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**Computer-Mediated intervention to Enhance emotional competence in children with Autism in schools**

**Submitted by**

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# Abstract

Autism spectrum condition (ASC) is a neurodevelopmental disorder characterized fundamentally by social deficits. Emotional competence – the ability to express, recognize, understand, and regulate emotions – is a key aspect of social communication. Evidence suggests that the developmental trajectories of children with ASC differ from that of neuro-typical children regarding their ability to process and recognize emotions from paralinguistic emotional facial, body language, and voice tone cues. They also have difficulty integrating these cues in context and lack in emotional language.

Numerous approaches to teaching people with ASC how to recognize and understand emotions have been tried, with recent increased interest in computer-based interventions (CBI). However, most of the research, focusing on teaching facial expressions cues to those with high functioning autism, has had limited results in generalization to natural social interaction.

This study’s main goal is to assess CBI’s effect on emotional competence among children with high and low functioning (HF/LF) autism. This research will include 120 participants, divided into three groups: 30 6–9-year-old HF-ASC children and 30 10–12-year-old LF-ASC children who will participate in the intervention program; 30 6–9-year-old HF-ASC children and 30 10–12-year-old LF-ASC children who will not participate in the intervention; and 30 neuro-typical children matched in cognitive and linguistic skills.

The research’s four stages are: pre-assessment tests for all participants; an intervention program administered by a certified educational staff for 18 weeks; evaluations immediately after the intervention; and evaluations 10 weeks post-intervention.

The important contribution of this study is twofold. It integrates an intervention program to promote emotional competence into the educational system, which serves as a major platform for acquiring social skills. Concurrently, it offers a way to assess the social functioning in real life situations of children with autism at different levels of functioning.

# Scientific background

## Autism spectrum disorder

Autism spectrum disorder (ASD) is a neuro-developmental disorder characterized by social-communication difficulties, circumscribed interests and preference for sameness and repetition from early childhood (APA, 2013). The deficits in social communication are intertwine with the development of social competence, that include the ability to recognize, understand, express and regulate emotions. Emotional competence develops throughout childhood and enables emotional connections, adjustment to different social situations and good mental health (Goodman et al., 2015; Li et al., 2020; Ward-Ciesielski et al., 2019)with ASD indicated a gap in emotional competence different aspects (Begeer et al., 2008; Cai et al., 2018; Salomone et al., 2018).

The term “autism” incorporates different definitions that differ in cognitive, lingual and behavioral criteria. This creates a broad picture of developmental features at different severity. Moreover, the clinical picture can change in the individual person over time (Chiarotti & Venerosi, 2020). Current studies suggest that 1% of the population might fit an ASD diagnosis (Baron-Cohen et al., 2009), but despite the high frequency, the core neurological indicator is not yet known. There are several cognitive theories that have tried to explain the cognitive, emotional and behavioral deficits associated with ASD (Rajendran & Mitchell, 2007).

### Theory of mind-TOM

According to this model ASD is characterized with a cognitive deficit in collecting socio-emotional cues, this is a vital to creating mental images in order to understand other's mental states (intentions, emotions, thoughts and believes). The ability to attribute mental states to another person is considered necessary in order to participate in affective communication and has great impact on social behavior understanding, Representation of mental states enable to understand and predict other’s behavior, and creating social relationships (Baron-Cohen et al., 2013; Le Sourn-Bissaoui et al., 2011)

### Empathizing-systemizing theory

Baron Cohen (2002) addresses to two distinct features associated to people with ASD; “systemizing” is the drive to analyze and build systems in order to understand and predict system mechanism. And “empathizing”, the drive to recognize and understand another person thoughts and emotions and respond accordingly. According to this theory ASD is characterized by strong systemizing abilities, including superior abilities in attention on- and understanding of- non agentive rule and pattern-based systems, and lack in emphasizing abilities. This theory explains the gaps some people with ASD present, with superior functions (for example: composing music) that entails high cognitive abilities alongside poor social-emotional processing, emotional expression and appropriately respond.

### Weak Central Coherence Theory WCCT)

This theory attributes the socio-emotional deficits of people with ASD to a unique cognitive processing that focus on local, specific, partial information processing (Volkmar et al., 2005)Happé argued that ASD characterized by a diminished ability to perceive context and see the higher holistic meaning (Happé & Frith, 2006). A review of 50 empirical researches has found that the tendency to specific local processing has been found to be independent cognitive feature, not secondary to deficits in other executive functions described as part of theory of mind (Happé & Frith, 2006).

### Executive Functions

according to this theory there is a failure in a failure in the superior cognitive mechanism that is in charge on cognitive control process responsible for reactions to problems which require a sequence of actions, solving problems and applying the solution, attention focusing and attention splitting and cognitive and behavior flexibility (Bauminger-Zviely et al., 2013; Jurado & Rosselli, 2007). The main executive functions include regulation (preventing impulsive behavior. Resisting temptations) and controlling interruptions (cognitive regulation and attention focus) working memory and cognitive flexibility. The executive function is controlled by frontal cerebral areas but the disability in not specific to autism and appear in learning disabilities ad Attention disabilities (Diamond, 2012). The described models offer different perspectives to the base of the challenges people with autism face. In the current research we will focus on different components of emotion competence that is a major part of social understanding development

## Basic and complex emotions

One component of emotional competence is the ability to recognize and understand others emotions, a vital social skill that has a major impact on a person behavior, his ability to integrate in the community and his ability to create social interactions and friendships (Denham et al., 2015)

The academic research has started in 1860 with darwin’s research, he described the ability to express some emotions has a clear neurological pattern among several species. Darwin findings were validated with Ekman’s research (de Silva, 2001) he found that visual emotional clues on facial expressions are similar among different cultures by 70-80% compatibility. Ekman’s findings address six emotions- happy, sad, afraid, surprise and disgust, those emotions were defined as “basic emotions”. Other emotions were found to lack the clear neurological pattern, they incorporate a cognitive component of mental state and were considered cultural dependent. These emotions were categorized as “complex emotions” (Harris, 1989; Golan et al., 2015)

The ability to understand how another person feels is a part of a social context and involves a sensory component to perceive the person emotional cues, as well as a cognitive component and social knowledge. In a social interaction the speaker transfers emotional information through language and simultaneously non-verbal information that perceived by visual mode through facial expressions and body language, and by auditory mode through acoustic cues in the speaker’s voice. These non-verbal cues are vital to perceive another person emotional state (Gil et al., 2014)

Next, we will examine how the differences between basic and complex emotions affects the ability to recognize emotions among people with ASD and the ability to understand emotions in social context.

## Emotion recognition in ASD

People with ASD has difficulty to recognize and understand emotional cues, express personal emotions and regulate emotions (Chaidi & Drigas, 2020; Golan et al., 2015). These difficulties are a part of social communication, that describes ASD according to the national health association and the American psych association (APA, 2013). The difficulties in recognizing and understanding emotions are negative compatible with acquiring social skills (Uljarevic & Hamilton, 2013) and has been found predictive so social adjustment difficulties (Hudepohl et al., 2015)

Many researchers examined the difficulties to recognize and understand emotions among people with ASD, most focused on recognizing para-lingual cues trough the sensory channels in the six basic emotions. Findings indicates difficulty in detecting visual cues from facial expressions, body language and auditory cues from the speaker’s voice compared to neurotypical population (Fridenson-Hayo et al., 2016; Grèzes et al., 2009; Philip et al., 2010; Todorova et al., 2019), however these findings are not conclusive. There is conflicting evidence, that these gaps in recognizing emotional cues are absent in people with high functioning autism and with Asperger syndrome (Lacroix et al., 2014; Leung et al., 2013; Tracy et al., 2011).

