles with different levels of difficulty. Prior to the assessment, you may ask the participant’s caregiver which puzzle suits the participant best. In participants with a severe or profound intellectual disability, usually the puzzle is chosen in which the pieces only have to be placed in a bucket. This option can also be chosen when the participant has difficulties with their fine motor skills. In high functioning participants, a puzzle with difficult shapes may be the better option. If you notice the puzzle is too easy or too difficult during the task, feel free to switch to the easier or more difficult option. When in doubt, consult the caregiver before you start.

Playing with the puzzle
Give the participant some time to act freely with the puzzle. If the participant does not act or only barely acts with the puzzle, hand them over a piece, bring their hands toward the puzzle using the hand-under-hand method or give verbal instructions to pick up pieces. When the participant is playing with the puzzle and has moved more than five pieces, you may proceed to the next step.

If possible, the researcher can try to play together with the participant, see ‘playing together’. This does, however, not replace playing together later in this task.

Hiding a piece
In clear sight or touch of the participant, take the last pieces of the puzzle away and place them in the translucent box with lid. The participant now cannot easily get to the pieces. When the participant does not ask for any more pieces, show them the box, shake it or point at it. If the participant asks you to open the box verbally or in sign, open it. The participant may also try it on his own if he does not ask for help.

When it is clearly too difficult for the participant to open the box or the participant does not appear to miss any pieces, or ask for them, remove them from the box and give them back to the participant.

Playing together
Try to evoke playing together with the participant by asking for a puzzle piece. Do this a number of times; it can be done verbally or by holding up your hand before the participant places the pieces in the puzzle. Pick up a new piece yourself and try to fit it in the puzzle without pressing it through, and

then give it to the participant. Alternate these options until you have tried to play together at least five times or until you run out of pieces.

The puzzle can be removed.

2.3.6 Task 5

Place the activity centre on the table. In the description below, it was assumed that the V-tech 'Rol en Dol pretpark' is used. If you use another type of activity centre the exact functions and options may vary.

Activity centre

Activate the activity centre and place it near the participant. If necessary, bring their hands toward the activity centre. Do this up to three times. If the participant does not respond, you can start playing with the activity centre yourself.

If the participant plays along, try to evoke taking turns by pressing a button or piano key and wait until participant does the same thing. Or hand the participant one of the balls that he gets to place in the activity centre. Play together like this for a while and build up a small routine of taking turns in acting with the activity centre. If this does not work, start imitating the participant's acts with the centre up to five times or until it does work.

Repeat the built up routine five times, and then break the routine. This can be done, for example, by hiding the balls or turning off the music. Keep repeating the steps you took during the routine, only without the sounds or balls. In other words, pretend to hand over a ball or press a button or key without the corresponding music.

Saying goodbye

This was the final task. Before the participant leaves, make physical contact once more when saying goodbye, for example by shaking their hand or giving them a high five.

3. Manual for scoring and interpretation

3.1 Scoring

Scoring of OASID always takes place after the assessment. The video images that are used during this session are used for scoring. Participants are scored on a total of 40 items. The first 29 items concern the participant's behaviour during the administration of the five different tasks. The final 11 items concern the general behaviour during the full assessment.

Each item is scored on a three-point scale with 0, 1, or 2 points. A score of 0 points corresponds to little or no behavioural characteristics of ASD, a score of 1 corresponds to mild or moderate ASD characteristics and a 2 point score corresponds to many or severe ASD characteristics. Always choose the answer that matches the observed behaviour the most. The scoring of OASID is done using the questionnaire in Appendix 3: OASID Questionnaire.

While scoring, take the time to read the questions and answering possibilities carefully. Pause the video when more time is needed to assess, and rewind the video when in doubt. Write down the score to each question on the scoring form, found in Appendix 2: OASID scoring form.

Behind each question on the scoring form is an empty white box below a specific subscale number. This box is used to write down the score for the particular participant that you are scoring. The numbers for subscales (A1, A2, etc.), correspond to the ASD criteria as described by DSM-5 (American Psychiatric Association, 2013). After answering all of the questions, the scores on each subscale can be added to make up a total scale score. The scale scores are required to interpret OASID.

3.2 Interpretation

When OASID is fully scored, the scores can be interpreted. This is done on a scale level (A & B). This requires the added up scores that correspond to subscales A1 through A3 and B1 through B4.

The score on scale A corresponds to the DSM-5 category about social behaviour and communication. The score on scale B corresponds to the DSM-5 category about repetitive and stereotyped behaviour. Because impairments need to occur on both domains in order to diagnose ASD, both scales are interpreted separately. These scores and interpretations were determined in an OASID study on sixty participants with and without ASD. The reference points are based on expert consensus (see De Vaan, Vervloed, Peters-Scheffer, et al., 2018).

First, it is determined how many behavioural characteristics related to ASD are found on each scale. This is done using Table 4: Interpretation of scale scores. On both scales, a different interpretation can be made, based on the score, varying from 'no autistic symptoms', to 'mild autistic symptoms', to 'severe autistic symptoms'.

