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USING SOCIAL STORIES™ WITH ILLUSTRATIVE VIDEOS TO TEACH EMOTION  
RECOGNITION TO A CHILD WITH ASPERGER'S SYNDROME

Bachelor's thesis

Running head: Social Stories™ and emotion recognition

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### **Abstract**

Individuals with Asperger's Syndrome have difficulties in recognizing emotions in themselves and others. Deficit in empathy may be compensated by their good systemizing skills and verbal mediation in the emotion recognition process. Hence, the aim of the present study was to teach emotion recognition to a primary school child with Asperger's Syndrome, using Social Stories™ and complementary illustrative videos. Three emotions were chosen to be taught: joy, sadness and anger. Nine Social Stories™ in which the expressions of the abovementioned emotions were described were written as study materials. Important cues in the texts were highlighted with color. Complementary scenes were videotaped with the child's peers acting out similar social situations as described in the Social Stories™. A multiple baseline experimental design across sets of stories and videos was used to display experimental control. Reinforcement was used. The child was assessed on the naming the highlighted cues after watching the videos. This method proved effective and interesting for the child.

## Kokkuvõte

Aspergeri sündroomiga isikutel esineb raskusi nii isenda kui teiste emotsioonide äratundmisel. Selle puudujäägi kompenseerimiseks on emotsioonide äratundmise protsessis võimalik rakendada nende süstematiseerimisoskusi ning sõnalist vahendatust. Eelnevat arvesse võttes oli käesoleva uurimuse eesmärk õpetada põhikoolialisele Aspergeri sündroomiga lapsele emotsioonide äratundmist Suhtluslugude™ ja illustreerivate videote abil. Õpetamiseks valiti kolm emotsiooni: rõõm, kurbus ja viha. Õppematerjalideks valmistati üheksa Suhtluslugu™, milles kirjeldati eelmainitud emotsioonide väljendust. Tekstis toodi olulised märksõnad värviliselt esile. Lugudele täienduseks filmiti illustreerivad videostseenid, milles lapse eakaaslased näitlesid Suhtluslugude™ sarnaseid sotsiaalseid olukordi. Uurimuses kasutati mitmese baastasemega eksperimendikava, tõestamaks sekkumise mõju. Lapse motiveerimiseks kasutati kinnituseks verbaalset kiitust ja videomänge. Õpetamise efektiivsust hinnati märksõnade nimetamise põhjal peale videote vaatamist. Käesolev meetod osutus tõhusaks ning lapsele huvipakkuvaks.

## Introduction

Asperger's syndrome (henceforth AS) is an autism spectrum condition characterized by deficits in social and communicative functioning and restrictive and repetitive behavior (American Psychiatric Association, 2005). A difficulty in understanding others' minds is apparent, an aspect of which involves recognizing emotional expressions (Losh & Capps, 2006).

One of five diagnostic criteria for AS according to Diagnostic and Statistical Manual of Mental Disorders, 4<sup>th</sup> Edition (DSM-IV) is stated subsequently:

A qualitative impairment in social interaction, as manifested by at least two of the following: (a) marked impairment in the use of multiple non-verbal behaviors such as eye-to-eye gaze, facial expression, body postures, and gestures to regulate social interaction, (b) failure to develop peer relationships appropriate to developmental level, (c) a lack of spontaneous seeking to share enjoyment, interests, or achievements with other people, e.g. by a lack of showing, bringing, or pointing out objects of interest to other people, and (d) lack of social or emotional reciprocity. (American Psychiatric Association, 2005, p. 77)

According to Golan & Baron-Cohen (2008), the study of autism spectrum conditions (ASC) has seen a shift in focus from describing and explaining the deficits alone to investigating strengths as well as difficulties.

The deficit in empathy in ASC is well established. Empathizing is defined as the ability to identify emotions and mental states in others and to respond to them with an appropriate emotion. Thus it provides a way of making sense and predicting another person's behavior (Golan & Baron-Cohen, 2008).

Systemizing is considered to be one of the strengths of individuals with AS. In order to extract and understand the underlying rules and regularities that govern a system, a systemizer seeks to analyze the system down to its lowest level of detail. Systemizing also involves constructing new rule-based systems and provides a way of understanding and predicting non-agents' behavior (Golan & Baron-Cohen, 2008).

From the perspective of treatment, the good systemizing skills that individuals with ASC possess may provide a route to compensate for the empathizing difficulties. However, these two domains are quite distinct: whereas systemizing is exact, rule-based and predictable, people's actions are open "systems". There is always some uncertainty or factors we cannot control. Empathizing is less precise and more flexible than systemizing and can thus cope with such open systems. If empathizing principles were taught systematically, systemizing strengths could be harnessed more easily in order to help individuals with ASC learn aspects of empathizing (Golan & Baron-Cohen, 2008).

### **Emotion recognition in ASC**

An aspect of empathizing is emotion recognition, which is considered to be a core difficulty for individuals with ASC, along with mental state recognition (Golan & Baron-Cohen, 2008). Such difficulties have been identified through cognitive, behavioral and neuroimaging studies (e.g. Mazefsky & Oswald, 2007; Silan & Bird, 2008). As most of our interactions with the environment and our emotive conduct depend on our capacity to perceive and understand the emotions of others (Rizzolatti & Sinigaglia, 2006), the typical and atypical development of emotion recognition is worth investigating.

Infants and young children understand and distinguish between only a few basic emotions. As experience is gained in different situations, children gradually learn to discriminate shades within a single emotion. These distinctions are stored cognitively in hierarchies of basic emotions and their derivatives. Through experience, a mental representation of different emotions is constructed (Reeve, 2009). It is suggested that these representations in children with ASC diverge from nonclinical populations. Despite their ability to set simple emotions in appropriate contexts, autistic children's script-like emotional accounts may lack reference even to the causes of their emotions. Thus, the depth of understanding of all types of emotional experiences is left in question (Capps & Losh, 2006).

Much of the diversity of emotional experience comes from learning fine distinctions among emotions and their antecedents. It is suggested that there exists a set of human facial expressions that are universally recognizable and innate (Darwin, 1999). These facial

expressions include those of sadness, fear, joy, anger, disgust, and surprise. The question of whether emotions are universal or differ across culture is debated. Emotions may be understood as being entangled within a system of beliefs and values, so that an emotion can hardly be said to exist independent of the culture of which it is a part. Thus, the interpretation of emotional accounts is clearly related to thinking (Brewer & Hewstone, 2004).