Studies that examined recognition of complex emotions present a match coherent picture and indicate a substantial difficulty in recognizing sensory cues among people with ASD compare to neurotypical population (Enticott et al., 2014; Fridenson-Hayo et al., 2016; Golan et al., 2007, 2015)

The explanation to these discrepancies in recognition of basic emotions among people with ASD explained by the different theories. Theory of mind attributes the difficulty to understand complex emotions to the fact that complex emotions are based on beliefs (for example: shame, pride) compare to basic emotions context based (for example: happy, sad), and claims that the gaps are expressed mostly among people with high-functioning autism and Asperger syndrome that rely on compensatory strategies based on cognitive and linguistic abilities (Golan et al., 2008; Le Sourn-Bissaoui et al., 2011). The Weak Central Coherence Theory attributes the difficulties to recognize emotions to the tendency to avoid eye contact and difficulties in integrating multi-channel information among people with ASD, that leads to over focusing on few visual cues mostly on the speaker’s mouth area, which is partly affective for the basic emotions (Ryan & Charragáin, 2010). In order to examine the gaps in recognizing emotions among people with autism, we will now elaborate on each of the different modalities separately

## Emotion recognition from facial expression

There are many indications that the visual mode is the most affective and has high reliability by the viewers (de Silva, 2001). Most of the visual information is transferred by the eyes and mouth regions. Infants with typical development show attraction to human eyes, and from the first few weeks of their lives they start to make eye contact and follow another person gaze (Brecht & Freiwald, 2012) at 10 weeks infants responds to their main caregiver emotional state, at 4 month they discriminate the different facial expressions of the basic emotions (Jessen & Grossmann, 2015; Schindler & Bublatzky, 2020)

Children with ASD show difficulty to recognize emotions from facial expressions compare to neurotypical children. The difficulty can be attributed to a decrease facial attention and different processing style of facial cues. There some evidence that people with ASD have dysfunction on facial discrimination tasks, and have difficulty to decipher familiar faces from a stranger face, the difficulty was found related to the face features and does not appear in visual processing of other items (Loth et al., 2010). one of the prominent charctaristic of ASD is avoiding eye contect , that can start from infancy. and is a major obstacle in the foundation of social behavior mechanism (Jones & Klin, 2013; Wang et al., 2018). neuro-physical researches support the perception of a failure in visual perception and slow processing compared to the neurotypical population (Chung & Son, 2020). However, research that examined visual processing among children compared to teenagers with high functioning ASD and Asperger syndrome indicated an improvement in emotion recognition with age and that emotional recognition of basic emotions among teenagers was similar to neurotypical population (Kuusikko et al., 2009).

## Emotional recognition from the auditory channel

the importance of emotion expression through the tone of voice was acknowledge from the pioneer research of Darwin with animals and humans, where he describes the importance of passing messages through the voice (Banse & Scherer, 1996

Scherer (1986) described in his research the impact of emotional arousal on the autonomic and somatic nervous system that leads to physiological changes on the breathing’ phonation and articulation mechanism, in a way that creates different changes in the vocal production and allows to listener to discriminate between the different emotions. There are a few acoustic criteria that discriminate the different emotions, the prominent are the basic frequency features (F0) and amplitude average. other criteria include the voice volume, changes in the volume through put the utterance, energy division in the spectral range, especially the energy proportion between the high frequencies and low frequencies, vowels frequencies, the length of the utterance or the pace of speech. Grossmann et al. (2005) argued that the human brain is able from infancy to perceive emotional components in the voice, after finding brain activity responses when exposing 7-month-old infants to emotionally charge words compared to neutral words. the ability to recognize emotions from prosodic cues begins at 4 years old until teens, children most often rely on lingual information (Aguert et al., 2013).

Adults with normal hearing are able to recognize basic and complex emotions from the auditory channel at a 55% accuracy level. among the basic emotions there is variance in the recognition reliability, anger and sad are the easiest to recognize, then happy, and the most difficult are afraid and surprised (Johnstone & Scherer, 2000; Lausen & Hammerschmidt, 2020; Most & Aviner, 2009; Paulmann & Uskul, 2013). most researches show difficulty to recognize emotion from the speaker’s tone of voice among people with ASD compare to neurotypical population (Charpentier et al., 2018; Chevallier et al., 2011; Philip et al., 2010; Rosenblau et al., 2017). Electro-physiological researches reinforces these findings and show difference neurological process from the sensory organ to the amygdala with reduced nervous reactions (Lindström et al., 2016; Rosenblau et al., 2017) and similar to the findings from emotion recognition from facial expressions, there a debate about the difficulties on basic emotion recognition, some researches did not find dysfunction among high functioning ASD or Asperger's syndrome subjects (Brennand et al., 2011; Jones et al., 2011; Wang & Tsao, 2015)

## Emotion recognition from body language

in the social world we are surrounded by non-lingual information that indicates the other person's emotional state. a part of the non-lingual information is transferred by body language with gestures, body position, personal space from the speaker, eye movement (pupil dilation, gaze direction) hand position, style of sitting/standing etc. (Noroozi et al., 2021). de Klerk et al. (2018) claimed that acquiring social information from body language, is mediated by human tendency to spontaneously unconscious mimicry of others. Research shows that from the first year of life infants mimic other’s movements but only when there is eye contact. In the second year of life, infants show the ability to understand and predict another person's behavior from his body language cues (Onishi & Baillargeon, 2005; Ramos-Cabo et al., 2019). Next and throughout childhood, children begin to interpret biological movements and comprehend social behaviors from body language cues, an ability that matures until at 7-8 years old (Centelles et al., 2013). in addition to social communication difficulties, ASD is characterized with behavioral characteristic that include avoiding eye contact, echolalia (speech repedipment) and repetitive stereotypic movements (APA, 2003 ) Rogers & Pennington (1991) were the first to describe the deficits in motor mimicry among children with ASD, they argued that motor mimicry embodies the base of the dysfunction and creates a barrier to create a self-representation as opposed to the other person, which then leads to difficulties to understand mental state. in the past two decades many researches reinforced these findings and indicated gaps in motor perception and processing (Annaz et al., 2010; Pavlova, 2012), researches among infants with ASD presented abnormal observing patterns after motor movement with focusing on the physical movement more than the social context (Klin et al., 2009; Klin & Jones, 2008).

Electrophysical research show that the difficulties in motor perception and processing among people with ASD stem froma different neurological base in the mirror neurons function in the superior temporal sulcus (STS), and their function is to connect between visual perception to the motor cortex, which responsible on movement. the abnormal function was found to be an indicator to emotion recognition ability (Alaerts et al., 2014)

very few studies have focused on emotional cues recognition from body language, the information available indicates gaps among children with ASD compared to neurotypical children (Girli & Doğmaz, 2018; Mazzoni et al., 2020; Metcalfe et al., 2019). these studies examined basic emotions and used point-light dispays technology

the pioneer research of Fridenson-Hayo et al. (2017) examined basic and complex emotions by assessing full body movements from video clips. results indicated that children with high functioning ASD had difficult to recognize the different emotions compared to neurotypical children. to our knowledge there is no information to emotion recognition from full body language cues among older children with ASD or children with lower function ASD. so far, we described the ability to recognize non lingual emotional cues from the different sensory modalities, however emotional information is deciphered in social context, for that reason we need to examine the ability to understand emotions in social context.

## Emotional understanding in social context

emotional competence is vital to the individual function in the society, it attributes to social adjustment and quality of life. social functioning is dependent on cognitive, emotional and behavioral abilities (Denham et al., 2015; Grazzani et al., 2018).

In the center of social understanding lies the theory of mind, the ability to understand that humans are intellectual creatures that have intentions, motivation. emotions and thoughts. According to the theory of mind, a baby is born with innate social abilities. around two years old there is a development in social-cognitive processes of discriminating the mind from the physical world, which manifested by imaginary game. toddlers develop understanding of their personal desires and another person desires and begin to express it verbally. with the ability to understand desires, they will start to realize another person's emotional state (for example: if the doll wants milk and she got milk, then she will be happy). around 3 years old, children start to understand and express what another person knows and thinks, they use this mental knowledge to detect his emotional state. At 4 years old a major development occurs and children start to address beliefs and the others’ expectations, they are capable to infer from that information about the emotional state (for example: if the doll is thirsty and she expected to get juice but she got milk, then she will be sad). later on, the ability to understand that consciousness can represent objects and events an accurate representation and incorrect representation. Children at that age understand that false beliefs can impact a person behavior, and around 5-6 years old they understand the impact of false belief on emotions. the highest developmental level is understanding that emotional responses are affected by previous expectations and emotions of the person and not only by what is happening, this appears in the late childhood (Lane & Bowman, 2021; Wellman, 2014; Wellman & Liu, 2004

