



BSc in Psychology
Department of Psychology

The Use of Whole Interval Recording as Registration
Method for Independent On-Task Behavior of a
Student with Autism-Spectrum Disorder

June 2020

Name: Hrefna Borg Brynjarsdóttir

ID number: 280897-2649

Foreword

Submitted in partial fulfilment of the requirements of the BSc Psychology degree, Reykjavik University, this thesis is presented in the style of an article for submission to a peer-reviewed journal. This thesis was completed in the spring of 2020 and may therefore have been significantly impacted by the COVID-19 pandemic. The thesis and its findings should be viewed in light of that.

Abstract

Children with autism spectrum disorder sometimes need extra motivation to stay on-task while in school. The purpose of the current study was twofold; (1) to use whole-interval recording as a recording method to document the occurrence of independent on-task behavior of a student with ASD, and (2) to study the effect of using behavior contract with token economy on on-task behaviors in academic setting. Recording of the student's behavior, referred to as Anna, took place in Klettaskóli, a special school for children with intellectual disabilities. The experimenter of the current study attended Anna's classes (mathematics, Icelandic, and English), three times a week to record her behavior with whole interval recording as a recording method, Anna's on-task behavior was objectively and well described. The main results showed that the occurrence of Anna's on-task behavior varied from 40-60% for each subject which indicates that there is room for improvement. The plan was to use behavior contract with token economy to increase Anna's on-task behavior but an intervention was never conducted due to the Covid-19 pandemic.

Keywords: autism-spectrum disorder, on-task behavior, direct assessment, whole interval recording, behavior contract

Útdráttur

Börn sem greind eru með einhverfurófsröskun þurfa að jafnaði á meiri hvatningu að halda til að ná árangri í námi en börn með venjulegan andlegan þroska. Tilgangur þessarar rannsóknar var tvíþættur; (1) að nota heilbilsskráningu (*whole-interval recording*) til þess að skrá niður fjölda tilfella þar sem þátttakandi með einhverfurófsröskun lærði sjálfstætt í kennslustund og hvenær hann lærði ekki, og (2) að rannsaka áhrif þess að nota hegðunarsamning (*behavior contract*) með kumlanámi (*token economy*) á lærdómshegðun í skóla. Skráning gagna fór fram í Klettaskóla, þar sem fylgst var með hegðun nemanda (kölluð Anna). Rannsakandi mætti í kennslustundir Önnu (stærðfræði, íslensku og ensku) þrisvar í viku þar sem hann fylgdist með og skráði hegðun hennar með heilbilaskráningu, hegðun sem átti að mæla var lýst á hlutlægan og nákvæman hátt. Megin niðurstöður sýndu að Anna lærði sjálfstætt 40-60% kennslustundar í hverju fagi sem gefur til kynna að rými gefst fyrir bætingar. Seinni hluti rannsóknarinnar, að nota hegðunarsamning til að auka vinnuhegðun Önnu, var ekki framkvæmd vegna áhrifa frá Covid-19.

Efnisorð: einhverfurófsröskun, virk lærdómshegðun, beint mat, heilbilaskráning, hegðunarsamningur

The Use of Whole Interval Recording as Registration Method for Independent On-Task Behavior of a Student with Autism-Spectrum Disorder

Autism Spectrum Disorder (ASD) is a lifelong mental disorder that impacts a range of developmental factors for those diagnosed (Shattuck et al., 2007). Characteristics of this disorder are mostly salient social impairments (Radley & Labrot, 2015) and maladaptive behaviors (Shattuck et al., 2007). These social impairments may be apparent in children at an early age. Children with ASD often spend less time with peers compared with typically developing children which may in turn lead to impaired development of language, intelligence and other important social skills (Radley & Labrot, 2015). Up to 94% of children with ASD exhibit such problems (Jang et al., 2011). As well as affecting development of social relations, the aforementioned problems may impact and interfere with effective education of children with ASD (Jang et al., 2011). These children may for example, interrupt other students which is incompatible with learning what they are supposed to learn as well as engaging in other disruptive in-class behaviors.