It is noted that children with ASC use different strategies for interpreting emotional experiences. Individuals with ASC appear to be less apt to organize accounts of emotions in causal-explanatory frameworks, while being able to discuss them in context. Also, individuals with ASC tend to describe visually salient elements that are seldom noticed among peers. Findings suggest that children with autism possess less coherent representations of emotional experiences and use alternative interpretive strategies (Capps & Losh, 2006).

### **Emotion recognition in faces**

The ability to decode emotion from facial expressions is considered to be associated with higher social competence. Facial expressions are one of the primary signals used to understand the feelings and intentions of others, making emotional states transparent in a way that mental states are not (Lindner & Rosen, 2006).

Some studies reveal emotion recognition deficits among children and adults with ASC, compared to nonclinical or clinical control groups (e.g. Silan & Bird, 2008). Other studies however have found no difference in the ability of children and adults with ASC to recognize basic emotions from pictures, voices or films of facial expressions (e.g. Mazefsky & Oswald, 2006). These inconclusive findings may be explained by developmental and methodological factors. Therefore, it is possible, that individuals with autism spectrum conditions, despite their developmental delay, learn to recognize basic emotions, or to compensate for their face-processing deficits using alternate strategies (Golan & Baron-Cohen, 2008).

Research findings support the idea that there are qualitative differences from nonclinical populations in how children with AS process facial expressions. Study results suggest that during identity and emotion discrimination, individuals with AS do not utilize right hemisphere face

processing mechanisms to the same extent as controls (Ashwin, Wheelwright & Baron-Cohen, 2005).

Notably, it is suggested that children with AS appear to have more difficulties decoding emotions from static facial expression, dynamic facial expression, and tone of voice when compared to typically developing peers, while in relation to decoding verbal content or combined modalities, no differences are evident. Compensatory strategies seem to be utilized by individuals with AS, primarily in verbal mediation (Lindner & Rosen, 2006). This may mask social-affective deficits under simple circumstances, e.g. simple recognition of facial expressions. However, these compensatory strategies may not be sufficient under special circumstances involving verbal biasing conditions or in complex social exchanges in everyday life (Grossman, Klin, Carter & Volkmar, 2000). Children with AS may be overly relying on verbal cues, which shifts attention from processing other emotional cues and may affect their accuracy in understanding emotion in social interaction (Lindner & Rosen, 2006).

Moreover, verbal intelligence has been found to be a significant predictor in decoding facial expression of emotions and in understanding emotions through multiple modalities of expression such as verbal content and prosody, as well as facial expression. Findings suggest that individuals with AS have the ability to distinguish facially expressed emotions but do not recognize the cues to use those abilities, which may contribute to deficits in understanding emotion. Thus, it may be more productive to convey emotional information verbally or in written form in order for the child to more clearly understand the social situation (Lindner & Rosen, 2006).

Research on the language structure of the emotional memories of children with ASC casts new light on questions concerning the understanding of emotionally evocative situations. While narrative appears to be a favored mechanism used by peers, children with ASC may be more apt to report observable behavioral elements. This might help identify the differences in interpretive strategies employed by individuals with autism. Authors indicate the value of language practices as a window into psychological functioning in typical and atypical development. A focus on internal experiences of emotion could be of value in helping to advance the emotion perception strategies of individuals with ASC (Capps & Losh, 2006).

## Teaching emotion recognition in ASC

The skills of emotion and mental state recognition are intuitive and automatic for most people. However, individuals with ASC have to be taught these skills, in order to fill this gap (Baron-Cohen, 2008). Given the centrality of emotion recognition, there have been different attempts to teach children and adults with ASC on recognition of emotions and mental states. Role modeling by facilitators, and feedback on children's videotaped role playing have been used (e.g. Bernad-Ripoll, 2007; Nikopoulosy & Keenan, 2003; Golan & Baron-Cohen, 2008).

According to Denning (2007), seven components are common in successful social interventions for students with ASC: (a) the focus on teaching specific skills, such as recognizing emotions; (b) modeling skills demonstrated by the interventionist, using scripts; (c) the skills are practiced after observing the demonstration; (d) positive reinforcement is used, such as praise or food; (e) parents are involved in the intervention so that the student could continue to practice the skills at home; (f) peers are involved as the intervention agents or in the practice and play sessions; and (g) written information and pictures are included to create an accessible and concrete format.

### Video modeling

Attempts to teach individuals with ASC have increasingly become computer-based due to several unique advantages: individuals with ASC favor the computerized environment, since it is rule-based, predictable and consistent. Here, the advanced systemizing skills of the individuals with ASC can be employed. Social demands, which individuals with ASC typically find stressful, are reduced to minimum. Information can be presented as multimodal inputs, characterizing real-life social situations. Computer users are provided the opportunity to work in their own pace and level of understanding with immediate feedback. Lessons can be repeated, until mastery is achieved (Golan & Baron-Cohen, 2008).

Video modeling is a behavioral technique that uses videotapes rather than live scenarios for the child to observe, thus focusing the attention on the stimulus tape (McCoy & Hermansen, 2007). With *in vivo* modeling, the child with ASC may shift focus from relevant cues such as the target behavior to a miscellaneous cue, for example the model's clothes. In video modeling



however, the child's stimulus overselectivity is compensated by the opportunity to zoom in closely on the relevant cues to learn the behaviors. By doing so, the camera allows the child to follow the model's relevant actions. Therefore the child is guided to "overselect" relevant cues to learn the behaviors (Charlop-Christy & Freeman, 2000).

### **Social Stories™**

Since the early 1990s, Social Stories™ have been suggested to positively affect the social development of children with ASC (Karkhaneh et al., 2010). A Social Story™ (SS) describes a situation, skill or a concept in terms of relevant social cues, perspectives and common responses in a specifically designed style and format (Gray, 2003). SS can be used to increase appropriate behaviors and decrease inappropriate behaviors. The advantage of Social Stories seems to be their ability to address social understanding and to provide behavioral solutions to the student in a concrete and portable form (Denning, 2007).

Social Stories™ attempt to accurately describe the situation in which a behavior occurred, describe the perspective of those involved, and provide guidelines for what should be done in similar future occasions. Also, the reader is provided with the perspective of other persons' thoughts and emotions in a social situation (Gray, 2003).

Distinct guidelines have been set in order to separate SS from similar works of educational literature. These include the use of six different sentence types (descriptive, perspective, cooperative, directive, affirmative, and control sentences) and a formula, stating there should be twice as many descriptive sentences as directive or control sentences combined (Gray, 2003). Illustrations are also discussed in the guidelines, including the use of drawings, photographs, objects, and children's illustrations (Gray, 2003).