Research literature shows much evidence of early onset of difficulty in understanding emotions among children with ASD. two years old toddlers were less responsive to stimulus of basic emotions (happy, afraid, disgust, and pain) , had low emotional affect and inappropriate emotional responses throughout childhood (Brian et al., 2015; Peterson et al., 2005, 2012, 2015a; Vernetti et al., 2020). Baron‐Cohen (1991) examined if children with ASD understand causality of emotions and found that the basic difficulty lies in understanding what another person believes. Ergo, children with ASD show a normal emotional understanding based on the situation the character desires, but they have difficulty understanding the character's emotions based on her false belief. These findings support theory of mind, which argues that the foundation to the difficulties children with ASD face is development of perspective taking, that influences understanding the different mental state of another person, which include the ability to understand another person's emotions. (LaCava et al., 2007; Peterson et al., 2012) Losh & Capps (2006) argued that the emotional experience mental state among children with ASD is less coherent compare to neurotypical peers, and that is why they lean on alternative strategies for interpreting social emotional situations and tend to address mainly to bold visual elements.

neuro-cognitive theories have another interpretation to the social-emotional deficits, their claim is that children with ASD do not poses a normative preference to social stimulus, that lies on specific neurological brain cycles and leads to incompetent emotional regulation and emotional response. research indicates a dysfunction in the fusiform gyrus, responsible to processing information from the face and the amygdala area that is connected to emotional functioning, when performing in emotion recognition tasks among subjects with ASD (Han et al., 2014; Trontel et al., 2013).

In conclusion, there is evidence that people with ASD have difficulty recognizing and understanding others’ emotions in social situations. next, we will examine the impact of these deficits on language development

## Emotional language development

Emotional language is a broad term that addresses the spectrum of the six basic emotions, a wide variety of complex emotions and mental states. Emotional language development is vital for two main causes: first, it enables us to share personal experiences with others, to discuss internal mental states and thoughts. the second, language development and especially the verbal representation to the emotional world, encourage the child awareness to his and others internal world, which reflects in theory of mind development (Gavazzi & Ornaghi, 2011; Yu et al., 2020)

neurotypical children start naming emotions at two years old, first they describe personal basic emotions (happy, sad, afraid and anger), next the mental vocabulary expends and they start to describe others’ emotions and reflect emotions to toys. cognitive dialog begins around 3 years old and increases in frequency until the age of 6 years (Hughes & Dunn, 1998). at 7 years old children starts to name complex emotions (surprise, excitement. loneliness etc. (Bartsch, K., & Wellman, 1995; Golan et al., 2015). The emotional lexicon main development is throughout childhood until 11 years, the vocabulary doubles every two years (Baron-Cohen et al., 2010)

although many researchers studied emotion recognition and understanding, very little attention was given on the ability to process and understand verbal emotional stimulus.

the literature research indicates that children with ASD lack in emotional vocabulary compared to neurotypical children Kauschke et al., 2016) they have difficulty to process, coding and memory of emotional vocabulary, and they have difficulty to express and understand emotional language in conversation (Lartseva et al., 2015). when examining the ability to encode and remember emotion related words, a-typical patterns were found among people with ASD, no such differences were other memory tasks with no emotional dimension (word list. sentences. stories). a neurotypical control group show an advantage when had to remember emotionally charge word and sentences over time compare to neutral stimulus, subjects with ASD did exhibit the same advantage. researches attributed the advantage found in encoding and remembering emotional data to the allocation of more processing resources in the middle-temporal lobe, after the stimulus is perceived as a potentially have meaningful motivation, it is encoded and preserved better. a failure in similar functions among people with ASD can indicate there is a difficult to recognize the stimulus as potentially meaningful motivation in the amygdala functioning or indicate a failure encoding due to deficiency in high processing stages in the connection of the amygdala, cerebral cortex and frontal cortex areas (Gaigg & Bowler, 2009; Lartseva et al., 2014, 2015).

researches that examined emotional language cues in conversation or in a narrative had to take into consideration the wide spectrum of language abilities among people with ASD, on the upper functioning level (Asperger syndrome and high functioning ASD) there are individuals with good cognitive abilities. normal-high IQ and difficulties in the pragmatic component. on the lower functioning level of ASD there are individuals that are not able to develop language at all. ,ost are in the middle functioning level and have semantic, grammatical and morphological language dysfunction in addition to the pragmatic difficulties (Lartseva et al., 2015).

Research indicates a reduced emotional vocabulary in language tasks (stories, structured dialog, personal experiences description and describing videos presenting moral dilemmas) among people with ASD compared to neurotypical people. These findings were described in high functioning ASD and Asperger syndrome individuals that acquire adequate verbal abilities. which support the notion that these difficulties are not language dependent. Moreover, on non-emotional verbal tasks there were no such gaps found (Barnes et al., 2009; Brown et al., 2012; Gaigg & Bowler, 2009).

## Emotional competence differences in individuals with ASD in different functioning levels

From the first definition of ASD by Kanner (1943), there were many efforts to examine the different components of the definition and the different functioning levels.

in the 70’s DeMyer et al., (1974) discussed the differential diagnosis between autism and intellectual disability, they conclude that the two can appear together and most often do, it is possible they share a common denominator (Malfa et al., 2004). in turn the term “high functioning autism” appeared in research literature, it was defined by IQ of 70 and above with normative verbal abilities (Prizant, 2012). good verbale and cognitive abilities were found as indicators to academic success (Miller et al., 2017) and a connection between cognitive function and emotions competence among neurotypical population (Denham et al., 2015).

emotion recognition and understanding studies among people with ASD were often with high functioning or Asperger population. From the scarce information in the literature, it seems that IQ variant is very influential on emotion recognition tasks in the different modalities, people with higher IQ functioned better in emotion recognition tasks (Jones et al., 2011; Mazzoni et al., 2020; Salomone et al., 2018). respectively, that will explain studies that did not found gaps in basic emotion recognition from different sensory cues among people with ASD. These study groups often included subject with IQ compatible to 6 years and above, and since in typical development basic emotion recognition is acquired until 5 years old, we can infer that the results can be explained by cognitive and linguistic skills (Castelli, 2005; Grossman et al., 2010)

IQ and memory measures were found to be strong predictable to emotion understanding and mental states in social situations (Buitelaar et al., 1999), when cognitive abilities influent executive functions development and language development, that in turn impact the exposer and experience in emotional – mental dialog, key factors to the development of mental state understanding (Astington & Edward, 2010; Lewis, & Carpendale, 2014; Michael Lewis et al., 2008)

however, while verbal and cognitive abilities predict development in different areas, the compatibility is far from being perfect. in many cases people with ASD present a mix and inconsistent picture of high cognitive abilities alongside difficulties in expressive language, often social function is dependent on emotional regulation, stress levels, environmental sensitivity and other challenges (Prizant, 2012)

Longitude studies have shown that sometimes people that were categorized with high functioning autism reported meaningful difficulties as they got older, they struggled with finding work, independently limited and had difficulty to create social connection to the point of socially isolated (Magiati et al., 2014).

These findings highlighted the need to redefine the functioning levels with other means except IQ. a functioning profile that reflects different skills, verbal and non-verbal communication, social abilities (for example initiating and maintaining social relationship) and daily activity functions. While for the most part cognitive measures and the functioning profile were compatible in the neurotypical population, people with autism tend to exhibit a lower functioning profile compared to their cognitive measures, these gaps are more prominent among people with ASD and high IQ levels (Duncan & Bishop, 2015). Alvares et al., (2020) reports that cognitive measures (IQ) did not reflect the functioning profile as the subjects were older. therefore, this component cannot stand on his own in order to determine functioning level.

the current research will compare emotional competence skills among children with ASD at different functioning levels, that will be determined by a wide functioning profile and will test the efficiency of a technological mediated intervention program in the different groups.