Behavior is described as people's actions, what they do and what they say. A series of actions, like throwing a chair, punching a wall or screaming are identified as behaviors, as well as smiling, laughing and giving hugs (Miltenberger, 2011). Some behaviors are called problem behaviors (Sieh et al., 2010) and are common in children with ASD (Jang et al., 2011). They come in many forms and are not socially acceptable but can be assessed and modified (Sieh et al., 2010)

By creating an effective motivation system, the goal of modifying a behavior can be achieved. In order to do so it is important to understand the target behavior by observing it. A motivation systems can be used to increase students focus in educational setting and

individualized education programs are designed to achieve that goal by meeting the needs of each and every student (Slade et al., 2018).

As rates of children with ASD in education are increasing (Stoner et al., 2005), it is important to identify the socially accepted behaviors that are important for them as students to emit in school settings. In addition, it is important to decrease the likelihood of behaviors that may have negative impact on learning outcome being emitted. To promote an effective behavior modification program for children with ASD, it is important to understand the behavior of the student.

Functional assessment is used to identify the environmental variables that influence the occurrence of behavior. When those variables have been identified, the observer may design appropriate intervention (Ellingson, Miltenberger, & Long, 1999). In other words, by using functional assessment, the efficiency and effectiveness of an intervention can be improved (Horner, 1994). The first step in functional assessment is to accurately and objectively define the target behavior. Defining a behavior involves identifying and describing specific actions or target responses of a behavior, what a person says or does. At the same time it is important to note that the behaviors have different dimensions that can be measured. These are how many times a behavior occurs (frequency), for how long (duration), with how much physical force (intensity) or when it starts occurring (latency) (Kahng et al., 2011).

There are a variety of functional assessment methods, that may be divided in two broad categories; direct and indirect assessment. When using indirect methods of assessment, information about the behavior is gained through an individual associated with the person exhibiting the behavior, for example a teacher or a family member. Indirect methods involve using behavioral interviews, questionnaires and rating scales (Miltenberger, 2011).

Most research in behavior modification relies on direct assessment rather than indirect (Miltenberger, 2011). Direct assessment (Murphy & Goodall, 1980) involves observation of the behavior as it occurs in relevant situations (Mischel, 1972) as well as observing and recording the antecedents and consequences potentially related to the behavior (Ellingson et al., 1999). When using direct assessment method the observer may use different recording methods such as continuous recording (Mudford, Taylor, & Martin, 2009), percentage of opportunities (Grob et al., 2019), momentary time sample recording (Taylor, Skourides, & Alvero, 2012) and interval recording (Miltenberger, 2011).

When using interval recording the observation period is divided into brief and equal time periods or intervals (Green et al., 1982). The most common length of an interval is 10 seconds but longer interval lengths, up to 15 minutes are also used (Kelly, 1977). The observer observes the occurrence or non-occurrence of the behavior and records it for each brief interval (Green et al., 1982). Then, the number of intervals with an occurrence (or non-occurrence) of the behavior, can be used to make an evaluation of the occurrence of the behavior throughout the total observation period. Interval recording is a widely used method and two common types are partial interval recording and whole interval recording (Taylor et al., 2012).

In partial interval recording the target behavior is recorded if it occurs at any point during the interval (Green et al., 1982). Frequency or duration of the behavior does not matter, and same goes for the on- and offset of the behavior, it does not have to be identified (Miltenberger, 2011). This type of recording method does not allow for registration of every occurrence of behavior so it may yield inaccurate estimates. With whole interval recording, the behavior is recorded if it occurs throughout the full length of the interval (Taylor et al., 2012). In addition, great attention

from the observer is required when using whole interval recording (Taylor et al., 2012). Direct measures are often used with individuals with Autism Spectrum Disorder.

In a study by Graham-Day, Gardner III and Hsin (2010), the authors used 10-second whole interval recording to document on-task behaviors in three adolescents with ADHD. The authors used alternating treatment design, comparing Baseline condition with Self-monitoring and Self-monitoring with Reinforcement. On-task behavior was objectively and well described and was shown to be between 46-51% before inserted intervention. The results showed improved on-task behavior with implementation of the two interventions, in all three participants. The on-task behavior increased up to 64-97% (Graham-Day, Gardner III and Hsin, 2010).