It is generally believed that children with ASC learn best when information is presented to them visually (Golan & Baron-Cohen, 2008). Hence the choice of materials used in the current study. SS are static visual stimuli that describe a social situation and provide direction. Videos are also visually based, although more transiently than Social Stories™. Videotaped segments have the advantage over static stimuli of enabling the child to see peers or themselves

engaging in behaviors in context, including the environment, antecedents and consequences (Bernard-Ripoll, 2007).

In the current study, peer video modeling strategy was used, providing illustration to the social situations described in the SS. However, the child was not instructed to replicate the actions depicted on the videos. This differs from typical video modeling. Relevant cues referring to certain emotional states in the SS were highlighted in order to provide static visual stimulus, which has been determined to be a strength for individuals with Asperger's Syndrome. As previous research has matched SS with videos only with self-as-model videos while not focusing on teaching important cues, the current study aims to investigate the effectiveness of this method with peer models, which may be more complicated to individuals with Asperger's Syndrome.

### **Applied behavior analysis**

Applied Behavior Analysis (ABA) represents an array of systematic autism-specific special education programs, based on empirically derived principles of behavior. Such interventions focus on improving socially meaningful behaviors that are demonstrated as the result of the intervention. Consistent finding from several decades of treatment research for children with autism is that the intervention of choice is ABA. (Steege, Mace, Perry & Longenecker, 2007).

According to Steege et al. (2007), ABA methods are used to support individuals with ASC and related developmental disabilities in at least five aspects: (a) teaching new skills via systematic instruction and reinforcement, (b) reinforcing and maintaining previously acquired skills, (c) generalizing the learned behavior from one situation to another, (d) restricting or narrowing conditions under which interfering behaviors occur, e.g. modifying the learning environment, (e) reducing interfering behaviors by discontinuing their reinforcement and reinforcing replacement behaviors. These methods are comprised of two major components: assessment of behavior in the educational context and intervention based upon the assessment in order to achieve the desired behavior.

Typically, no control groups and statistical techniques are used in ABA while employing the behavior modification research designs. Two major sets of criteria are taken under

consideration while evaluating the effect of a particular treatment: scientific and practical. The guidelines of scientific criteria are used to evaluate whether the effect on the dependent variable is convincingly demonstrated as a reliable result of the intervention. Commonly, this judgment is made by visual inspection of the graph of the results. The evaluation of the practical impact of the treatment, in another words judgment about the applied importance of behavioral change, is referred to as judgment of social validity. The generalization of positive results of the treatment into natural settings is indicated by the satisfaction of the people responsible for caring for the child (Martin & Pear, 1996).

While employing the intervention, a schedule of reinforcement is set in order to specify which occurrences of a given behavior will be reinforced. Among several basic schedules, ratio schedules are applied to increase and maintain rates of specific responses that can easily be counted, e.g. solving mathematical problems correctly. Ratio schedules are used in order to generate a high rate of response, given that each response can be monitored. Initially, the frequency of reinforcement should be high enough to maintain the desired behavior and its gradual decrease should lead to the maintenance of the final desired amount of behavior per reinforcement (Martin & Pear, 1996).

In the current study, emotion recognition was selected as the empathy component to be systematically presented to a child with AS, using Social Stories™ with highlighted referential cues and illustrative videos. Multiple baseline design was used in order to demonstrate the effect of the intervention. The aim of the study was to teach a child with AS emotion recognition in people's faces, behavior and verbalizations via Social Stories™ with written cues referring to specific emotions provided with audiovisual illustration, and thus enhance social competence.

In the choice of emotions taught, two aspects were taken under consideration: the existence of clearly distinguishable facial expressions and social importance of the emotion. As at the social level of analysis, attention is best directed to particular emotions rather than a broad category of emotion in general (Brewer & Hewstone, 2004), three emotions were chosen: joy, anger and sadness as the subjects of teaching. According to Vainik (2001), these emotions along with *love* are the four most prototypical emotions of Estonians, referring to their relevance in the cultural context.

## Method

### *Participant and setting*

The participant was a 12-year old boy Martin (name changed) diagnosed with Asperger's Syndrome. He was enrolled in a public school, where appropriate education is given to students with health problems or pervasive developmental disorders. Martin took keen interest in playing with Legos. He also enthusiastically participated in carpentry and music classes. Although his intelligence score was unassessed, it is known he successfully learned by the State Curriculum of Primary School and Gymnasium, indicating average or above average intelligence. Martin had developed good functional reading skills, which was a criterion for participation, as Social Stories™ as written texts were used.

The intervention was conducted in Martin's school by the school psychologist. All the teaching and control sessions took place in the psychologist's office, which was a familiar environment for the child. Martin had previously been assigned to visit the psychologist once every week. During these appointments he was taught social skills such as conflict solving via discussion. Therefore, a student-teacher relationship between the conductor of the intervention and the child had been established beforehand. As the conductor, the psychologist was present in all of the teaching and control sessions. The author of this paper was present in the control sessions, marking the results.

### *Materials*

The following materials were used:

- 1) Nine Social Stories™ describing three emotions: joy, sadness and anger
- 2) Nine videos, with the average length of approximately 30 seconds
- 3) A computer used for displaying the videotapes and playing video games as reinforcers
- 4) A video camera for taping the nine illustrative video segments
- 5) Six colored cards with names of emotions: *joy, sadness, anger, surprise, disgust* and *neutral*
- 6) Test kit for assessment of the Theory-of-Mind

- 7) Two video games, “Helicopter” and “RPM Tuning”, as reinforcers
- 8) Precise description of the course of each session for the psychologist
- 9) A table with random video displaying sequences for baseline and control sessions

### ***Social Stories™ production***

Nine Social Stories™ were written by the author of this paper (see appendix 1), following the guidelines of Carol Gray (2003). The subject of each story was a social situation with one of the characters experiencing and expressing an emotion. The situation and behavior of the characters was described in a child-directed manner. The stories consisted of 10–24 sentences. Social situations were described focusing on the characters experiencing one of three emotions: joy, sadness or anger in different situations. Thus, three sets of stories with three sets of characters were created, each set with the three abovementioned emotions.