## Computer based intervention programs

Through the years many different intervention programs were developed to improve social understanding among children with ASD. most focused on high functioning children at school age, because IQ has been known to predict progress in different intervention programs (Bauminger et al., 2003; Ben-Itzchak & Zachor, 2007).

researches indicated positive learning curve in social skills, that include the ability to recognize emotions, but the results are divided in generalization of taught material on social functioning, that most often was assessed by indirect measures with no information on “real life” situations (Adibsereshki et al., 2015; Begeer et al., 2010; Fisher & Happé, 2005). Ratcliffe et al., (2014, 2019) studies is one of the few that examined emotional skill intervention programs among children with ASD with high cognitive abilities compared to intellectual disability. These studies indicated an improvement in the subject's emotional competence, but the results were measured by teachers’ questionnaires only with an advantage to children with high function ASD compared to children with ASD and intellectual disability and no such improvement was found in the parents’ questionnaires and other social measures.

in the past two decades there have been a raising interest in technologic based interventions to improve social skills among people with ASD. this interface developed based on the systemizing theory that claims people with ASD holds a preference to act on predictable patterns, a predictable environment with clear rules and overfocus in small details. this advantage to detect patterns can bridge social gaps if it is accessible in a suitable system, a computerized system offers many advantages, such as flexibility in learning pace, material repetitions, direct goals in a narrative that increases motivation, graduate complexity levels, selective options, reinforcements and rewards in the way to achieve goals (Fridenson-Hayo et al., 2017). these computer-based intervention programs that focused on social-emotional functions, have shown improvement in emotion recognition and understanding and pro-social skills (Eden & Oren, 2021; Hopkins et al., 2011; Ramdoss et al., 2012). few reports a positive impact on emotional language acquisition (Marino et al., 2019). However, these positive results have some important limitations: first, the chosen methodology. most of the intervention programs had studied only emotion recognition from facial expressions, some has included basic and complex emotions from from the speakers tone of voice in addition to facial expressions (Chen et al., 2016; Fridenson-Hayo et al., 2017; Gev et al., 2017; Golan et al., 2006; Tanaka et al., 2010). and a sole study had examined all modalities in basic and complex emotion recognition, the SG emotionally intervention program was tested on emotion recognition from facial expression, tone of voice and body language and integration to social situations (Fridenson-Hayo et al., 2017).

Another important limitation is the research group, most research has examined high function ASD subjects, similar to non-technological intervention programmers. the progress reported can be attributed to compensatory language and cognitive strategies. Hopkins et al. (2011) research reported an improvement in 6-15 years old children with asd and intellectual disability, but their research examines emotion recognition from facial expression only.

The third limitation is the generalization assessment of learned skills. emotion competence research examines generalization mostly with indirect measures like parents/teachers' questionnaires or structures tests. However, these measures do not reflect emotion competence that by definition is the ability to conduct natural social interaction with an reciprocal emotion exchange according to the situation (Collie, 2020).

there are some evidences of a connection between emotion competence improvement and prosocial behavior among children with ASD (Jahromi et al., 2021), however the ability to generalized learned skill and implement it in non-practice situations is considered especially challenging to people with ASD (de Marchena et al., 2015). In light of this it is vitally importance to incorporate intervention programs in the natural social environment in order to practice the learned skills (Bauminger-Zviely et al., 2013). children between the ages 5-18 years spend the majority of their time in the educational system, making social bonds, exposed to different cultures and experiencing life shaping events (Eccles & Roeser, 2015), moreover integrating children with disabilities with neurotypical children in the educational system has been found to advance social understanding (Smogorzewska et al., 2020)

LaCava., (2007) research is one of the few studies that examined if computer-based intervention program that focused on improving emotional competence will reflect in pro-social behaviors in natural setting, however this study had only 3 subjects at school age and in spite of positive findings to an uprise in positive social interactions, the findings were not significant, it is possible that it is attributes to small number of participants

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ASD is characterized with difficulties in social understanding and communication, the one of the key aspects is emotional competence, in other words the children ability to recognize and understand personal emotions and others emotional, to learn to regulate emotions use emotional knowledge to initiate and preserve social relationships (Denham et al., 2015).

children with ASD show from a young age difficulty to initiate interactions, low affect and inappropriate emotional responses to an environmental stimulus. the difficulties in perspective taking leads to mental representation failure (Gould et al., 2011)

Research literature indicates deficiency in multiple layers of emotional competence, starting with recognizing emotions from nonverbal cues that reflect in facial expressions, speaker's tone of voice and body language, difficulties to integrate the cues in social context and difficulty in acquiring emotional-mental vocabulary. nonetheless findings are not conclusive in basic emotion recognition and understanding, there are evidence that with age and high cognitive abilities people with ASD are able to reduce the gaps compare to neurotypical population (Jones et al., 2011; Mazzoni et al., 2020; Salomone et al., 2018). on the other hand, the functional difficulties in emotion recognition and understanding are more coherent on complex emotions (Fridenson-Hayo et al., 2016; Golan et al., 2015; Tracy et al., 2011). the common methodology to assess emotion recognition is from visual cues in facial expression, very few studies have examined prosodic changes in the speaker's voice or visual cues from body language. (Fridenson-Hayo et al., 2016, 2017; Mazzoni et al., 2020; Metcalfe et al., 2019). The current study will address to emotion recognition from all the 3 modalities

In the past two decades computer-based interventions came more to light, on account of the many advantages they offer to the ASD community, these programs are developed to teach emotion recognition and mental state understanding. These intervention program findings are encouraging and show a learning curve in social emotional skills but the results are inconclusive for generalization to natural social situations. Only a few of the studies had paid attention to the emotional language component, which offers representation to the children’s inner emotional world. in addition, most researches focused on high functioning autism without supplying information to the majority of the ASD population that are diagnosed with cognitive and verbal disabilities (Begeer et al., 2010; Fridenson-Hayo et al., 2017; Golan et al., 2006; Marino et al., 2019; Tanaka et al., 2010)

In the current research we offer computer-based intervention programs aiming to enhance emotional competence aiming at children with ASD in various functioning levels. the intervention applies to the different components of emotional competence: emotion recognition from the sensory channels, emotion understanding in social context and emotional-menta vocabulary/ we will examine if and how practicing emotional competence skills in the classroom will indirectly affect social skills in real time situations

# Research questions and hypotheses

**research questions:**

1. Will the computer-based intervention program promote emotion competence among children with ASD in different functioning level compare to children with ASD and neurotypical children with no intervention. And to what extent?
2. Will the improvement in emotion competence affect socio-emotional functioning in natural environment?
3. Will the emotion competence and social functioning changes be maintained over time?

**Research hypotheses:**

Before the intervention program:

1. The ASD group would have lower scores om the 3 different emotional competence components (emotional recognition from the different modalities (facial expression, tone of voice and body language), emotion understanding in social context, emotional-mental vocabulary, compare to the neurotypical group.

This hypothesis is based in the gaps found among children with ASD in the acquisition of the different emotion competence skills compare to neurotypical children (Chaidi & Drigas, 2020; Fridenson-Hayo et al., 2016; Kauschke et al., 2016; Mazzoni et al., 2020; Peterson et al., 2015b)

2. the high functioning ASD group will have higher scores in the 3 different emotional competence components compare to children with lower functioning ASD.

This hypothesis is based on the connection found between high cognitive ang lingual functions as a mediator to emotion recognition and understanding skills. Children with high functioning ASD have high cognitive ability and age-appropriate language, that facilitates higher emotional competence functioning compare to children with lower functioning level tjat have intellectual disability and language delays (Jones et al., 2011; Mazzoni et al., 2020; Salomone et al., 2018).

1. The differences between basic emotion recognition scores and complex emotion recognition will be grater among children with ASD compare to neurotypical children. This hypothesis is based on gaps found in complex emotion recognition among children with different functioning levels, compare to basic emotion recognition which some researches indicated age-appropriate functioning among children with high functioning ASD and Asperger syndrome. The difficulties in the complex emotions were attributed to context and mental state dependency (Fridenson-Hayo et al., 2016; Golan et al., 2015; Tracy et al., 2011)

After the intervention program

1. The experiment group scores (children with high and low functioning ASD) in the 3-emotional competence component will be significantly higher compare to the scores before the intervention, and this improvement will be maintained 10 weeks after the end of the intervention
2. The experiment group improvement in the 3 emotional competence components after the intervention will be significantly higher than the changes un the ASD control group that did not take part of the intervention
3. The gap between the research group and the neurotypical control group scores will be diminished after intervention

Hypotheses 1-3 are supported by interventional studies that indicated that children with ASD can learn socio-emotional skills (Begeer et al., 2010; Fridenson-Hayo et al., 2017; Golan et al., 2006; Marino et al., 2019; Tanaka et al., 2010)

1. The high function ASD experimental group scores will be higher in the 3 emotional competence components compare to the lower functioning ASD experimental group scores. This hypothesis is based on evidence that the IQ and verbal memory functions influence emotion recognition and understanding and mental state understanding (Buitelaar et al., 1999; Jones et al., 2011; Mazzoni et al., 2020; Ratcliffe et al., 2014, 2019; Salomone et al., 2018)
2. The experiment group scores after the intervention in social functioning measures will be higher compare to their scores before the intervention, and the improvement will maintain 10 weeks after the of the program
3. Children in the experiment group with high functioning ASD will have greater improvement in social functioning measures compare to children I the experiment group with lower functioning functioning
4. Children with high functioning ASD in the experiment group will have greater improvement in social functioning measures compare to high functioning ASD children in the control group.