Table 4: Interpretation of scale scores

	Score on scale A 'Social Behaviour and Communication'	Score on scale B 'Repetitive and Stereotyped Behaviour'
No autistic symptoms	11 and below	7 and below
Mild autistic symptoms	12 – 17	8 – 11
Severe autistic symptoms	18 and above	12 and above

When the interpretation on a scale level is done, an interpretation can be made about the presence of autistic symptoms in general. This is done using the table below, Table 5: Interpretation of ASD symptoms. As can be seen, the scores on OASID do not lead to an official diagnosis. OASID merely indicates the presence and severity of symptoms that are indicative of ASD. This means that OASID should always be used as part of larger and more elaborate diagnostic assessment to come to a full and definitive diagnosis, see also paragraph 1.2.

Table 5: Interpretation of ASD symptoms

Score on OASID	**Interpretation**
No autistic symptoms on both scales *or* No autistic symptoms on one scale, mild autistic symptoms on the other scale	No ASD symptoms
No autistic symptoms on one scale, severe autistic symptoms on the other scale *of* Mild autistic symptoms on both scales	Mild ASD symptoms
Mild autistic symptoms on one scale, severe autistic symptoms on the other scale	Severe ASD symptoms
Severe autistic symptoms on both scales	Profound ASD symptoms

References

American Association on Intellectual and Developmental Disabilities (2013). Definition of intellectual disabilities. Retrieved from: https://aaidd.org/intellectual-disability/definition

American Psychiatric Association (2013). *Diagnostic and Statistical Manual of Mental Disorders, DSM-5*. Washington, DC: American Psychiatric Publishing.

Andrews, R., & Wyver, S. (2005). Autistic tendencies: Are there different pathways for blindness and Autism Spectrum Disorder? *British Journal of Visual Impairment, 23*(2), 52-57. Doi: 10.1177/0264619605054776.

Bartiméus (2019). *Hand onder hand contact [Hand under hand contact]*. Retrieved from: https://www.bartimeus.nl/hand-onder-hand-contact

Boris, N.W., & Zeanah, C.H. (2005). *Practice parameter for the assessment and treatment of children and adolescents with reactive attachment disorder of infancy and early childhood*. Retrieved from: www.aacap.org

Buitelaar, J. K., Van Daalen, E., Dietz, C., Van Engeland, H., Van Der Gaag, R. J., Van Steijn, D., & Swinkels, S. (2009). *ESAT - Screening van ASS op jonge leeftijd [ESAT – Screening for ASD at a young age]*. Houten, the Netherlands: Bohn Stafleu van Loghum.

Carnaby, S. (2007). Developing good practice in the clinical assessment of people with profound intellectual disabilities and multiple impairment. *Journal of Policy and Practice in Intellectual Disabilities, 4*(2), 88-96, doi: 10.1111/j.1741-1130.2007.00105.x

Carvill, S. (2001). Sensory impairments, intellectual disability and psychiatry. *Journal of Intellectual Disability Research, 45*(6), 467-483. Doi: 10.1046/j.1365-2788.2001.00366x

Cass, H. (1998). Visual impairment and autism. *Autism, 2*(2), 117-138. Doi: 10.1177/1362361398022002

Constantino, J. N., & Gruber, C. P. (2005). *Social Responsiveness Scale (SRS)*. Los Angeles, CA: Western Psychological Services.

De Vaan, G. (2018). Autism Spectrum Disorder in people with multiple disabilities (doctoral dissertation, Radboud University, Nijmegen, the Netherlands). Retrieved from: http://hdl.handle.net/2066/191699

De Vaan, G., Beijers, R., Vervloed, M.P.J., Knoors, H., Bloeming-Wolbrink, K.A., De Weerth, C., & Verhoeven, L. (2019). The relationship between stress and autism spectrum disorder in people with sensory and intellectual disabilities: Evidence from cortisol levels. *Manuscript submitted for publication.*

De Vaan, G., Vervloed, M.P.J., Hoevenaars-van den Boom, M., Antonissen, A., Knoors, H., & Verhoeven, L. (2016). A critical review of screening and diagnostic instruments for autism spectrum disorders in people with sensory impairments in addition to intellectual disabilities.

Journal of Mental Health Research in Intellectual Disabilities, 9(1-2). Doi: 10.1080/19315864.2015.1119917

De Vaan, G., Vervloed, M.P.J., Knoors, H., & Verhoeven, L. (2013) Autism spectrum disorders in people with sensory and intellectual disabilities: Symptom overlap and differentiating characteristics. In M. Fitzgerald (ed.), Recent Advances in Autism Spectrum Disorders Volume I: Intech. Doi: 10.5772/53714. Available from: https://www.intechopen.com/books/recent-advances-in-autism-spectrum-disorders-volume-i/autism-spectrum-disorders-in-people-with-sensory-and-intellectual-disabilities-symptom-overlap-and-d

De Vaan, G., Vervloed, M.P.J., Peters-Scheffer, N.C., Van Gent, T., Knoors, H., & Verhoeven, L. (2016). Behavioural assessment of autism spectrum disorders in people with multiple disabilities. *Journal of Intellectual Disability Research, 60*(2), 101-112. Doi: 10.1111/jir.12206

De Vaan, G., Vervloed, M.P.J., Peters-Scheffer, N.C., Van Gent, T., Knoors, H., & Verhoeven, L. (2018). Assessing autism spectrum disorder in people with sensory impairments combined with intellectual disabilities. *Journal of Developmental and Physical Disabilities, 30*(4), 471–487. Doi: 10.1007/s10882-018-9597-x