Important cues referring to a specific emotion were highlighted with color in each SS. The colors of the highlights were chosen by prototypicality: blue for sadness, yellow for joy and red for anger. In the first set, each SS contained three cue words or phrases. The SS in the second set each contained four highlighted cues – two from set one and two new ones in each story. In the third set of SS there were five cue phrases – two new ones and three from both previous sets.

The highlighted cue words or phrases were of several types: adjectives, verbs, descriptions of behavior or appearance and direct speech that may be said in a state of affect. The choice of the important cues referring to emotions was based on Darwin’s (1999) descriptions of emotional expressions and also by visual observance of the videos in set three.

There were two characters in each story. Each story began with introductory sentences, naming the characters and antecedents of a certain emotion, e.g.: “*Sometimes Jaanus’s friend changes his mind. This makes Jaanus angry.*” Six stories described the interaction between two children and three stories focused on a child and her mother. Each story contained direct speech, providing the reader with an example of verbal expressions that may be said when someone experiences a certain emotion. The stories also provided information on the appearance,

behavior, physical sensations e.g. heart beating and the tone of voice of the characters. The social situation described in each story ended with possible favorable responses and courses of action that may be taken. Acceptable prosocial behavior is offered in the final sentences on how to act in similar situations for both the person who experiences the emotion and their companion.

### ***Video production***

Videos illustrating similar situations as described in each SS were produced by the author of this paper in two settings. The first set was filmed in a home setting, depicting two girls in their everyday activities. These videotaped segments were unrehearsed natural situations with the girls expressing joy, anger and sadness. Two other sets of video segments were filmed in a local children's centre. Children aged 8–15 were filmed expressing the abovementioned emotions in different situations. In all cases, written parents' informed consent was requested. The first set of videos was approximately 35 seconds in length on average. The second and third sets' average length was about 15 seconds.

As no instruction was given to children in the first set of videos, the corresponding SS were written on the basis of the videos. Also the cues written in the stories were extracted from the video segments. In the production of the other two sets of videos however, SS were made beforehand in order to accelerate the process. The children were instructed to act out a situation. It was requested that they act out important cues, e.g. crossing the hands or frowning. Thus, the two latter sets of videos were short and somewhat rehearsed, while the first prepared set depicted a natural situation. As the latter sets were shorter and the children slightly exaggerated the expressions of the emotions, these sets were chosen to be taught first. The set with natural situations depicted emotional expressions more subtly. Therefore was considered more difficult and was to be taught last.

### ***Training procedure***

***Target behavior.*** The target behavior was recognizing the correct emotion and learning the important cues written in the stories and seen on the videos. Recognizing the emotion meant choosing the correct response card from the table. The definition for learning the cues was naming 75 per cent of the highlighted cues referring to emotions after watching the illustrative videos where these cues were depicted.

**Teaching schedule.** Before intervention, two baseline measurement sessions were carried out. These sessions were structured as follows: first, six emotion-labeled choice cards were presented. These were set on the table near the computer where the videos were shown. On each card a name of an emotion was written as a noun: joy, sadness, anger, surprise, disgust or neutral. The cards were of different color, making them clearly distinguishable. The psychologist asked the child the following questions about each of these emotions:

- What does this word mean? What does *joy* mean?
- What is the face of a person like, when he or she feels this way? How might they act like? What might a person say?
- Could you tell me, when can a person feel this way?

When the child did not know the answer, it was told to him. This procedure was carried out with all six of the choice cards. Continuously, all of the nine videos were shown in random order. The video displaying sequence was previously marked down in a table, ensuring different video presentation orders each time. After watching each video, questions were asked:

- What did the child feel in this video? (a response card was asked to be chosen from the table)
- Why do you think so?
- What was his/her face like?
- When a person feels this way, how may he/she act like?
- How did the child act like in this video? What did he/she say?

The psychologist was instructed to ask only these questions, more direct questions were not asked. Also, the child's answers were asked to be responded to in neutral manner, not affirming or negating them. No Social Stories™ were read during these sessions. The answers were registered by the author of this paper. The child was reinforced firstly with verbal praise at the end of the session and later with video games at the end of each session.

Subsequently, two learning sessions were carried out with the first set of Social Stories™ and illustrative videos. The same three stories and three videos were the subjects of teaching

each time. SS were read together with the child, the psychologist reading them aloud while emphasizing the highlighted cue phrases. After every SS, the respective illustrative video was shown. The psychologist pointed out the depictions of the cues in the videos. Teaching sessions took place one or two times a week.

After every two learning sessions a control session took place. The structure of the control sessions was the same as during the baseline measurement, with one difference: the emotion choice cards were not discussed. All of the videos were shown in randomized order and the child was asked the abovementioned questions about each video. A choice card was asked to be chosen, naming the emotion Martin thought was depicted in the video. All of his answers were again registered.

***Experimental design.*** A multiple baseline across sets of Social Stories™ and videos was used. This design has several advantages over AB designs, e.g. in cases where the dependent variable is not expected to return to baseline after the treatment. There were three sets of SS with complementary videos and two phases – baseline and intervention. First, measurement of the trait of interest took place. Subsequently, the treatment was applied before measuring the trait again.

After the baseline measurement two teaching sessions were carried out. The first set of SS were read and respective illustrative videos were shown. The second and third sets of stories and videos were not presented. This was to demonstrate the effect of the intervention. Yet, improvement in recognizing and naming the cues in the videos that had not yet been taught could indicate generalization.

***Intervention.*** During each teaching session three Social Stories™ were read. As the psychologist read the stories aloud, she emphasized the highlighted cue phrases. Subsequently, while watching the corresponding illustrative video, she verbally directed the attention of the child to the facial expressions and behavior depicted in the video. As the purpose was not to mechanically teach the child the phrases in order to be repeated later, the child was not informed that he must learn them by heart. He was told to be attentive and watch closely.



At first, verbal praise was given as a reinforcer at the end of each session. As sessions proceeded, this appeared to lose the desired effect. An incident occurred before the first control session, when Martin refused to come to the psychologist. He said he had already seen the videos. Thus it was decided to choose a stronger reinforcer. In order to do so, a hierarchy of reinforcers was to be created.

We met with the child to discuss why it was important for him to attend these sessions and to make an agreement on the reinforcers. Discussing with Martin, a list of pleasant activities he would like to be engaged in after teaching was constructed. The strongest of the offered reinforcers were chosen: two video games, Helicopter and RPM Tuning (henceforth Racecar). Martin was most interested in Racecar game, Helicopter game was next in line. Therefore, an agreement was made: after every teaching session, he could play Helicopter game for 10 minutes. After each control session he could play the Racecar game for 20 minutes at the end of the session. This was explained and agreed upon understandably for the child without explaining the process of the phrases to be learned. The reinforcer was gradually decreased in order to achieve participation without external motivating while increasing his inner motivation. As he gained mastery in the video game, he was told to be given less time to complete the mission in the video game.