For a student in need of motivation in academic setting, behavior contract can be used as intervention. Behavior contract is a written agreement between two parties in which a target behavior is specified as well as consequences reinforcing the occurrence of that behavior. Behavior contract can be implemented with token economy, that is when so called tokens are used to condition each consequence contingent on the target behavior. Then, the tokens are exchanged for backup-reinforcers (Miltenberger, 2008) such as money, toys or an activity (McKenzie, Clark, Wolf, Kothera, & Benson, 1968).

It has been indicated that behavior contracting and token economy is beneficial for students regardless of their age, gender or ability status (Bowman-Perrott, Burke, de Marin, Zhang, & Davis, 2015), therefore it is often used in special needs education (Bowman-Perrott, Burke, de Marin, Zhang, & Davis, 2015). In a study targeting students (6-12 years old), Cantrell et.al. (1969) designed and used behavior contract with token economy to try improving their school performance. Students grades improved in six weeks in three out of six classes (Cantrell et al., 1969).

As mentioned above, for an optimal learning outcome in children with ASD it is important that the child emits on-task behaviors instead of off-task behaviors. However, before effective interventions are implemented objective description of behavior is needed. Therefore, the purpose of the current study was twofold; (1) to use whole-interval recording method to document the occurrence of independent on-task behavior of a student with ASD, and (2) to study the effect of using behavior contract with token economy on on-task behaviors in academic setting.

Method

Participants

One Icelandic female in eighth grade, diagnosed with ASD participated, referred to as Anna. Anna attended a special school called Klettaskóli, for students with intellectual disabilities, mild intellectual disabilities and additional disabilities. She was referred by clinical supervisors (a behavior analysts) in consultation with teachers because of her interruptive and off-task behaviors in class. Another reason for selection of this student for participation was that her on-task behavior was considered to potentially improve with individually tailored intervention. Klettaskóli has continuous observation and registration of participant behavior as a part of their regular curriculum and provided consent for data collection during baseline period (whole interval recording). As intervention was never implemented due to Covid-19, an informed consent signed by parents was not briefed nor obtained.

Setting and Materials

Sessions were conducted in two locations at Klettaskóli, dependent on what class the student attended each time. Recordings were conducted in one classroom for English and another one for Icelandic and mathematics. English class consisted of students with the same English

ability regardless of their age. In Icelandic and mathematics, all students were the same age but had different abilities. The number of students and teachers in these classes varied from day to day.

Each classroom consisted of tables, chairs and a screen on the wall. Participant's table contained writing materials and assignments in all three subjects; English, Icelandic and mathematics. In both classrooms, experimenter's materials were the same; a whole interval recording data sheet, a pen and a stopwatch for measurements. As well as a table and a chair for the researcher, located in the back of both classrooms. Materials for behavior contracting and token economy (see below) were not used due to Covid-19.

Dependent Variables and Registration Method

As mentioned above, data were collected on on-task behavior across three academic subjects; Icelandic, mathematics, and English (described below). Whole interval recording was used to document student's behavior which was either recorded as on-task or off-task for each 10-second interval.

Mathematics and Icelandic. Mathematics and Icelandic classes consisted of independent studying (such as reading, writing, looking at the material etc.). On-task behavior in these classes was defined as the participant sitting in her seat with body facing forward and feet on the floor, eyes directed toward assignments (reading) and writing in response to it. On-task behaviors were also raising a hand for assistance, getting positive feedback, paying attention to and responding to teacher's questions, raising a hand (and getting confirmation) to go to the bathroom as well as ignoring interruptions from other students or replying with „I'm busy“.

English. English class consisted of a learning-video being shown to students on a big screen followed by an assignment on video's content. On-task behavior in English was defined

as participant sitting in her seat with body facing forward and feet on the floor, eyes directed toward screen or assignments (watching/reading) and paying attention to video. On-task behaviors were also defined as responding to teacher's questions on video's content or writing in response to assignments as well as raising a hand for assistance or to go to the bathroom (and getting confirmation). Student had to ignore interruptions from other students or replaying with „I'm busy“ to be on-task.