Hypotheses 5-7 are based in evidence that there is a connection between advancement in emotional competence and pro-social behaviors among children with ASD (Jahromi et al., 2021), the impact on such unpracticed measures was found on a few studies that indicated improvement in social functioning and social interaction increase when emotional skills were practiced (Fridenson-Hayo et al., 2017; LaCava et al., 2007)

# Method

## Participants

The current research will include a total of 120 children, divided to 3 research groups: (1) experiment group - 30 children with high functioning autism, first to third grade, and 30 low functioning children forth to sixth grade. That will take part on the intervention program . (2) control group of 60 age and function compatible children with ASD that will have treatment as usual without the intervention (3) second control group of 30 neurotypical children. Matches by gender, and cognitive-language abilities, with no intervention program. All participants will have above 6 years language and cognitive abilities, and normal hearing and eyesight. Additional disabilities (for example: attention or learning disability) will be noted and taking into account at subject selection and match control groups.

The intervention program will be administered in special education classes and will include the all class, fir the research needs only the children selected to the research groups will be examined. The program will be delivered by a certified educational faculty (special education teacher or a speech therapist)

## Design and procedure

### Sorting measures:

ADOS-2- Autism Diagnostic Observation Schedule (Lord et al., 2012) -

(ADOS™-2) is a standardized assessment of communication, social interaction, play, and restricted and repetitive behaviors in children. During an ADOS™-2 assessment, a specialist interacts directly with the child in social and play activities.

This tool includes 4 modules customized to the subject age and functioning level ( non-verbal children from 31 month and above, children with non-fluent language, children with a fluent language and a module for speaking teenagers and adults). ADOS-2 has high reliability G(q,k) = .85-.92 (Zander et al., 2016).

ABAS-II - Adaptive Behavior Assessment System (Gray & Carter, 2013)

provides a comprehensive norm-referenced assessment of the adaptive skills of individuals ages birth to 89 years. The ABAS–II provides for the assessment of an individual by multiple respondents (e.g., parents, teachers, family members, the individual), evaluates function across multiple environments, and contributes to a complete assessment of the daily functional skills of an individual. This measure evaluates 10 adaptive domains: communication. Functional academics, self-direction. Leisure, social. Community use, home / school living health and safety, self-care and work. Internal Consistency is reports high, average reliability coefficients of the skill areas across age groups are typically in the .90s, ranging from .85 to .97.

ABAS-II was translated to Hebrew and standardized by PsychTech Ltd. In the current study the participants parents will complete the assessment before the intervention program commence.

Wechsler Preschool and Primary Scale of intelligence (WISC-IV) ) (Wechsler, 2011) - the test is design to 6-16:11 years old children. two subtests from the WISC-IV will be used, matrix reasoning and vocabulary representing performance and verbal IQ. Metrix reasoning is a non-verbal task that presents a series of pictures with a missing component and the child is asked to find the missing picture suitable to the series from 5 options. In the vocabulary sub scale the child is asked direct questions on the meaning of different words. The test has high test-retest reliability (r=.90).

### Emotional competence measures

emotion recognition test (Fridenson-Hayo et al., 2017)

- this test includes 4 tasks to examine emotion recognition: 1. facial expressions videos that was extracted from mindreading (Golan et al., 2006) 2. decontextualized vocal utterances from EU-Emotion stimulus set (Lassalle et al., 2019) 3. body language videos from EU- (Lassalle et al., 2019) Emotion stimulus, the actors’ faces were blurted in order to exclude facial cues 4. Integrative video clips presenting all 3 modalities in context., these clips were extracted from old television shows (Golan et al., 2008), sound track was muffled in order to prevent semantic information, but keep prosodic cues. The test was adjusted to the current research, it was reduced to include only the 8 emotions in the intervention program, and this evaluation point was added to evaluate effect maintenance. The test was validated with 36 neurotypical Hebrew speaking children ages 6-10 years. The items selected were approved with above 50% recognition rate (*p*<.01, binomial test), and none of the distractors were selected above 33%.

In the test, for every video or recording 4 answers are presented - the chosen emotion and 3 distractors, one distractor is in the opposite effect (positive / negative) from the target emotion (for example: for “sad” the distractor will be “happy”) and the other 2 distractors will have the same effect to the target emotion (for example: for “angry” the distractors will be “disgust” “afraid”). The order of the possible answers was counterbalanced. In each modality the subject can achieve 0-8 points, a point for every emotion recognized correctly. The internal reliability was reported r= .61 r= .75 (Fridenson-Hayo et al., 2017) (appendix 3)

TEC - Test of Emotion Competence (Pons & Harris, 2000)

- this test was design to assess emotion understanding in 3-12 years old children, it is based on Pons et al., 2002) model of 9 developmental stages to emotion understanding among children.

In the test, the subjects are presented with 23 illustrated pictures, in a boy and girl versions. In the first 5 scenarios the child is asked to recognize basic emotions from facial expressions, Next, the child is presented with short stories and the illustrated picture is missing emotional cues in the character face. The examiner reads the story and the child is asked to chose the correct emotion from 4 options. Maximum scoring 21 points (appendix 4)

TEC is reported with high test-retest reliability (*r* (18) = .84) (Pons et al, .2002) and good compatibility to cognitive and verbal skills (Tenenbaum et al., 2016).

Emotional mental lexicon:

the lingual component will be assessed in two parts: (1) definition and description task to emotional words. In this task we will assess the subject’s ability to define the 8 emotions practices in the program (for example: “please explain what is happy?”) and 4 emotions that were not included (disgust, ashamed, disappointed, frustrated) and they are asked to give examples to personalize experience related to each of the emotions. The definition and examples will be scored by two independent judges, according the subscale vocabulary in WIPPSO (APENDIX 5) (Gev et al., 2017). (2) spontaneous emotional vocabulary - in this task the lingual assessment if Mayer (2003) picture books, these stories convey cognitive emotional situations. The subjects are asked to look freely int the pictures and afterwards to tell the story. The children performance will be audio recorded and analyzed according to the katzenberger story sub section, 12 points max (katzenberger, 2002) (appendix 6), the use of mental verbs and emotional words will be coded by the mental verbs table (Egoz-livshtein, 2007) (appendix 7)

#### Socio-communicative measures

The school-age form (4 to 18 years) of the Social Responsiveness Scale, 2nd edition (SRS-2) (Constantino & Gruber, 2012) was used to assess severity of autism traits. The SRS2 measures social awareness, social communication, social motivation, social cognition and inflexible behaviors applying a dimensional concept of autism, and has demonstrated good intercultural validity ( Bölte, Poustka, & Constantino, 2008). The SRS-2 includes 65 items, each scored on a 4-point Likert scale, from 0 (“not true”) to 3 (“almost always true”), yielding a maximum of 195. Out of the 65 items of the SRS-2, 53 focus on socialcommunicative abilities, these items examine the ability to interpret social cues, to maintain social conversation, as well as to initiate social interaction (e.g. “Doesn’t recognize when others are trying to take advantage of him or her”). The 12 remaining items probe repetitive behaviors or restricted patterns of interest (e.g. “Shows unusual sensory interests or strange ways of playing with toys”). The SRS-2 has demonstrated with good to excellent reliability and validity r-.88-.95 (Bruni, 2014)

social functioning in a natural setting

socio-emotional functioning will be evaluated by playground observation and coded by POPE - Playground Observation of Peer Engagement (Kasari, Rotheram-Fuller, & Locke, 2005). This instrument measures behavioral engagements for 10 minuts, each minute is divided to 40 second observation and 20 seconds for coding. The behavioral components include interactions with peers, the type of interaction (conversation, symbolic game, parallel game, observing others, isolation) and the amount of interaction time. the observers will be trained to a internal reliability of r> 80. (Appendix 8)