Doofblind.nl (2017). Doofblind, wat is dat? [Deaflind, what is it?] Retrieved from: http://www.doofblind.nl/doofblind-wat-is-dat/

Evenhuis, H.M., Sjoukes, L., Koot, H.M., & Kooijman, A.C. (2009) Does visual impairment lead to additional disability in adults with intellectual disabilities? *Journal of Intellectual Disability Research*, *53*(1), 19-28. Doi: 10.1111/j.1365-2788.2008.01114.x

Garnett, M. S., & Attwood, A. J. (1993). Australian Scale for Asperger's Syndrome (ASAS). *Asperger's Syndrome: A guide for Parents and Professionals*. London, Uk & Philadelphia, PA: Jessica Kingsley Publishers. Retrieved from http://www.aspergersyndrome.org/Articles/The-Australian-Scale-for-Asperger-s-Syndrome.aspx.

Hoevenaars-van den Boom, M.A.A., Antonissen, A.C.F.M., Knoors, H., & Vervloed, M.P.J. (2009). Differentiating characteristics of deafblindness and autism in people with congenital deafblindness and profound intellectual disability. *Journal of Intellectual Disability Research, 53*(6), 548-558. Doi: 10.1111/j.1365-2788.2009.01175.x

Kraijer, D. (1999). *Autisme- en Verwantestoornissenschaal-Z-Revisie: AVZ-R. Handleiding. Derde herziene en uitgebreide uitgave[Pervasive Developmental Disorders in Mental Retardation Scale: PDD-MRS Manual]*. Lisse, the Netherlands: Swets en Zeitlinger.

Krug, D. A., Arick, J. R., & Almond, P. (1978). *Autism screening instrument for educational planning (ASIEP)*. Austin, TX: ProEd.

Lord, C., Rutter, M., DiLavore, P. C., & Risi, S. (1999). *ADOS: Autism diagnostic observation schedule*. Manual. Los Angeles: WPS.

Nederlandse Vereniging voor Psychiatrie (2009). *Diagnostiek en behandeling autismespectrumstoornissen bij kinderen en jeugdigen [Diagnosis and treatment of autism spectrum disorders in children and youth]*. Utrecht: De Tijdstroom

Oosterling, I.J., Wensing, W., Swinkels, S.H., Van der Gaag, R.J., Visser, J.C., Woudenberg, T., Minderaa, R., Steenhuis, M.P., Buitelaar, J.K. (2010). Advancing early detection of autism spectrum disorder by applying an integrated two-stage screening approach. *Journal of Child Psychology and Psychiatry, 51*(3), 250-258. Doi: 10.1111/j.1469-7610.2009.02150.x

Reiss, S., Levitan, G.W., & Szyszko, J. (1982). Emotional disturbance and mental retardation: diagnostic overshadowing. *American journal of mental deficiency, 86*(6), 567-574.

Robins, D., Fein, D., & Barton, M. (2009). *Modified Checklist for Autism in Toddlers, Revised with Follow-Up*. Retrieved from https://m-chat.org/_references/mchatDOTorg.pdf

Rutter, M., Bailey, A., & Lord, C. (2003). *Social Communication Questionnaire*. Los Angeles, CA: Western Psychological Services.

Rutter, M., Le Couteur, A., & Lord, C. (2003). *Autism Diagnostic Interview - Revised*. Los Angeles: Western Psychological Services.

Schopler, E., Reichler, R. J., & Renner, B. (1988). *The Childhood Autism Rating Scale (CARS)*. Los Angeles, CA: Western Psychological Services.

Schopler, E., Van Bourgondien, M.E., Wellman, G.J., & Love, S.R. (2010). *Childhood Autism Rating Scale, Second edition*. Torrance, CA: Western Psychological Services.

Siegel, B. (2004). *The Pervasive Developmental Disorders Screening Test-II (PDDST-II).* San Antonio: Pearson.

Van Berckelaer-Onnes, I. A., & Hoekman, J. (1991). *Auti-R schaal. Handleiding en Verantwoording.Ten behoeve van de onderkenning van vroegkinderlijk autisme [Auti-R scale. Manual]*. Lisse, the Netherlands: Swets en Zeitlinger.

Wing, L. (2003). *Diagnostic Interview for Social and Communication Disorders. Eleventh revision*. Kent, UK: National Autistic Society.

World Health Organization (2016). International statistical classification of diseases and related health problems (ICD-10). Retrieved from: http://apps.who.int/classifications/icd10/browse/2016/en

Appendix 1: OASID preparation form

Name participant: male / female

Date of birth: Age:

Communication

This means language, method of communication, level of communication, in which manner the play objects may be offered and how the participant can be addressed, for example by name or name signs.

During the assessment the researcher will interact with the participant. It is therefore necessary to know how the participant communicates, and which form of communication the participant understands. This may include the use of symbols, spoken language, sign language or any other form of augmentative or alternative communication. Ask how objects should be presented to the participant: is it possible to talk about the object, should the object be handed over or should hand-under-hand or hand-over-hand communication be used? It is important to know if the participant can use multiple senses at once (touch, sight, sound) and how information coming from these senses is processed. Determine which intensity and amount of repetition is necessary to bring across a message.