Procedure

Baseline. The experimenter attended student's class three times a week, on Mondays, Wednesdays and Thursdays each visit lasted for around one hour. Experimenter sat in class and watched Anna's behavior from the back of the class. By using a stopwatch, the experimenter measured her on- and off-task behavior. The stopwatch was set on 15 seconds were experimenter watched the behavior for 10 seconds and had 5 seconds to record it on a whole interval recording data sheet with a pen. The behavior was either recorded as on- or off-task, dependent on student's behavior in class. If the student's behavior wasn't on-task for more than 1-2 consecutive seconds, the experimenter recorded it as off-task. Only when the student studied through-out the 10-second interval (eight seconds or more), it was recorder as on-task. In the baseline period the student had no knowledge of being recorded, this period started January 29th and lasted until 5th of march. In this time period, the student's behavior was recorded without any interference.

Intervention. This phase was never conducted due to covid-19. In the days before shutdown of Klettaskóli, the plan for the intervention phase was to introduce a behavior contract, (a mutual agreement between Anna and the researcher). Anna would get tokens contingent upon on-task behaviors in the three subjects and exchange them for reinforcers at the end of class. The

tokens would have been pictures of famous celebrities. Backup reinforcers were for example access to 15 minutes in iPad or other activities Anna found desirable. The researcher would have continued attending Anna's class three times a week for an hour each time after the implementation of behavior contract as intervention. If behavior contract would have been conducted, the intervention phase would have matched previous descriptions of the researcher sitting in the back of class, recording Anna's behavior for 10-second intervals, either as on-task or off-task dependent on the behavior. The main difference from the two phases of baseline and intervention would have been that Anna had no acknowledge of being recorded in the baseline period whereas she would be aware of participating in a behavior contract and being recorded in the intervention period.

Design. Multiple baseline design would have been used to introduce the contract and add on one behavior at a time in each subject. As the intervention phase was never conducted due to the external circumstances, data were not obtained for the intervention phase.

Inter-observer agreement. Inter-observer agreement (IOA) was not collected due to Covid-19. The plan was to conduct IOA for 20-30% of the session with trained master's students as independent observers. Training of observers was conducted before the pandemic. The plan was to score the sessions interval by interval for agreement or disagreement. Then comparison and calculation to determine the percentage of agreement would have been conducted for each session.

Results

The results were presented in percentage by dividing the number of intervals were behavior was on-task, by the total number of intervals. By recording the on-task behavior,

information about off-task behavior was achieved as well. Anna's in-class behavior varied between subjects for various reasons.

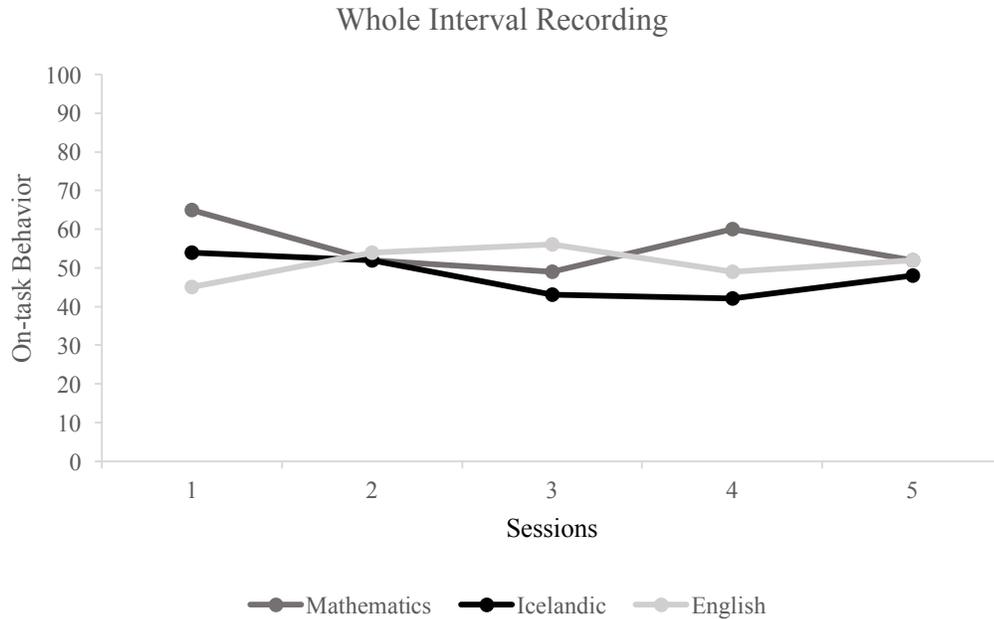


Figure 1. On-task behavior recorded across three subjects with whole interval recording.