The teaching and control sessions lasted for approximately 15–20 minutes. The treatment had not ended by the time of presenting the current paper, predictably lasting 12 weeks in total with prior baseline measurement. Several pauses occurred in the intervention due to Martin's falling ill, the spring holiday and Easter holidays. The possible effect of this delay on the response accuracy on the first and second control session is discussed in chapter Results and discussion.

***Measurement techniques.*** Measurement was carried out during control sessions only. A control session was carried out after every two learning sessions. Sheets with the important cues referring to specific emotions as highlighted in Social Stories™ were used for registration of the child's answers. The structure of all of the control sessions is described in chapter Training schedule.

In order to move on to learning the second set of cues, 75 per cent of the cues in the first set had to be named in the control session. Synonyms and phrases with similar meaning were also acceptable. In case the learning criteria had not been met, the teaching would continue with the same set of SS and videos. The same principle applied in the second control session: only the second set of phrases was assessed as the moving on criterion. The intervention ends when the criterion for learning the third set of cues is met.

***Theory-of-Mind measurement.*** Theory-of-Mind (TOM) is the ability to take another person's perspective. It is a way to conceptualize and reason about the other and is considered to be a central capacity within social cognition, being involved in almost any type of interpersonal functioning.

TOM was measured prior the treatment. This was conducted with the Theory-of-mind kit assembled by Annemat Collot d'Escury, PhD, a clinical youth psychologist at the University of Warsaw. The kit enabled to measure perspective taking in three categories: emotional, visual, and cognitive. There were coherent taskbatterys in each category.

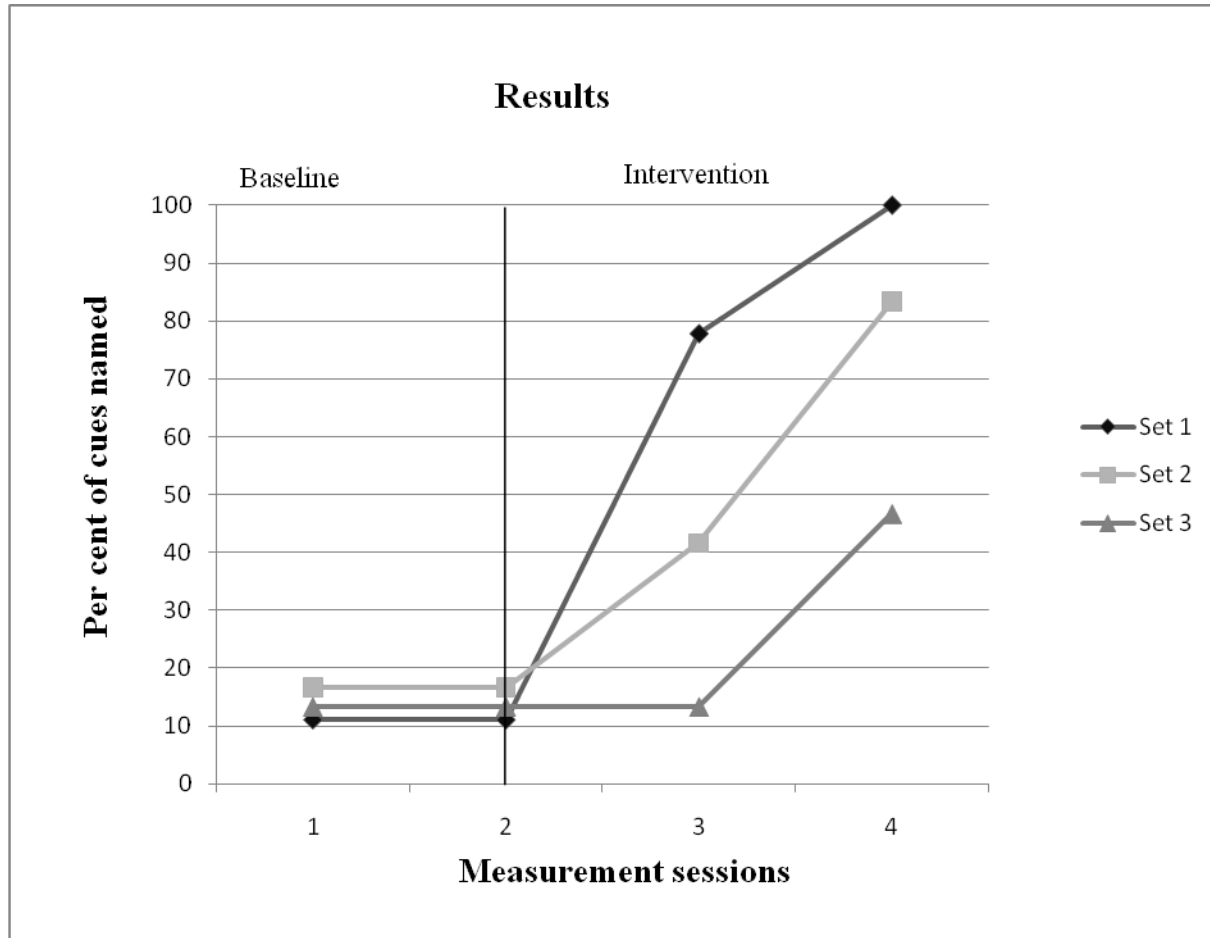
***Inter-observer agreement.*** (IOA) data was collected in order to demonstrate that the emotions depicted on the videos were collectively decided upon to be those that were taught. Five typically developed children aged 8–11 were asked to watch the nine videos and choose which emotions were displayed. Six options were given according to the choice cards: joy, sadness, anger, surprise, disgust and neutral. The IOA for the nine videos was 80 per cent.

## **Results and discussion**

The results of the intervention are depicted in Graph 1. The baseline indicated low skills of recognizing and naming important cues referring to emotions seen on videos. The percentage of the correct answers for each set was calculated.

The baseline set according to the data collected from two measurement sessions was relatively low. Martin showed little difficulties choosing the correct emotion card, but had difficulties answering the questions. He tended to give a simplistic reason that might have caused the emotion without much focus on the facial expressions, body posture or behavior. This was in

coherence with the previous research on the individuals with AS. Notably he mentioned the direct speech said in the video in almost all of the cases, indicating his focus on verbal information. Hence, he was able to mention one cue in each set during baseline.