Sensory impairments

This means all relevant information regarding the visual field and acuity, how far the participant can see, how the remaining vision is used and whether the person wears glasses. Sensory impairments also refers to the participant's hearing. This concerns whether the participant has hearing loss or is deaf, the severity of hearing loss, whether the participant uses hearing aids or wears a cochlear implant and how hearing is used.

OASID allows for the presence of sensory impairments. Communication and the level of the tasks can be adjusted to the present sensory impairments. It is therefore important for the researcher to know what and how much the participant can see and hear. Regarding to sight, it is important to know

what the smallest details and shapes are that the participant can visually distinguish, if the visual field is limited, what their preferred posture is to see properly and how much and which form of lighting the participant needs. Concerning their hearing it is important to know which frequencies the participant can hear and at which volume, whether the participant can understand words and sentences, and how much they can express verbally. Also determine whether the person's hearing and sight can be addressed at the same time or should be addressed subsequently.

Intellectual disability

This means the level of intellectual disability, the level of functioning and the play level that can be expected.

OASID is suitable for participants with different levels of intellectual disability. The play level can be adjusted to the cognitive possibilities of the participant. For example, when playing the puzzle, four different options are given for how the puzzle can be played, dependent on the intellectual disability and motor abilities of the participant. Always check the level of intellectual disabilities prior to the assessment and explain about the tasks that will be done. During the assessment, level of play and communication can be adjusted to the level that is necessary, but it is always best to start at a realistic level.

Physical and motor impairments

Generally, the OASID tasks can be done at a table. However, this is not possible for every participant. Sometimes the tasks need to be done at the wheelchair table or on the floor. It is also useful to know how the participant's motor abilities are developed. This will give an idea about the play behaviour that can be expected. Every toy that is included in OASID can be played with using fine motor skills, but can also be used when the participant is limited to more gross motor skills. For example, the car from task 1 allows for the wheels to be rotated and objects to be placed in the back of the car. If this is not possible, the car can be used to move back and forth.

Stress

This means stress reactions that may occur during the assessment. It is important to know how stress can be recognized within this participant, how it can be prevented and how to cope when stress occurs.

OASID generally does not induce stress within participants. However, it may occur that a participant feels uncomfortable or tense during a specific task. It is therefore important to know how stress can be recognized within the participant and how you should handle these situations. Explain that the caregiver can intervene whenever they sense that the stress level of the participant is too high.

The assessment

Date: Time:

Location:

Name assessor:

Name caregiver:

The caregiver has been informed about:

- ☐ Bringing a familiar play object
- ☐ Their advisory role in the assessment
- ☐ The date, time and location of the assessment

Appendix 2: OASID scoring form

Name assessor:
Name participant:
Date:

	Scale							
item	**A1**	**A2**	**A3**	**B1**	**B2**	**B3**	**B4**	**notes**
1	■	■	■	■	■		■	
2	■	■	■		■	■	■	
3	■	■	■	■	■		■	
4	■	■	■		■	■	■	
5	■	■	■	■	■		■	
6	■	■		■	■	■	■	
7	■	■		■	■	■	■	
8	■	■		■	■	■	■	
9		■	■	■	■	■	■	
10		■	■	■	■	■	■	
11	■	■	■	■		■	■	
12		■	■	■	■	■	■	
13	■	■	■	■		■	■	
14	■		■	■	■	■	■	
15	■	■	■		■	■	■	
16		■	■	■	■	■	■	
17		■	■	■	■	■	■	
18	■	■	■	■		■	■	
19	■	■	■	■		■	■	
20	■	■	■		■	■	■	
21		■	■	■	■	■	■	
22	■		■	■	■	■	■	
23	■	■		■	■	■	■	
24	■	■	■		■	■	■	
25		■	■	■	■	■	■	
26	■	■		■	■	■	■	
27		■	■	■	■	■	■	
28	■	■	■	■		■	■	
29	■	■	■	■		■	■	
30	■	■		■	■	■	■	
31	■	■		■	■	■	■	
32	■	■		■	■	■	■	
33		■	■	■	■	■	■	
34	■	■		■	■	■	■	
35	■		■	■	■	■	■	
36	■	■	■	■	■	■		
37	■	■	■	■	■	■		
38	■	■	■	■	■	■		
39	■	■	■		■	■	■	
40	■	■	■		■	■	■	
Total								**Interpretation**
Scale total								
Scale interpretaion								

Appendix 3: OASID questionnaire

The questionnaire starts at the next page.