As presented in Figure 1, Anna's behavior was recorded 15 times over a month period of time; five times for each class in three classes (mathematics, Icelandic and English). Figure 1 shows that on-task behavior went from a mean of 56% in mathematics down to 51% in English and finally 48% in Icelandic. In mathematics and Icelandic, Anna's on-task behavior decreased from the first recording to the last. The exact opposite happened in English where her on-task behavior increased towards the last recording. Her overall on-task behavior had the mean of 51% which indicates that she studied on the average for about half of each class. This also indicates that her in-class behavior was off-task for approximately half of each class on average.

In the first session conducted in mathematics, Anna's behavior was on-task for 65%. Second time recording her behavior in mathematics, her on-task behavior decreased down to 53% from the first recording. It decreased again down to 49% in the third recording session before increasing again, to 60% in the fourth recording session. The fifth and last recording in mathematics resulted in Anna's on-task behavior being 52% or about half the class period. Mathematics recordings of Anna's on-task behavior had the mean of 56%. In Icelandic class, the first recording of Anna's behavior resulted in 54% of the time. Her on-task behavior never went above that percentage but in the second recording it went down to 52% and down to 43% in the third recording. Then for the fourth recording conducted in Icelandic class her on-task behavior went down to 42% before increasing to 48% in the last recording. The mean of her on-task behavior in Icelandic class was 48%. In English class, Anna's on-task behavior covered 45% of the time for the first recording. In the second recording her on-task behavior went up to 54% and then 56% for the third one. Then for the fourth recording it decreased again to 49%. In the last recording her on-task behavior was 52%. On-task behavior in English had the mean of 51%.

As the intervention phase was not conducted due to the external circumstances (Covid-19 pandemic), data were not obtained for the intervention phase.

Discussion

The purpose of the current study was twofold, (1) to use whole-interval recording method to document the occurrence of independent on-task behavior of a student with ASD, and (2) to study the effect of using behavior contract with token economy on on-task behaviors in academic setting. Due to the Covid-19 pandemic this thesis was significantly impacted in various ways and therefore, effects of behavior contract on on-task behavior (in academic setting) was not studied. Whole-interval recording method on the other hand was used to document Anna's in-class

behavior because data was obtained before the pandemic. The main results showed that the occurrence of Anna's on-task behavior varied from 40-60% for each subject. This shows that she studied for about half of each class and when the occurrence of her on-task behavior was 40% it meant that her off-task behavior was 60%. These results indicated that there would be room for an improvement of Anna's in-class behavior.

The length of Anna's on-task behavior varied between sessions and classes for various reasons. In mathematics, she was on-task for longer than in the other two subjects which might have been because of greater interest and mastery of the subject or the fact that she got more assistance from teachers. It may have also led to timing of the class; mathematics class was often in the beginning of the day whereas English and Icelandic classes started later the same day. In Icelandic her off-task behavior percentage was the lowest out of the three subjects. That may be due to number of students in class for each period which varied from day to day and between subjects. It could also be caused by the fact that her teacher gave her less assistance in Icelandic class which resulted in her studying less. In English class her on-task behavior percentage was lower than in mathematics but higher than in Icelandic. Teacher's learning strategies and methods differed a lot from the other two subjects and were more structured in a way, which may have led to a higher on-task behavior percentage. But in turn there were more students in English class which may have led to less concentration and poorer on-task behavior.