*Graph 1.* Results of the intervention

After the intervention had begun, Martin showed rapid increase in correct answers. There was an increase in response accuracy in the first two sets. Here, the effect of teaching was noticeable: the most dramatic increase in correct answers was in the set taught. Having reached the 75 per cent accuracy criterion at the first control session, set two was begun to be taught.

The first and second control sessions took place a week and a half after the last teaching session. As it is known that individuals with AS tend to focus on verbal material in the emotion recognizing process, the SS as explanatory material may be of best use when being read shortly

before or after displaying the videos as illustrations. Possibly, the correlation between the Social Stories™ and the illustrative videos might fade in a week and a half's time, influencing the effect of the teaching. Thus, this might have resulted in lower response accuracy in the first control session than it would have been if the control session had been carried out shortly after the teaching sessions. Interestingly however, Martin's response accuracy in the control sessions showed rapid improvement compared to baseline, despite the relatively long interval between teaching and control sessions. A possible implication to this might be a rather solid internalization of the learned emotion recognition strategy. This was evident in the first and the second control sessions.

Notably, there were differences in the response accuracy in the three sets. Martin recognized most accurately the emotions depicted in the second video set. A possible explanation to this was the mastery of the children acting out the important cues. As two sets were rehearsed, children in the videos slightly and unintentionally exaggerated the facial expressions and body movements in order to portray the emotion. This may make the emotions depicted more easily recognizable. Following this logic, the set of videos that depicted natural scenes, taught after the two rehearsed sets, was the most difficult to analyze for Martin. This was a challenge for Martin to put the learned skill into practice. In this set, the expressions were depicted in a more complex situation. Also the increased length of the videos compared to sets one and two possibly made it more difficult to focus on certain cues while neglecting the rest.

This appeared to be consistent at the beginning of the treatment as Martin was able to mention one cue for each video in the third set. During the second control session however, Martin showed a solid internalization of the emotion recognition skill, naming 83 per cent of the cues in the first and second video sets. He was also able name 47 per cent of the cues in the video set he had not yet learned. The effect of generalization was the likely factor that resulted in increase of correct answers in the sets Martin had not yet been taught. This may be caused by internalization of the process of which he was taught by. While teaching, he was asked to attentively observe the video while pointing out important cues in the facial expression or behavior of the character. It may be possible he learned to use this strategy independently, asking himself the same questions or noting to be attentive on certain details.

During intervention phase Martin chose the correct card with 100 per cent accuracy after seeing the videos by which he had learned the cues. However, he was incorrect in recognizing the emotion depicted on videos he had not yet learned by in two specific videos, mistaking surprise for joy and disgust with anger. This again indicates the need for further teaching of subtle differences between emotions. As disgust seems to have a divergent meaning to him, the need to help discriminate disgust from other emotions is evident.

In case Martin chose an incorrect response card and therefore did not recognize the correct emotion depicted on the video, the cues he named were not taken into account, even if they were correct. This was because he had not learned the cohesion between certain cues and the emotion they expressed. His result for completing the video task was zero per cent accuracy. Notably, in four occasions during baseline, Martin chose an incorrect response card for *joy*, labeling it *surprise* and for *anger*, labeling it *disgust*.

This might be due to his unconventional use of the word *disgust*. At the beginning of baseline measurement sessions Martin was asked to explain the meaning of six words: *joy*, *sadness*, *anger*, *surprise*, *disgust* and *neutral*, written on the response cards. His explanation for *disgust* was as following: “When someone tells something disgusting to another, then it is disgusting.” The meaning of the words and possible reasons for experiencing the emotions were briefly explained by the psychologist.

After treatment, Martin will be again asked to explain the meaning of the words written on the response cards: *joy*, *anger*, *sadness*, *disgust*, *neutral* and *surprise*. Comparing Martin’s explanations to emotional terms prior and after treatment, it may be predicted that the meaning of the taught emotional terms specified.

According to Martin’s explanations to emotions prior the treatment, his understanding of emotional accounts tended to be quite rigid, revealing few discriminations between shades within emotions. Having given explanations to emotions, he did not describe the facial expressions or behaviors that make emotional experiences transparent. Instead, he guessed a possible antecedent for the emotion and focused on verbal accounts. So, it might be hypothesized that his strategy for emotion recognition was creating systematic causal-explanatory frameworks. This strategy

however might not be sufficient in complex, real-life situations in order to be aware of the emotional states of others.

Hence, it may be said that verbal mediation was rightly a suitable route to shift his attention to observable behavioral elements as well as the social situation. As the interpretation of emotional accounts is clearly related to thinking, the goal of creating compensatory strategies would be to internalize the skill of pinpointing relevant cues in order to understand the situation. This requires the knowledge of the cues referring to certain emotions. As Graph 1 indicates, Martin was able to learn the relevant cues regarding joy, sadness and anger, which he was not aware of during baseline in the emotion recognition task. The skill of focusing his attention on observable elements internalized, helping him to pinpoint these cues.

### **Conclusion**

In the current study, emotion recognition was systematically taught to a child with AS, using Social Stories™ with highlighted referential cues and complementary illustrative videos. Multiple baseline design was applied, demonstrating the positive effect of the intervention. The aim of the study was fulfilled: a child with AS was taught emotion recognition in people's faces, behavior and verbalizations via Social Stories™ and complementary videos.

The findings in the current study suggest that using Social Stories™ with illustrative videos was effective in teaching emotion recognition to a child with Asperger's Syndrome. Graph 1 displays the effect of the intervention: the response accuracy rose rapidly after the intervention had begun.

Choosing the optimal difficulty in the emotion recognition task and pinpointing the child's proximal development area proved to be a challenge. The task should be simple enough to be able to focus on teaching the emotion recognition strategy instead of concentrating on the question of which emotion is being portrayed. Yet, the task could not be simple enough for him to lose interest in it. Thus, the use of reinforcement was of cue value. As Martin's internal motivation did not keep his interest and willingness to participate, external motivation was used via reinforcement. This was chosen while discussing with the child in order to find the strongest motivator. After each session one of two chosen video games was to be played for a certain

period of time. The time in which Martin could play the computer game was gradually decreased in order to decrease the proportion of external and increase internal motivation.