### Intervention program

EmotiPlay is a computer-based psych-educational program, that teaches recognition and understanding of emotions to children with ASD. EmotiPlay’s storyline includes the professor and his assistant, Max, inviting the users to be explorers in a research camp, and research the different emotional cues. The first two units are devoted to introduction to emotions and then there are 7 units, each to a different emotion (happy, sad. Anger, surprise, pride, kind and unfriendly are joined lesson). In every unit there are 4 lessons: introduction to the target emotion. Facial expression. Tone of voice and body language. Total of 36 lessons, that are administered twice a week for 18 weeks (examples on appendix 2). The lessons are taught in a class setting, each lesson has 4 main components: 1. A short animated video of the professor and Max to introduce the lesson subject 2. Human actors’ videos / recordings to observe and explore the target emotion cues 3. Fun activities for practicing the emotional cues 4. Group discussion

### Procedure

The research will be approved by the ethics committee at Bar-Ilan university and the

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The research team will contact schools in central Israel, that ingrate special education classroom to children with ASD. Schools selection will be according to the number of integrated pupils suitable to the research criteria, suitable facilities and the educational staff and after the approval of the head teacher and faculty. In the first stage we will implement a pilot that includes 8 children from each grade and a control group of 20 neurotypical children (first to third grade). The full intervention program will be administered in order to evaluate the adaptation to school environment, and all of the evaluation measures will be implemented before and after the intervention.

In the next stage the intervention will be administered to all of the research and control group children.

The research will include 4 stages: (1) pre-intervention- parents approval and background questioners, and sorting measures evaluation (ABAS-II, Weschler, ADOS-2). The children will be divided to research and control groups and be evaluated by emotional competence measures and social functioning measures. a child that did not meet the criteria specified will continue the intervention program with the class but will not complete the rest of the evaluations. (2) intervention program will be administering in the special education classrooms by a certified education faculty for 18 weeks, twice a week. At the end of each lesson the teacher fills a report to monitor attendance, children participation and feedback (appendix 9) (3) post intervention- emotional competence and social functioning measures (4) 10 weeks after the end of the intervention - emotional competence and social function measures

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### Appendix no.1 background questionnaire

Child’s name:

Childe social sequirity number:

Child’s age:

Name of school:

Grade:

Child’s gender: male / female

Country of birth: Israel / other (please specify:\_\_\_\_\_\_\_\_\_)

Second anguage: English / Arabic / russian / Amharic / other

Educational framework : regular classroom / small classroom in a regular school / special school

A what age did your chold diagnosed?

Are there any additional disabilities?

The background information will be collected via Qualtrics:

<https://biusocialsciences.eu.qualtrics.com/jfe/form/SV_85JrAd8r2rr9oI6>

### Apendix no.2: examples to EmotiPlay intervention program

Every unit presents a specific emotion, in 4 classes:

Introduction, facial expression, tone of voice and body language

Every ine of the classes includes 5 main components:

* + - 1. Animated video that presents the subject for the class
      2. Real actors’ videos and recording to explore the emotional cues
      3. A fun experimental practice
      4. Class discussion
      5. summarize

דוגמא פרק שמחה מבוא -

|  |  |  |  |
| --- | --- | --- | --- |
|  | שם השיעור | תיאור המשימה | דוגמא |
|  | וידאו קצר עם צוות המחקר | סרטון אנימציה של הפרופסור ומקס |  |
| התבוננות וחקר הרמזים הרגשיים | חידון קטן | שאלות הבנה על החומר שהועבר בסרטון אנימציה |  |
| נראה אם תדעו... | האם זה מצב משמח?  האם תוכלו לתת דוגמאות למצבים משמחים נוספים? |  |
|  | צופים וחוקרים | צפייה בשני סרטונים של שחקנים אמיתיים המציגים מצבים משמחים והשוואת התגובות שלהם |  |
| תרגול חוויתי להמחשת הנלמד | משימת סקר | מה גורם לאנשים להיות שמחים?  הילדים מתבקשים לראיין אנשים שהם מכירים ולבחון מה גורם להם להרגיש שמחים |  |
| משהו כייפי לעשות | מצאו, ציירו או צלמו תמונה שעוררת בכם שמחה ושלחו אותה לקבוצה. למה התמונה מעוררת בכם שמחה? |  |
| דיון קבוצתי | משתפים במחשבות | נסו להיזכר במצבים שבהם הרגשתם שמחה. שפרו עליהם לראש הקבוצה.  להמחשה, תוכלו להוסיף תצלום או ציור. |  |
| סיכום | ועכשיו נסכם! | שאלות חזרה להערכת הבנת החומר שתורגל |  |

דוגמא פרק שמחה הבעות פנים-

|  |  |  |  |
| --- | --- | --- | --- |
|  | שם השיעור | תיאור המשימה | דוגמא |
| הצגת הנושא | וישאו קצר עם צוות המחקר | סרטון אנימציה של הפרופסור ומקס |  |
|  | חידון קטן | שאלות הבנה על החומר שהועבר בסרטון אנימציה |  |
|  | מסבירים פנים | צפו בסרטון של אריק. אילו סימנים לשמחה אפשר לראות בהבעת הפנים שלו? 1. לחיים עגולות 2. חיוך גדול 3. עיניים צרות 4. קמטים קטנים בקצוות העיניים |  |
|  | מבחינים בסימנים | שאלות זיהוי סימנין לשמחה בפנים תוך השוואה של 2 סרטונים |  |
|  | ניסוי | טבלת דיווח - השוואת סימנים בפנים לשמחה בהשוואת תמונות |  |
|  | משימת אתגר | קחו מראה קטנה והתבוננו בפנים שלכם. נסו לעשות פרצופים ולהיראות:  1. טיפ טיפה שמחים 2. די שמחים  3. ממש שמחים  4. שמחים עד השמיים! |  |
|  | שחקו אותה | אתם יודעים מה מדליק בשמחה? היא מידבקת! כשאדם שמח זה משפיע על האנשים בסביבתו. זה ככה גם עם חיוכים וצחוקים. רוצים לנסות? שחקו במשחק הזה: 1. שבו במעגל או בכל דרך שתאפשר לכם לראות זה את זה. 2. כל אחד בתורו מנסה להישאר אדיש ולא לצחוק בזמן שכל שאר המשתתפים מנסים להצחיק אותו בכל דרך אפשרית: צחוקים, פרצופים מצחיקים, מה שתרצו (אבל היי! בלי נגיעות ובלי דגדוגים!) |  |
| סיכום | ועכשיו נסכם |  |  |

**לבחינת תכנית ההתערבות המלאה:**

כתובת: <https://emotiteam.com/>

משתמש: Child\_Bar

סיסמה: Emoti123

## Apendix no.3 examples to emotion recognition test(Fridenson-Hayo, 2017)

|  |  |  |
| --- | --- | --- |
| Emotion recognition from facial expression | Emotion recognition from body language | Integration task |
| How does the girl feel? | How does the he feel? | How does the girl feel at the end of the video? |
| 1. proud 3.**sad** 2. disgusted 4. afraid | 1. **angry** 2. happy   3. surprised 4. disgusted | 1. disgusted 2. surprised  3. happy 4. **angry** |

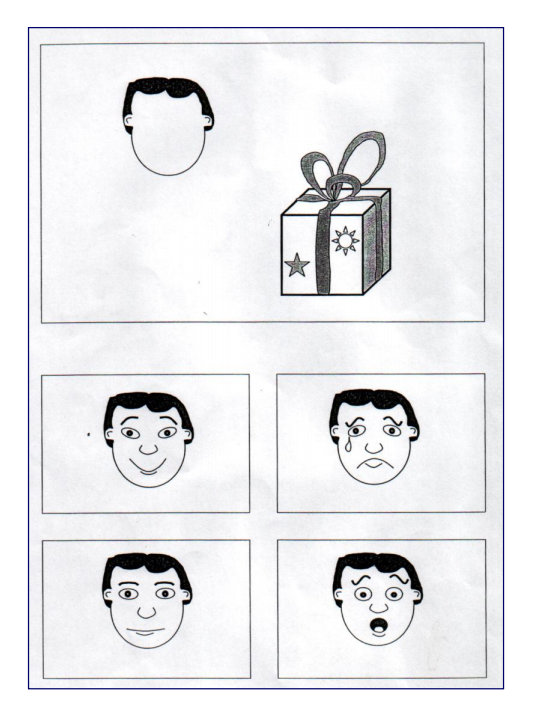
## 

## Apendix no.4 Test of Emotion Comprehention (TEC) (Cavioni et al., 2020)

Example: page 7

The child is getting a birthday present

How does the boy feel? Happy / sad / alright / afraid

****

## Apendix no.5 : emotional -mental vocabulary first task

## (Golan et al, [2010](about:blank); ; Gev, Rosenan & Golan, [2016](https://www.researchgate.net/publication/309702562_Unique_effects_of_The_transporters_animated_series_and_of_parental_support_on_emotion_recognition_skills_of_children_with_ASD_Results_of_a_randomized_controlled_trial))