There were number of other variables that may have affected her in-class behavior, for example that her mood differed as well as the number of students attending. Some days she was interested or motivated to do a good job which resulted in her on-task behavior being high, whilst other days her on-task behavior was low, affected by her being in a bad mood. Anna was more in-task when there were fewer students in class, most likely because of less interruption

from others. In addition, some days she received full attention from a teacher throughout a whole class lesson resulting in higher on-task behavior than when she studied independently. Her on-task behavior was more frequent in the beginning of each class and then it decreased towards the end of the class.

In a school for children with developmental disability, it was challenging to avoid interruption from other students in Anna's class. Anna often got distracted by students in class as well as the researcher being interrupted by them. Commonly, Anna also interrupted other students, the teacher or the experimenter. The experiment process was also slowed down for various reasons, the experimenter attended Anna's class a few times to record when there was no class or the participant was absent. The reasons for this were for example class trip to a theatre, parent-teacher interviews or Halloween. In other cases, the participant was sick or at the doctor's.

Anna's main challenging behavior was interrupting people in class (students or educational personnel) as well as replying to interruption from others as she was easily distracted by noises both outside of the classroom and within. Anna was described as being "street-smart" meaning that she often disobeyed instructions from teachers which was particularly apparent in the presence of new teachers or interns. She often forgot to ask for permission before standing up from her seat or leaving the classroom. Her on-task behavior was highest in the presence of a particular teacher, but decreased as soon as that teacher was out of sight.

In the current study, direct assessment methods were preferred to assess Anna's behavior over indirect methods, providing a valid assessment of her behavior as well as being considered more appropriate (Radley & Labrot, 2015). One reason for that is that in various indirect methods, respondents could be aware of the intent of the study or even self-conscious which

could affect the results (Campbell, 1950). Another shortcoming for indirect methods is that the respondent may not be trained to observe a problem behavior which could lead to important information to be forgotten. And even if the person is trained, the information depends on memory which could lead to incomplete information about the problem behavior, this risk does not concern direct assessment methods (Miltenberger, 2012). The fact that in indirect methods, the behavior is not observed directly, reliability and validity may also suffer (Kahng et al., 2011). Direct methods are therefore recommended (Miltenberger, 2012) and previous studies have indicated that direct assessment methods provide better validity data compared to indirect methods (Mischel, 1972).

Results of the current study were comparable to what others had identified, Graham-Day, Gardner III and Hsin (2010) used whole interval recording to document the on-task behavior of students with ADHD. On-task behavior of these students was 46-51% before any intervention was inserted which is similar to student's on-task behavior of the current study. Graham-Day et.al. used alternating treatment design comparing three conditions, two interventions were inserted for the students which increased their on-task behavior up to 64-97% (Graham-Day, Gardner III & Hsin, 2010). This implies that with the right intervention there could be great potentials of increasing Anna's on-task behavior above 60%.

The main limitation of the current study was that intervention was never implemented (in continuation of the whole interval recording). As mentioned, the plan was to use behavior contract and pictures of Anna's favorite celebrities as tokens. Cantrell et.al. (1969) used behavior contract with token economy to improve school performance in students (6-12 years old) and their grades improved with the inserted contract (Cantrell et al., 1969). These results support the idea that if behavior contract would have been used with token economy to modify Anna's on-

task behavior, it would have possibly increased. Behavior contract has been shown to be effective in modifying behavior in special education (Bowman-Perrott, Burke, de Marin, Zhang, & Davis, 2015) but instead of using alternating treatment design like Graham-Day et.al. (2010), multiple baseline design would have been an ideal design for the current study to achieve experimental control. The behavior contract would have been added to each subject, one at a time to see the effects on Anna's behavior in class.

Another limitation of the current study was that there was no Inter-observer agreement (IOA), external circumstance permitted IOA from being taken. The plan was to obtain IOA for the baseline period (whole interval recordings) and intervention period (behavior contract, not conducted). Training is necessary to achieve inter-observer agreement (Green et al., 1982) and for the current study, a master's student had been trained to take data, the description of Anna's on-task behavior was thorough and exact in order to achieve affective measurements. When the researcher along with the master's student attended Anna's class to obtain IOA, Anna was absent and the reason for no following IOA measurements was The Covid-19 pandemic. This is an important issue to account for in future data collection for judging the quality of data obtained and compare within-method accuracies.