Analysis of Martin's explanations of the terms on response cards prior and after the intervention may show the specification of the three emotional terms. His explanations given to the term *disgust* prior the treatment indicate a rather mechanical use of the word, not a broad understanding. This indicates the necessity for future work, in order to explain the meaning and recognition of *disgust* and other, complex emotions.

Moreover, having used to being asked the questions concerning the other person's emotional state may result to internalizing this skill. Therefore, hopefully in future occasions, the child may ask himself the same directing questions that may help focus his attention on relevant cues in a person's facial or bodily expressions, behavior or speech.

In addition, improvements in the emotional perspective category of the Theory-of-mind is predicted, possibly indicating the generalization of the emotion recognition skill. Thus, in future occasions, Martin may put the learned skill into practice in everyday social situations where emotion recognition in others is needed in order to fully understand and respond adequately in the situation.

It may be said that this method proved effective with Martin. In future research, the individuality of each child must be taken under consideration while choosing the subject of teaching and creating the materials to be taught by. Here, the cue would be child-centeredness.

## References

- American Psychiatric Association. (2005). *Diagnostic And Statistical Manual of Mental Disorders*. Washington DC: American Psychiatric Association.
- Ashwin, C., Wheelwright, S. Baron-Cohen, S. (2005). Laterality Biases to Chimeric Faces in Asperger Syndrome: What is ‘Right’ About Face-Processing? *Journal of Autism and Developmental Disorders*, Vol. 35(2), 183-196.
- Bernad-Ripoll, S. (2007). Using a Self-as-Model Video Combined with Social Stories™ to Help a Child with Asperger’s Syndrome Understand Emotions. *Focus on Autism and Other Developmental Disabilities*, Vol 22 (6), 100–106.
- Brewer, M.B., Hewstone, M. (2004). *Emotion and motivation*. Blackwell Publishing.
- Charlop-Christy, M.,H., Le, L. & Freeman, K.,A. (2000). A comparison of video modeling with in vivo modeling for teaching children with autism. *Journal of Autism and Developmental Disorders*, Vol. 30 (6), 537–552.
- Darwin, C. (2009). P.Ekman (Ed), *The expression of the emotions in man and animals*. (3rd ed.). London: Fontana Press.
- Denning, C.B. (2007). Social Skills Interventions for Students With Asperger Syndrome and High-Functioning Autism: Research Findings and Implications for Teachers. *Beyond Behavior*, 16–23.
- Golan, O., Baron-Cohen, S. (2008). Teaching Adults with Autism Spectrum Conditions to Recognize Emotions: Systematic Training for Empathizing Difficulties. E. McGregor, M. Nunez, K. Cebula, J.C. Gomez (Eds.), *Autism: an integrated view from neurocognitive, clinical, and intervention research*. (pp. 236–259). Blackwell Publishing.
- Gray, G. (2003). Social Stories™ 10.0: the New Defining Criteria and Guidelines. *Jenison Autism Journal*, 1–28.



- Grossman, J.B., Klin, A. Carter, A.S. Volkmar, F.R. (2000). Verbal Bias in Recognition of Facial Emotions in Children with Asperger Syndrome. *Journal of Child Psychology and Psychiatry*. Vol. 41 (3), 369–379.
- Karkhaneh, M., Clark, B., Ospina, M., Seida, J.C., Smith, V., Hartling, L. (2010). Social Stories™ to Improve Social Skills in Children with Autism Spectrum Disorder: A Systematic Review. *Autism Vol 14(6)* 641–662.
- Lindner, J., Rosen, L.A. (2006). Decoding of Emotion through Facial Expression, Prosody and Verbal Content in Children and Adolescents with Asperger’s Syndrome. *Journal of Autism and Developmental Disorders* 36, 769–777.
- Losh, M., Capps, L., (2006). Understanding of emotional experience in autism: Insights from the personal accounts of high-functioning children with autism. *Developmental Psychology, Vol 42(5)*, 809–81.
- Mazefsky, C.A., Oswald, D.P. (2007). Emotion Perception in Asperger’s Syndrome and High-Functioning Autism: The Importance of Diagnostic Criteria and Cue Intensity. *Journal of Autism and Developmental Disorders* 37, 1086–1095.
- Martin, G. & Pear, J. (1996). *Behavior modification: What it is and how to do it* (5th ed.). Upper Saddle River, New-Jersey: Prentice-Hall, Inc.
- McCoy, K. & Hermansen, E. (2007). Video modeling for individuals with autism: a review of model types and effects. *Education and Treatment of Children Vol. 30(4)*, 183–213.
- Nikopoulos, C.K., Keenan, M. (2003). Promoting Social Initiation in Children with Autism Using Video Modeling. *Behavioral Interventions* 18, 87–108.
- Reeve, J. (2009). *Understanding Motivation and Emotion* (5th ed.). John Wiley & Sons, Inc.
- Rizzolatti, G., Sinigaglia, C. (2006). *Mirrors in the Brain – How Our Minds Share Actions and Emotions*. New York: Oxford University Press.
- Silan, G., Bird, G. (2008). Levels of emotional awareness and autism: An fMRI study, 2007. *Focus on Autism and Other Developmental Disabilities, Vol. 22 (2)*, 97–112.

Steege, M.W., Mace, F.C., Perry, L., & Longenecker, H. (2007). Applied behavior analysis: Beyond discrete trial teaching. *Psychology in the Schools, Vol. 44(1)*, 91–99.

Vainik, E. (2001). Eestlaste emotsioonisõnavara. Handscripted Master's thesis, University of Tartu.

## Appendix 1

### *Anger 1*

Mõnikord muudab Jaanuse sõber meelt. Selle peale Jaanus **vihastab**.

Jaanus leppis sõbraga kokku, kuidas mäng käib. Nad tegid kindlaks mängu reeglid. Nüüd aga ütleb sõber: „Ma mõtlesin ümber.“ Tal tuli uus mõte, kuidas võiks mängida. Jaanuse **kulm läheb kortsu**. See ei meeldi talle üldse. Jaanus **pane**b käed risti. Ta **karjub** sõbrale: „Sa ei või nii teha!“ Nii ei saagi sõbrad mängida.

Igäüks muudab aeg-ajalt meelt. See pole midagi halba. Järgmisel korral, kui nii juhtub, proovib Jaanus rahulikuks jääda.

### *Anger 2*

Vahel palub ema Helinal juukseid kammida. See **vihastab** Helinat.

Ema ütleb Helinale: „Su juuksed on sassis. Palun kammi neid.“ Selle peale läheb Helina endast välja. Talle ei meeldi juukseid kammida. Helina ei taha teha midagi, mis talle ei meeldi. Ta **karjub** emale: „Ei kammi!“ Ta paneb **käed risti**.