Task 1 The participant enters the room and is welcomed to explore and play freely with the new, unfamiliar objects. After this, their own familiar object or toy is presented and they may play with this freely. Finally, their own toy is removed from the table and new toys are presented. The researcher attempts to play with these toys at various different levels: exploration, functional play, combining toys and symbolic play.			
1. Does the participant act with the new objects?	0	1	2
**A few seconds means a period between 2 and 10 seconds.* **A longer duration means a period longer than 10 seconds.*	The participant acts with one of the objects for a longer duration, or with several objects for a short duration.	The participant explores the objects using touch for a few seconds, or acts with one object for a few seconds and then stops acting with the new objects. Also give this score when the participant does not act with the objects but has attention for the objects for a longer duration, for example by holding it, staring at it, listening to it or placing it in his mouth.	The participant does not act with the objects or pushes them away directly, he doesn't show any further attention to the objects.
2. Does the participant act in a varied way with the new objects?	0	1	2
	The participant shows two or more different actions with one or multiple objects.	The participant mainly shows one action with one object, with some small variations, or the participant shows the same action with multiple objects.	The participant does not act with the objects or acts with the objects in stereotyped, repetitive or in an apparently aimless manner.
3. Does the participant act with his own familiar object?	0	1	2
	The participant acts with his own familiar object but does appear sensitive for stimuli from his surroundings, the researcher or other objects.	The participant does not act with his own familiar object or pushes it away directly. The participant is mostly interested in his surroundings, other objects or persons.	The participant fully aims his attention to the familiar object and does not appear sensitive to stimuli from his surroundings, the researcher or other objects.

4. Does the participant act in a varied way with his own familiar object?	0	1	2
**An action is related to the attributes of the object when the action is clearly related to the purpose of the object or parts of it. This means that the participant plays with the object as it is intended, but also that the participant acts with the attributes of the object as they are intended, for example: spinning a wheel, petting a fur, moving legs, listening to the sounds of the object.*	The participant shows two or more different actions with his own familiar object. These actions are clearly related to the attributes of the object.	The participant mainly shows one action with the object, with some small variations. These actions are related to the attributes of the object.	The participant does not act with the object or acts with the object in stereotyped, repetitive or in an apparently aimless manner. These actions are not related to the attributes of the object.
5. Does the participant show resistance to taking away his own familiar object?	0	1	2
	The participant does not show anger, sadness or frustration as a response to the removal of the object.	The participant shows some anger, sadness or frustration as a response to the removal of the object, or clings to the object briefly. The participant hands over the object within three attempts of the researcher.	The participant shows anger, sadness or frustration as a response to the removal of the object, or clings to the object strongly and refuses to give away the object after three attempts of the researcher.
6. Does the participant explore the new objects?	0	1	2
**Exploration refers to exploring objects or object attributes using the senses. This includes feeling, but also looking at the objects, placing it in their mouth or listening to the objects.* **Non-functional combination play is combining toys or multiple objects, or using them together. This manner of play does not have to be related to the purpose or attributes of the object.* **For a description of functional or symbolic play, see question 7 and 8.*	The participant shows exploration or non-functional combination play spontaneously or within few attempts of the researcher. This score can also be given when the participant shows functional or symbolic play.	Prior to exploration, the participant shows some short fright reactions. After multiple attempts of the researcher, the participant shows exploration or non-functional combination play with the objects.	The participant does not act with the objects or acts with the objects in a stereotyped, repetitive or apparently aimless manner.
7. Does the participant show functional play with the objects?	0	1	2

**Functional play is manipulating objects in a functional manner, using the object as it is intended. The participant is apparently familiar with its function.* **Functional combination play is combining toys or multiple objects, using them together in way that they would normally be combined and used. For example, stirring the teaspoon in the teacup.*	The participant shows functional combination play spontaneously or within few attempts of the researcher.	The participant shows functional play spontaneously or within few attempts of the researcher, but does not show functional combination play.	The participant does not show functional (combination) play.
8. Does the participant show symbolic play?	0	1	2
**Symbolic play can be recognised as make-belief actions, by using ones imagination while playing, pretending an object is something else, by using an object as if it has another function or by role playing in which the different persons in the room are assigned different roles and act according those roles.*	The participant shows role play with the researcher or uses one object as if it has multiple functions, or shows a symbolic act with the object. For example, drinking from a cup while making appropriate sounds or gestures, such as tilting the head or making drinking sounds.	The participant shows symbolic actions, but without appropriate sounds or gestures. For example, bringing the cup to his mouth but without tilting the head and making drinking sounds.	The participant shows no form of symbolic play.
Task 2: In task 2 a plush animal is used that can be activated. It is placed within the visual field of the participant, or at an arm's length when the person is blind. The researcher will provoke attention toward this object. When the participant holds the object, they may act with it for a while. It is then activated and finally deactivated.			
9. Does the participant follow cues from the researcher toward to dog?	0	1	2
** The participant has attention for the dog when he expresses having seen the dog, he wants to hold the dog or wishes to act with the dog. Attention can be shown verbally, in sign or in facial expression. The person can also show attention for the dog by simply looking at or touching it.* **The researcher will give cues to the participant aimed at the dog until the participant notices the dog. The directness of the cues increase. The exact type of cue can vary, dependent on the sensory impairments of the participant.* ** If the participant uses sight, he researcher will use gaze direction, facial expression, pointing at the dog, and playing with it within the*	The participant shows attention for the dog, after the researcher uses gaze or gaze in combination with a surprised face, or when the researcher has used the hand-under-hand method to guide the participant toward the dog.	The participant only shows attention for the dog after the researcher has pointed toward the dog, or when the researcher has used the hand-under-hand method to let the participant know he is touching the dog without them making direct contact with it.	The participant does not show attention for the dog, or only shows attention when the researcher starts playing with the dog within the visual field of the participant, or when the researcher has brought the participant in direct tactile contact with the dog