An informed consent was designed for Anna's parents to give permission for her participation in this study, but was never obtained due to Covid-19 and the lack of intervention. If the behavior contract would have been conducted, the informed consent would have been needed. The consent would have contained descriptions of the study's aims and background along with possible discomfort and the right to withdraw from the study at any time. According to Klettaskóli, a part of the school's curriculum is observing behavior and as the participant was made anonymous, a consent from Klettaskóli was obtained for the writing of baseline data.

Whole interval recording provided the researcher with information about Anna's on-task behavior but a limitation to this method was that it possibly underestimated the duration of her behavior. For a few seconds of each 10-second interval that Anna's behavior was recorded as off-task, she was potentially on-task in some cases. But because these intervals consisted of off-task behavior she didn't get credit for the behavior that was actually on-task. With whole interval recording, Anna's off-task behavior was not documented which could have possibly provided valuable information. Partial interval recording could have been used along with the whole interval method, to achieve this information which might have given a better picture of Anna's in-class behavior overall. However, partial interval recording can be inaccurate (Radley and Labrot, 2015).

It would be ideal for a teacher to go further with the assessment on their own but little is known about teachers' ability to complete structured assessment accurately, without any assistance (Ellingson et al. 2000a). The ultimate goal for Anna's behavior in class would be creating an intervention to increase her on-task behavior and as for her teachers in Klettaskóli, there is interest of continuing this journey by adding behavior contract.

References

- Bowman-Perrot, L., Burke, M. D., Marin, S., Zhang, N., & Davis, H. (2014). A Meta-Analysis of Single-Case Research on Behavior Contracts: Effects on Behavioral and Academic Outcomes Among Children and Youth. *Behavior Modification, 39*(2), 247–269. doi:10.1177/0145445514551383
- Campbell, D. T. (1950). The indirect assessment of social attitudes. *Psychological Bulletin, 47*(1), 15–38. doi:10.1037/h0054114
- Cantrell, R. P., Cantrell, M. L., Huddleston, C. M., & Wooldridge, R. L. (1969). Contingency Contracting with School Problems. *Journal of Applied Behavior Analysis, 2*(3), 215–220. doi:10.1901/jaba.1969.2-215
- Ellingson, S. A., Miltenberger, R. G., & Long, E. S. (1999). A Survey of the Use of Functional Assessment Procedures in Agencies Serving Individuals with Developmental Disabilities. *Behavioral Interventions, 14*(4), 187–98. doi:10.1002/(SICI)1099-078X(199910/12)14:4<187::AID-BIN38>3.0.CO;2-A
- Graham-Day, K. J., Gardner, R. III., & Hsin, J. (2010). Increasing On-Task Behaviors of High School Students with Attention Deficit Hyperactivity Disorder: Is It Enough? *Education and Treatment of Children, 33*(2), 205–221. Retrieved from <https://www.jstor.org/stable/42900063?seq=1>
- Green, S. B., McCoy, J. F., Burns, K. P., & Smith, A., C. (1982). Accuracy of Observational Data with Whole Interval, Partial Interval, and Momentary Time-Sampling Recording Techniques. *Journal of Behavioral Assessment, 4*(2), 103–18. doi:10.1007/BF01321385

- Grob, C. M., Lerman, D. C., Langlinais, C. A., & Villante., N. K. (2019). Assessing and Teaching Job-Related Social Skills to Adults with Autism Spectrum Disorder. *Journal of Applied Behavior Analysis, 52(1)*, 150–72. doi:10.1002/jaba.503
- Horner, R. H. (1994). Functional Assessment: Contributions and Future Directions. *Journal of Applied Behavior Analysis, 27(2)*, 401–4. doi:10.1901/jaba.1994.27-401
- Jang, J., Dixon, D. R., Tarbox, J., & Granpeesheh, D. (2011). Symptom Severity and Challenging Behavior in Children with ASD. *Research in Autism Spectrum Disorders, 5(3)*, 1028–32. doi:10.1016/j.rasd.2010.11.008
- Kahng, S., Ingvarsson, E. T., Quigg, A. M., Seckinger, K. E. & Teichman, H. M. (2011). Defining and Measuring Behavior. In Fisher, W. W., Piazza, C. C., & Roane, H. S. (Eds.), *Handbook of Applied Behavior Analysis* (pp. 113–131). New York, United States: The Guilford Press.
- Kelly, M. B. (1977). A Review of the Observational Data-Collection and Reliability Procedures Reported in the Journal of Applied Behavior Analysis. *Journal of Applied Behavior Analysis, 10(1)*, 97–101. doi:10.1901/jaba.1977.10-97
- McKenzie, H. S., Clark, M., Wolf, M. M., Kothera, R., & Benson, C. (1968). Behavior Modification of Children with Learning Disabilities Using Grades as Tokens and Allowances as Back up Reinforcers. *Behavior Modification, 34(10)*, 745–752. doi:10.1177/001440296803401005