Ema palub uuesti tütrele juukseid kammida. Viisakas on, kui tüdruku juuksed on korralikud. Helina ärritub veelgi. Ta karjub uuesti: „Ei kammi! **See ei meeldi mulle!**“ Nüüd võtab ema ise kammi kätte. Helina võtab padja ja **lööb** sellega ema. Siis jookseb ta teise tuppa.

Igäüks vihastab vahel. Järgmisel korral proovib Helina mitte vihastada.

### *Anger 3*

Vahel Anni **vihastab**, kui tema õde kõvasti trummi mängib.

Anni ütleb siis õele: „**Ära lärma! See ei meeldi mulle!**“ Võib juhtuda, et õde mängib ikkagi trumme edasi. See tegevus meeldib õele väga. Aga Anni jaoks on see müra. Tema **süda hakkab kiiremini lööma**. Anni on ärritunud. Igaüks ärritub vahel.

Anni tahab siis minna õe juurest eemale. Ta läheb teise tuppa. Ta hoiab oma kõrvu kinni ja viskab diivanile pikali. Ta tunneb, et tema **lihased on pinges**.

Siis **karjub** Anni õele: „Lõpeta ära!“ Õde mängib trumme edasi. See vihastab Annit järjest rohkem. Anni jookseb õe juurde ja **lööb** teda. Selle peale hakkab õde nutma. Annil hakkab õest kahju. Ta palub vabandust. Kui tülli minnakse, tuleb uuesti ära leppida.

Kui Anni jälle nii tunneb, ütleb ta: „Ma olen vihane. Palun ära enam mängi trumme.“

### *Joy 1*

Jaanus on väga **rõõmus**, kui ta kingitusi saab.

Alati on tore kingitusi saada. Sünnipäevad on eriti vahvad. Siis saab sünnipäevalaps kingitusi.

Jaanus kutsus oma sõbra sünnipäevale. Sõber tuleb hea meelega. Ta ulatab kingituse Jaanusele ja ütleb: „Palju õnne sünnipäevaks!“ Jaanus **naeratab** ja tänab sõpra. Ta võtab kingi vastu. Kingikotis on uus mänguauto. Jaanusele meeldib see väga. Ta **kallistab** sõpra ja ütleb: „**Sa oled väga tore sõber!**“

Sünnipäeval kingituste saamine teeb Jaanuse tuju rõõmsaks.

**Joy 2**

Helinale meeldib koolis häid hindeid saada. See teeb ta **rõõmsaks**.

Helina kõige lemmikum aine on matemaatika. Ta oskab seda hästi. Vahel teeb õpetaja matemaatikas kontrolltöid. Siis loodab Helina hea hinde saada.

Käes on hinnete jagamine. Õpetaja kutsub õpilasi oma laua juurde. Ta annab neile hinnatud kontrolltööd kätte. Vahel saab Helina hindeks viie plussi. Siis kiidab õpetaja: „**Sa olid väga tubli!**“ See tekitab Helinal väga hea tunde. Ta **naeratab** laialt. Ta hakkab ta lausa rõõmust **kilkama**. Helina tahab õpetajat **kallistada**. Siis ütleb õpetaja: „Tore! Ole nüüd rahulik. Istu oma kohale tagasi.“

Helinal on rõõmus meel, kui ta hea hinde saab. Ta jääb rahulikuks ja töötab ikka tunnis kaasa.

**Joy 3**

Kui Anni õega lemmikmängu mängib, on ta väga **rõõmus**.

Vahel kutsub Anni oma õe mängima. Siis on mõlemal õel hea tuju. Kõige rohkem meeldib neile peitusemäng. Esimesena peidab ennast Anni. Õde hakkab teda otsima. Annil on üks väga hea peidukoht. Õde teda sealt ei leia.

Õde hõikab Annile: „Kus sa oled? Tule välja!“ Siis tuleb Anni peidust välja. Nad hakkavad õega mõlemad **naerma**. Anni naeratab laialt/hüppab rõõmust. Selle peale ütleb õde: „Sa oled naljakas!“ Ta paneb **pea kuklasse** ja naerab laginal.

Anni läheb õe juurde ja **kallistab** teda. Ta ütleb õele: „Nüüd on sinu kord peita.“ Tore on kordamööda mängida. Nad **kilkavad** ja mängivad koos.

Peitusemäng meeldib Annile ja tema õele. Koos mängimine on väga lõbus.

*Sadness 1*

Vahel juhtub, et Jaanus kaotab oma mänguasja ära. Siis on ta **kurb**.

Jaanus läheb siis ema juurde. Ema näeb, et poja **suunurgad on alla vajunud**. Jaanus ütleb emale: „Ma kaotasin oma auto ära.“ Suurest kurvastusest hakkab poiss **nutma**. Ema **lohutab** Jaanust: „Ära muretse! Otsime koos auto üles.“ Nad lähevadki otsima.

Kui Jaanusel kurb tuju on, oskab ema teda alati lohutada.

*Sadness 2*

Helina lemmikloom on ära jooksnud. Helina on selle pärast väga **kurb**.

Ema proovib Helinat **lohutada**. Ta silkitab tütre pead. Ema ütleb tasase häälega: „Küll Miisu tagasi tuleb.“

Helina **ohkab**. Ta mõtleb ikka oma kassi peale. Kass on nende perele väga armas. Helina hakkab **nutma**. Ta igatseb oma loomakest väga. Ema rahustab Helinat. Varsti jätabki tüdruk nutmise. Ta **nuuksub** veel natuke ja rahuneb siis.

Kui tüdrukul on kurb tuju, saab ta emalt tuge.

*Sadness 3*

Anni õde saab **kurvaks**, kui Anni teda poodi kaasa ei võta.

Siis läheb ta Anni juurest eemale. Ta tahab omaette olla. Õe tuju on halb. Ta istub vaikselt ja **vaatab maha**. Anni küsib: „Mis sul nüüd viga on?“ Õde **ohkab** ja ütleb vaikselt: „Mitte midagi.“

Aga Anni näeb, et õel on kurb tuju. Õe **lõug hakkab värisema**. Tema **suunurgad on alla vajunud**. Siis **lohutab** Anni oma õde: „Olgu pealegi, tule kaasa. Ära kurvasta.“

Kui Anni õel tuju kurvaks läheb, siis proovib Anni tema tuju paremaks teha.