visual field of the participant. **If the participant does not use sight or has severe visual impairments, the researcher will use the hand-under-hand method, in which the research brings the hands of the participant toward the dog.*			
10. Does the participant share attention with the researcher (from the moment that the participant has received the dog until right before the dog is activated)?	0	1	2
**A shift in attention is a shift in attention from the dog toward the researcher or from the researcher toward the dog.* **Attention can be shown by looking at the face of the researcher or at the dog, or by tactile following of the dog or letting the researcher follow their hands.*	The participant shows two shifts of attention successively. This can be done by having attention for the dog first, then the researcher (1), then the dog again (2), or vice versa.	The person shows one shift of attention. This can be done by having attention for the dog first, then the researcher, or vice versa.	No shift of attention takes place. This score can also be given when the person only has attention for the dog, or only for the researcher, but the attention never shifts from one toward the other.
11. What kind of reaction does the participant show when the dog is activated?	0	1	2
	The participant responds positively when the dog is activated, by picking it up, acting with it or showing a clear expression of happiness or interest.	The participant shows a brief neutral reaction or a short fright reaction. After this, the participant responses positively by picking up the dog, acting with it or showing a clear expression of happiness or interest.	The participant shows no reaction when the dog is activated, or the participant shows resistance toward the dog when it is activated, by pushing it way, turning themselves away, expressing anger, sadness or frustration in sound, sign or facial expression.
12. Does the participant share attention with the researcher	0	1	2

(from the moment the dog is activated until the dog is deactivated)?			
** A shift in attention is a shift in attention from the dog toward the researcher or from the researcher toward the dog.* **Attention can be shown by looking at the face of the researcher or at the dog, or by tactile following of the dog or letting the researcher follow their hands.*	The participant shows two shifts of attention successively. This can be done by having attention for the dog first, then the researcher (1), then the dog again (2), or vice versa.	The person shows one shift of attention. This can be done by having attention for the dog first, then the researcher, or vice versa.	No shift of attention takes place. This score can also be given when the person only has attention for the dog, or only for the researcher, but the attention never shifts from one toward the other.
13. How does the participant respond to the deactivation of the dog?	0	1	2
	The participant does not show anger, sadness or frustration as a response to the deactivation of the dog. He tries to activate the dog on his own or with help.	De participant does not show anger, sadness or frustration, or only briefly, but he does not try to activate the dog on his own or with help.	The participant shows resistance to deactivating the dog by pushing it away, pushing himself away or expressing anger, sadness or frustration in sound, sign or facial expression.
14. Does the participant ask for help in reactivating the dog?	0	1	2
	The participant asks for help in reactivating the dog in sound, sign or facial expression, or searches visual confirmation with the researcher in his own attempts to reactivate the dog.	De participant does not ask for help in reactivating the dog. He tries to reactivate the dog on his own or further acts with the dog without searching for visual confirmation from the researcher.	The participant does not ask for help in reactivating the dog. He stops playing, loses interest in the dog or shows anger, sadness or frustration.
15. Does the participant act in a varied way with the dog (during the full task)?	0	1	2
	The participant shows two or more different actions with the dog. These actions are clearly related to the properties of the dog, such as petting, moving legs, etc.	The participant mainly shows one action with the dog, with small variations. This is clearly related to the properties of the dog.	The participant does not act with the dog or acts with the dog in a stereotyped, repetitive, or apparently aimless manner.

Task 3: In this task a physical interaction game is played with the participant, including song. When the game has been repeated a couple of times, the routine is broken and the game is continued in a different manner.			
16. Does the participant show imitation of the researcher (during the full task)?	0	1	2
**It can also be imitation of the action is not directly imitated but the action is shown at a later stage in the task.* **Even when the same imitation is shown multiple times, score answering possibility 0.*	The participant shows two or more imitations. These can be exact copies of the researcher's behaviour or small variations. These occur spontaneously or at request.	The participant shows imitation a single time during the task. This can be an exact copy of the researcher's behaviour or a small variation. This occurs spontaneously or at request.	The participant does not show imitation, not even after repeated request from the researcher.
17. Does the participant respond to the initiatives of the researcher to take turns?	0	1	2
	The participant joins the researcher actions by taking turns. The participant accepts the actions of the researcher and joins the game by moving his hands along with the researcher's hands.	The participant accepts the researcher's attempts, but does not join in taking turns. The participant only moves his own hands when the researcher takes his hands and moves them.	The participant ignores the researcher or shows resistance by expressing anger, sadness or frustration in sound, sign or facial expression or by moving away or pushing away the researcher.
18. Does the participant show anxiety, fear, anger or resentment to changing the routine?	0	1	2
	The participant responds positively or directly adapts to the change.	After a brief negative response such as a sign of fright, the participant shows a positive or neutral response. He may show some confusion without negative emotions.	The participant shows a negative response to changing the game by expressing anger, sadness or frustration in sound, sign or facial expression, by moving away or pushing away the researcher.
19. Does the participant try to return to the previous routine?	0	1	2
	The participant adapts to the new routine. He may show	The participant attempts once or twice to return to the previous	The participant stops playing after changing the routine or