The subjects are asked to define 8 emotions included in the intervention program and 4 emotionas that are not included (“explain what is happy?”, and give each one a personliza experience example (“describe a situation that you felt happy”)

The definitions and examples will be examined and scored by two independent judges, 0,1,2 points will be credited accordind to the WPPSI rational. A 2 point answer will include at list one synonym, a key feature to the target emotional word, and descriptive features that indicate emotion inderstanding or a precise example. 1 point answer will include the use of a synonym that is not accurate, descriptive features that are not conclusive or nor precise and a partial example. 0 points will be given to a vage, associative or trivial description and incorrect definition (Gev et al., [2016](https://www.researchgate.net/publication/309702562_Unique_effects_of_The_transporters_animated_series_and_of_parental_support_on_emotion_recognition_skills_of_children_with_ASD_Results_of_a_randomized_controlled_trial))

## Appendix no.6 : emotional -mental vocabulary second task

Spontaneuse emotional mental vocabulary will be assessed by Mayer (2003) picture books. The 3 selected stories are: (A boy, a dog and a frog / Frog, where are you? / Frog on his own)

The child is given in each evaluation point one of the books and asked to look at the pictures in his own pace and then to tell the story while browsing in the pictures a second time. The story will be audiotape and the narrative will be analyzed using the subscale “story” of the katzenberger test, the vocabulary will be assessed by the Egoz-Livshtein (2014) emotional-mental table

Example to Mayer (2003) story:

** **

** **

** **

** **

****

Subscale story - katzenberger test (2002)

Features analyzed in the story:

1/ connection between text and picture might accrued in two ways:

* An accurate description of the events in the pictures (0.5 point) for example: “now the boy is going and the frog is jumping”
* A story according to the pictures (1 point) for example: “one time the boy went for a walk in the woods and took the frog, all of a sudden the frog jumped from the bucket”
* Connections between the text events can occur in 4 ways:
* Text for every picture separately that do not create a temporal connection between the events in the same picture (0.5 point)
* Text that creates a temporal connection between the events displays in the picture but not events in different pictures (1 point)
* Text that creates temporal connection between events in sequential pictures (1.5 point)
* A integrative text that connects the different events to an hierarchic structure (all the text events are an extension of the problem / goal that is presented at the start and leads to the solution at the end) (2 points)

1. Story opening with creaturized dialogue cues
2. Dynamic text with half of the syntax clause connected to events (1 point) (meaning they answer the question - “what happened?”)
3. Text evaluation components include indicating the problem / goal or the results (addressing the problem - 1 point, addressing the solution - 1 point)
4. Script components - the text includes a specific phrase that uses a typical lexical feature of the script (1 point), the participants (1 point) accessories or specific qualities (1 point)
5. Character reference - a clear identification of the main character throughout the story (2 points)

## Appendix no.7 : mental verbs table (Egoz-livshtein, 2009)

בלוח מוצגים כל הפעלים המנטאליים שהוצאו מתוך מילון ההווה (בהט ומישור, 1995) וחולקו בחלוקות שונות עפ"י מודל הפעלים המנטאליים מתוך עבודתה של אגוז ליבשטיין (2009).

הלוח מציג את שלושת החלוקות השונות המוכללות במודל בפעלים המנטאליים:

1.**חלוקה מורפולוגית**- העיקרון המארגן של לוח זה, בציינו פעלים, הוא השורש. כנגד כל שורש מצויינים הפעלים המנטאליים הנגזרים ממנו בבניינים השונים בעברית .

2.**חלוקה תחבירית**- הפעלים השייכים לתת הקבוצות השונות מסומנות במודל מסומנים בסימונים הבאים

**פעלים מנטאליים קאנונים בסיסיים** – פעלים בהם הנושא חווה מצב מנטאלי, אינם מסומנים.

**פעלי גרימה מנטאליים**- מסומנים בכוכבית - \*

**פעלי גרימה סבילים**- מסומנים ב- ˆ

**פעלים מנטאליים כפולים** מסומנים בקו תחתי

3.**חלוקה סמנטית- פראגמטית** – הטור הימני בלוח מחלק את הפעלים המנטאליים השונים בבניינים השונים לתת הקבוצות – **פעלים מודאליים, פעלים המביעים רגשות ותחושות , פעלים קוגניטיביים.**