- Miltenberger, R. G. (2008). Behavior Modification. In Hersen, M., & Gross, A.M. (Eds.), *Handbook of clinical psychology, volume 2: Children and adolescents* (pp. 626–52). New Jersey, United States: John Wiley & Sons Inc.
- Miltenberger, R. G. (2011). Understanding problem behaviors through functional assessment. In Matray, T., Hovanessian, P., DeNola, S., & Moody, L. (Eds.), *Behavior Modification: Principles and Procedures* (pp. 237–265). California, United States: Cengage Learning.
- Mischel, W. (1972). Direct versus Indirect Personality Assessment: Evidence and Implications. *Journal of Consulting and Clinical Psychology, 38*(3), 319–324. doi:10.1037/h0032896
- Mudford, O. C., Taylor, S. A., & Neil T. Martin. (2009). Continuous Recording and Interobserver Agreement Algorithms Reported in the Journal of Applied Behavior Analysis (1995–2005). *Journal of Applied Behavior Analysis, 42*(1), 165–69. doi:10.1901/jaba.2009.42-165
- Murphy, G., & Goodall, E. (1980). Measurement Error in Direct Observations: A Comparison of Common Recording Methods. *Behaviour Research and Therapy, 18*(2), 147–50. doi:10.1016/0005-7967(80)90109-6
- Radley, K. C., O'Handley, R. D., & Labrot, Z. C. (2015). A Comparison of Momentary Time Sampling and Partial-Interval Recording for Assessment of Effects of Social Skills Training. *Psychology in the Schools, 52*(4), 363–78. doi:10.1002/pits.21829
- Shattuck, P. T., Seltzer, M. M., Greenberg, J. S., Orsmond, G. I., Bolt, D., Kring, S., Lounds, J., & Lord, C. (2007). Change in Autism Symptoms and Maladaptive Behaviors in

- Adolescents and Adults with an Autism Spectrum Disorder. *Journal of Autism and Developmental Disorders*, 37(9), 1735–47. doi:10.1007/s10803-006-0307-7
- Sieh, D. S., Meijer, A. M., Oort, F. J., Visser-Meily, J. M. A., & Van der Leij, D. A. V. (2010). Problem Behavior in Children of Chronically Ill Parents: A Meta-Analysis. *Clinical Child and Family Psychology Review*, 13(4), 384–97. doi:10.1007/s10567-010-0074-z
- Slade, N., Eisenhower, A., Carter, A. S., & Blacher, J. (2018). Satisfaction With Individualized Education Programs Among Parents of Young Children With ASD. *Exceptional Children*, 84(3), 242–60. doi:10.1177/0014402917742923
- Stoner, J. B., Bock, S. J, Thompson, J. R., Angell, M.E., Heyl, B. S., & Crowley, E. P. (2005). Welcome to Our World: Parent Perceptions of Interactions Between Parents of Young Children With ASD and Education Professionals. *Focus on Autism and Other Developmental Disabilities*, 20(1), 39–51. doi:10.1177/10883576050200010401
- Taylor, M. A., Skourides, A., & Alvero, A. M. (2012). Observer Error When Measuring Safety-Related Behavior: Momentary Time Sampling Versus Whole-Interval Recording. *Journal of Organizational Behavior Management*, 32(4), 307–19. doi:10.1080/01608061.2012.729389