	some confusion at first, but then participates in the new routine.	routine by repeating those steps. After this, he adapts to the new routine.	attempts more than twice to return to the previous game.
Task 4: In task 4, the participant receives a puzzle. In this task the researcher tries to play together and at one point will hide pieces from the participant.			
20. How does the participant play with the puzzle?	0	1	2
**Exploration is exploring objects or object properties using the senses. This includes looking, putting it in their mouths, listening, etc.*	The participant acts in a functional way with the puzzle, possibly after a brief exploration of the materials.	The participant explores parts of the puzzle but does not show any functional play.	The participant shows stereotyped, repetitive or apparently aimless actions with parts of the puzzle.
21. Does the participant respond to the researcher's initiatives?	0	1	2
**Acting with the pieces means: trying to solve the puzzle / placing pieces in the intended box.*	The participant joins the actions of the researcher by taking offered pieces and acting with them, or the participant takes the offered pieces, puts them away and gives the researcher another piece.	The participant accepts the researcher's attempts but does not take offered pieces, or the participant does take offered pieces but puts them away without offering the researcher another piece, or does not act with the pieces at all.	The participant shows resistance by expressing anger, sadness or frustration in sound, sign or facial expression, by turning away or pushing away the researcher, or the participant takes an offered piece and throws it away.
22. Does the participant ask the researcher for help?	0	1	2
	The participant asks for help in sound, sign or facial expression in order to retrieve the pieces. If the participant finds a way to retrieve pieces without help, this score can also be given.	The participant does not ask for help in retrieving the pieces, but tries it on his own, without success, or continues playing without the missing pieces.	The participant does not ask for help. The participant stops playing, loses interest and/or shows anger or frustration.
23. Does the participant show initiatives to play together?	0	1	2
	The participant invites the researcher to play together in sound, sign or facial expression;	The participant invites the researcher to play together in sound, sign or facial expression;	The participant does not show any initiatives to play together.

	for example by giving pieces to the researcher or asking for help in solving the puzzle. He responds neutral to positive to the researcher's actions.	for example by giving pieces to the researcher or asking for help in solving the puzzle, but he does not respond the researcher's actions or gets angry or upset as a response.	
Task 5: The final task contains an interactive game that can interact with multiple senses. The participant can act with the game freely, until the researcher attempts to play together. Near the end of the task, the researcher will shut down the game or hide pieces.			
24. Does the participant play in a varied way with the activity centre?	0	1	2
	The participant shows two or more different actions with the activity centre, these actions are clearly related to the intended play options of the activity centre.	The participant mainly shows one action with the activity centre, with some small variations. These actions are clearly related to the intended play options of the activity centre. Also give this score if the person only explores the activity centre, for example by using touch.	The participant does not act with the activity centre or acts in a stereotyped, repetitive or in an apparently aimless manner.
25. Does the participant respond to the researcher's initiatives to play together?	0	1	2
	The participant joins the researcher by taking turns and adjusting his actions the researcher's actions.	The participant accepts the researcher's attempts, but does not join in taking turns.	The participant ignores the researcher or shows resistance by expressing anger, sadness or frustration in sound, sign or facial expression or by moving away or pushing away the researcher.
26. Does the participant show initiatives to play together?	0	1	2
	The participant invites the researcher to play together in sound, sign or facial expression;	The participant invites the researcher to play together in sound, sign or facial expression;	The participant does not show any initiatives to play together.

	for example by giving balls to the researcher or placing their hands on the activity centre. He responds neutral to positive to the researcher's actions.	for example by giving balls to the researcher or placing their hands on the activity centre. He does not show a positive reaction to the researcher's actions.	
27. Does the participant imitate the researcher during this task?	0	1	2
**It can also be imitation of the action is not directly imitated but the action is shown at a later stage in the task.* **Multiple imitations may be the same imitation shown multiple times.*	The participant shows two or more imitations. These can be exact copies of the researcher's behaviour or small variations. These occur spontaneously or at request.	The participant shows imitation a single time during the task. This can be an exact copy of the researcher's behaviour or a small variation. This occurs spontaneously or at request.	The participant does not show imitation, not even after repeated request from the researcher.
28. Does the participant show anxiety, fear, anger or resentment to changing the game?	0	1	2
	The participant responds positively or directly adapts to the change.	After a brief negative response such as a sign of fright, the participant shows a positive or neutral response. He may show some confusion.	The participant shows a negative response to changing the game by expressing anger, sadness or frustration in sound, sign or facial expression, by moving away or pushing away the researcher.
29. Does the participant try to return to the previous game?	0	1	2
	The participant responds positively or directly joins the new game. He does not try to	After a brief reaction of fright, the participant shows a positive or neutral reaction, or a neutral	The participant shows a negative response to changing the game by

	return to the previous game or plays along despite the changes.	reaction with some confusion. The participant attempts once or twice to return to the previous game, but then plays along, despite the changes.	showing anger, sadness or frustration in sound, sign or facial expression, by moving away or pushing away the researcher. The participant does not play along anymore since the game changed.
General Questions: These questions regard the whole assessment, including all of the tasks. Pick the answer that fits the participant's behaviour best during the whole assessment, or the answer that best represents the participants during the assessment.			
30. Does the participant approach the researcher from his own initiative?	0	1	2
	During the assessment, the participant approaches the researcher multiple times. This can be done in sound, sign or facial expression, with a clear interest in social interaction.	During the assessment, the participant approaches the researcher once or a couple of times. This can be done in sound, sign or facial expression, but there is not a clear interest in social interaction.	The participant does not approach the researcher from his own initiative during the assessment.
31. Does the participant show positive emotions towards the researcher?	0	1	2
	The participant generally shows positive emotions during the assessment. The participant also shows positive emotions when in interaction with the researcher.	When the participant is interacting with the researcher, he does not clearly show positive emotions. The participant does show positive emotions when he is having fun during an activity or when engaging with play material he enjoys.	The participant does not show positive emotions predominantly during this assessment. The participant mostly shows neutral or negative emotions.
32. Does the participant show a (social) smile toward the researcher?	0	1	2
	The participant smiles towards the researcher or smiles as a response to the researcher making contact.	The participant smiles, but the smile is not aimed at the researcher or is shown mostly when the participant is not in	The participant does not smile during the assessment.

		contact with the researcher.	
33. Does the participant share attention with the researcher?	0	1	2
*Sharing attention in this question is aimed at the participant purposefully attempting to aim the researcher's attention toward something.	The participant purposefully tries to focus the researcher's attention on something, mostly with the purpose of sharing an interest, showing an object or playing together.	The participant purposefully tries to focus the researcher's attention on something, mostly because the participant needs help, wants to receive an object or needs something done.	The participant does not purposefully try to focus the researcher's attention on something during the assessment.
34. Does the participant show pleasure in interaction?	0	1	2
	The participant generally shows pleasure in interaction or playing together with the researcher.	The participant accepts the interaction with the researcher or attempts at playing together, but does not clearly show pleasure in interaction.	The participant generally shows resistance, frustration or anger as a response to interaction or the researcher's attempts at playing together.
35. Does the participant respond to his name or name sign, when communicated by the researcher?	0	1	2
	As a respond to his name or name sign, the participant shows a change in posture or gaze direction toward the researcher, or the participant responds verbally or in sign to his name.	As a response to his name or name sign, the participant shows a change in posture, motor activity or gaze direction, but this change is not in the direction of the researcher.	The participant shows no reaction to his name or name sign.
36. Does the participant show resistance to physical contact?	0	1	2
	In general, the participant accepts all physical contact.	The participant accepts most physical contact, possibly after a short reaction of fright.	The participant does not accept physical contact. He moves away, pushes away the researcher, shows clear motoric discomfort, shows anger, sadness or frustration

			or freezes completely.
37. Does the participant initiate physical contact?	0	1	2
**Affective physical contact is related to looking for social contact. The participant touches the researcher to play together, share an interest or out of interest for the researcher.* **Functional physical contact is used because the participant needs something, for example to hand something over, open a box, activate one of the toys, etc.*	The participant makes affective physical contact with the researcher. Also give this score when the participant additionally makes functional physical contact.	The participant makes functional physical contact with the researcher, but no affective physical contact.	The participant does not initiate any type of physical contact with the researcher.
38. Does the participant show any remarkable preferences for objects?	0	1	2
	The participant shows no clear preferences for specific materials, shapes, colours or objects. Also give this score if the participant likes acting more with certain objects than with others, but still acts with objects that he does not prefer.	The participant shows a strong preference for specific materials, shapes, colours or objects, and prefers to only act with his preferences. Other objects are only briefly touched and avoided as much as possible.	The participant shows a strong preference for specific materials, shapes, colours or objects. The participant shows a strong negative response towards other objects, by showing anger, sadness, frustration or resistance. This score can also be given when the participant has no preference at all, by not wanting to act with any of the objects.
39. Does the participant show stereotyped behaviour with his own body?	0	1	2
**Stereotyped behaviour with his own body is repetitive, self-stimulatory or self-harming behaviour.* **Intercepting stereotyped behaviour is done by offering another form of stimulation such as touch, calling their name or offering an object. This can be done by the researcher or the familiar caregiver.*	The participant does not show any stereotyped behaviour with his own body, or the participant shows stereotyped behaviour with his body once or multiple times but it stops without	The participant shows stereotyped behaviour with his own body once or multiple times during the assessment. During this behaviour, the participant is still receptive for other stimuli	The participant shows stereotyped behaviour with his own body once or multiple times during the assessment. During this behaviour, the participant is

	intervening within a few seconds.	from his surroundings. The stereotyped behaviour can be intercepted within three attempts.	not receptive for other stimuli from his surroundings. The behaviour cannot be intercepted within three attempts.
40. Does the participant show stereotyped behaviour with objects?	0	1	2
**Stereotyped behaviour with objects is repetitive, non-functional behaviour with objects.* **Intercepting stereotyped behaviour is done by offering another form of stimulation such as touch, calling their name or offering an object. This can be done by the researcher or the familiar caregiver.*	The participant does not show any stereotyped behaviour with objects. Or the participant shows stereotyped behaviour with objects once or twice, but this stops without intervening within a few seconds.	The participant shows stereotyped behaviour with objects once or multiple times during the assessment. During this behaviour, the participant is still receptive for other stimuli from his surroundings. The stereotyped behaviour can be intercepted within three attempts.	The participant shows stereotyped behaviour with objects once or multiple times during the assessment. During this behaviour, the participant is not receptive for other stimuli from his surroundings. The behaviour cannot be intercepted within three attempts.