בכל תת קבוצה שורשי הפעלים מסודרים לפי הא"ב.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | שורש | קל | פעול | נפעל | פיעל | פועל | הפעיל | הופעל | התפעל |
| 1.פעלים מודאליים | ח.מ.ד | חמד |  |  |  |  |  |  |  |
| ח.פ.צ | חפץ |  |  |  |  |  |  |  |
| י.כ.ל | יכול |  |  |  |  |  |  |  |
| כ.מ.ה | כמה |  |  |  |  |  |  |  |
| ע.ג.ב | עגב |  |  |  |  |  |  |  |
| צ.ר.כ |  |  |  |  |  |  |  | הצטרך |
| ר.צ.י | רצה |  |  | ריצה\* |  |  |  | התרצה |
| 2.פעלים המציינים רגשות ותחושות | א.ב.ל |  |  |  |  |  |  |  | התאבל |
| א.ה.ב | אהב | אהוב\* | נאהב\* |  |  |  |  | התאהב |
| א.ה.ד | אהד | אהוד\* |  |  |  |  |  |  |
| א.ו.י |  |  |  |  |  |  |  | התאווה |
| א.כ.ז.ב |  |  |  | אכזב\* | אוכזב |  |  | התאכזב |
| א.מ.ל.ל |  |  |  | אמלל\* |  |  |  | התאמלל |
| א.ש.ש |  |  |  |  | אושש |  |  | התאושש |
| ג.נ.י |  |  |  | גינה | גונה |  |  |  |
| ג.ע.ג.ע |  |  |  |  |  |  |  | התגעגע |
| ג.ע.ל |  |  | נגעל |  |  | הגעיל\* |  |  |
| ג.ר.י |  |  |  | גירה\* |  |  |  | התגרה |
| ד.א.ב | דאב |  |  |  |  | הדאיב\* |  |  |
| ד.א.ג | דאג |  |  |  |  | הדאיג\* | הודאג |  |
| ד.ה.מ |  |  | נדהם |  |  | הדהים\* | הודהם |  |
| ד.ח.י | דחה |  | נדחהˆ |  |  |  |  |  |
| ד.כ.א |  |  | נדכא | דיכא\* |  |  |  |  |
| ד.כ.ד.כ |  |  |  | דכדך\* | דוכדך |  |  |  |
| ה.פ.ר.ס |  |  |  | דפרס\* | דופרס |  |  |  |
| ה.נ.י |  |  | נהנה |  |  |  |  |  |
| ז.ל.ז.ל |  |  |  | זלזל |  |  |  |  |
| ז.ע.ז.ע |  |  |  | זעזע\* |  |  |  | הזדעזע |
| ז.ע.מ | זעם |  |  |  |  | הזעים\* |  | הזדעם |
| ח.ב.ב |  |  |  | חיבב |  |  |  | התחבב\* |
| ח.ו.ש | חש |  |  |  |  |  |  |  |
| ח.מ.ל | חמל |  |  |  |  |  |  |  |
| ח.ש.ק | חשק |  | נחשקˆ |  |  |  |  | התחשק |
| ח.ש.ש | חשש |  |  |  |  |  |  |  |
| ט.מט.מ |  |  |  | טמטם\* |  | היטמטם |  |  |
| ט.ר.ד | טרד |  | נטרד |  |  | הטריד\* | הוטרד |  |
| י.א.ש |  |  | נואש | ייאש\* |  |  |  | התייאש |
| י.ס.ר |  |  |  | ייסר\* |  |  |  | התייסר |
| י.ר.א | ירא |  |  |  |  |  |  | התיירא |
| כ.א.ב | כאב |  |  |  |  |  |  |  |
| כ.ב.ד |  |  |  | כיבד |  | הכביד\* |  |  |
| כ.ז.ב |  |  | נכזב | כיזב |  | הכזיב\* |  |  |
| כ.מ.ר |  |  | נכמר |  |  | הכמיר |  |  |
| כ.ל.מ |  |  | נכלם |  |  |  |  |  |
| כ.ע.ס | כעס |  |  |  |  | הכעיס\* |  | התכעס |
| ל.ה.ב |  |  | נלהב |  |  | הלהיב\* |  | התלהב |
| ל.ח.צ |  | לחוץ | נלחץ |  |  | הלחיץ\* |  |  |
| מ.א.ס | מאס |  |  |  |  | המאיס\* |  |  |
| מ.ר.מ.ר |  |  |  | מרמר\* |  |  |  | התמרמר |
| נ.ח.מ |  |  |  | ניחם\* |  |  |  | התנחם |
| נ.ע.מ |  |  |  |  |  | הנעים\* |  |  |
| ס.ל.ד | סלד |  |  |  |  | הסליד\* |  |  |
| ס.מ.פ.ת |  |  |  | סמפת |  |  |  |  |
| ס.ע.ר |  |  | נסער |  |  |  |  |  |
| ס.פ.ק |  |  |  |  |  |  |  | הסתפק |
| ע.ו.ב |  |  |  |  |  | העיב\* |  |  |
| ע.ו.ד |  |  |  |  | עודד |  |  | התעודד |
| ע.ו.ק |  |  |  |  |  | העיק\* |  |  |
| ע.ל.ב | עלב |  | נעלב |  |  | העליב\* | הועלב |  |
| ע.מ.ק |  |  |  |  |  |  |  | התעמק |
| ע.נ.ג |  |  |  | עינג\* |  |  |  | התענג |
| ע.צ.ב |  | עצוב | נעצב |  |  | העציב\* |  | התעצב |
| ע.צ.ב.נ | עצבן |  |  | עיצבן\* |  |  |  | התעצבן |
| ע.ר.ג | ערג |  |  |  |  |  |  |  |
| ע.ר.צ |  |  | נערץ\* |  |  | העריץ |  |  |
| פ.ג.ע | פגע\* |  | נפגע |  |  |  |  |  |
| פ.ח.ד | פחד |  | נפחד |  |  | הפחיד\* |  |  |
| פ.ל.א |  |  |  |  |  | הפליא\* |  | התפלא |
| פ.ע.מ |  |  | נפעם |  |  |  |  | התפעם |
| פ.ת.י |  |  |  | פיתה |  |  |  | התפתה |
| צ.ב.ר.ח |  |  |  | צברח\* |  |  |  | הצטברח |
| צ.ח.ק |  |  |  |  |  | הצחיק\* |  |  |
| צ.ע.ר |  |  |  | ציער\* |  |  |  | הצטער |
| ק.ל.ל |  |  |  | קילל | קולל | הקל |  |  |
| ק.נ.א |  |  |  | קינא |  |  |  | התקנא |
| ק.ס.מ |  |  |  |  |  | הקסים\* | הוקסם |  |
| ק.ש.י. |  |  |  |  |  | הקשה\* |  |  |
| ר.ג.ז | רגז |  |  |  |  | הרגיז\* |  | התרגז |
| ר.ג.ע |  | רגוע | נרגע |  |  | הרגיע\* |  | התרגע |
| ר.ג.ש | רגש |  | נרגש | ריגש\* |  | הרגיש |  | התרגש |
| ר.ח.מ |  |  | רחום | ריחם |  |  |  |  |
| ר.כ.ז |  |  |  |  |  |  |  | התרכז |
| ר.מ.י |  |  |  | רימה | רומה |  |  |  |
| ר.ע.ש |  |  | נרעש |  |  |  |  |  |
| ר.צ.נ |  |  |  |  |  | הרצין |  |  |
| ר.ת.ע |  |  | נרתע |  |  | הרתיע\* |  |  |
| ש.ו.צ |  |  |  |  |  | השוויץ |  |  |
| ש.ו.ק |  |  |  |  |  |  |  | השתוקק |
| ש.מ.ח | שמח |  |  | שימח\* |  |  |  |  |
| ש.נ.א | שנא |  | נשנאˆ |  |  |  |  |  |
| ש.ע.מ.מ |  |  |  | שיעמם\* |  |  |  | ש\השתעמם |
| ש.ע.ש.ע |  |  |  | שעשע\* |  |  |  | השתעשע |
| ש.פ.ל |  |  |  |  |  | השפיל | הושפל |  |
| ת.ס.כ.ל |  |  |  | תסכל\* | תוסכל |  |  |  |
| ת.ע.ב | תעב |  |  | תיעב |  |  |  |  |
| 3.פעלים קוגניטיביים | א.ב.ה | אבה |  |  |  |  |  |  |  |
| א.ז.ר | אזר |  |  |  |  |  |  | התאזר |
| א.ל.צ |  |  | נאלץ | אילץ\* | אולץ |  |  |  |
| א.מ.נ |  |  | נאמן |  |  | האמין |  |  |
| א.נ.ש |  |  |  |  |  | האניש |  |  |
| א.פ.י.נ |  |  |  | איפיין |  |  |  |  |
| א.ש.מ |  |  |  |  |  | האשים | הואשם |  |
| א.ש.ר |  |  |  | אישר | אושרˆ |  |  |  |
| ב.ד.ה | בדה |  |  |  |  |  |  |  |
| ב.ו.נ |  |  |  |  |  | הבין | הובןˆ |  |
| ב.ח.נ | בחן |  |  |  |  | הבחין |  |  |
| ב.ח.ר | בחר |  | נבחר\* |  |  |  |  |  |
| ב.ט.ח | בטח | בטוח |  |  |  | הבטיח | הובטח\* |  |
| ב.כ.ר |  |  |  | ביכר |  |  |  |  |
| ב.ל.ב.ל |  |  |  | בלבל\* |  |  |  | התבלבל |
| ב.ל.ג |  |  |  |  |  | הבליג |  |  |
| ב.ס.ס |  |  |  | ביסס |  |  |  |  |
| ב.ר.ר | ברר |  |  |  |  |  |  |  |
| ג.ב.ר |  |  |  |  |  |  |  | התגבר |
| ג.ב.ש |  |  |  | גבש | גובשˆ |  |  | התגבש\* |
| ג.מ.ש |  |  |  |  |  |  |  | התגמש |
| ד.ג.ל | דגל |  |  |  |  |  |  |  |
| ד.ח.ק |  |  |  | דמיין |  | הדחיק\* |  |  |
| ד.מ.י.נ |  |  |  |  |  |  |  |  |
| ה.ג.י | הגה |  |  |  |  |  |  |  |
| ה.ז.י. | הזה |  |  |  |  |  |  |  |
| ה.ס.ס |  |  |  | היסס |  |  |  |  |
| ה.ר.ה.ר |  |  |  | הרהר |  |  |  | התהרהר |
| ו.ד.א |  |  |  | ווידא |  |  |  |  |
| ו.ת.ר |  |  |  | וויתר |  |  |  |  |
| ז.ה.י |  |  |  | זיהה |  |  |  | הזדהה |
| ז.כ.ר | זכר |  | נזכר |  |  | הזכיר\* |  |  |
| ח.ב.ר |  |  |  |  |  |  |  | התחבר |
| ח.כ.מ |  |  |  |  |  | החכים |  | התחכם |
| ח.ל.ט |  |  |  |  |  | החליט | הוחלטˆ |  |
| ח.ל.מ | חלם |  |  |  |  |  |  |  |
| ח.נ.כ |  |  |  | חינך | חונך |  |  | התחנך |
| ח.ק.ר | חקר |  |  |  |  |  |  |  |
| ח.ר.ד |  |  | נחרד |  |  | החריד\* |  |  |
| ח.ר.ט |  |  |  |  |  |  |  | התחרט |
| ח.ש.ב | חשב |  | נחשב\* |  |  | החשיב |  | התחשב |
| ח.ש.ד | חשד |  | נחשדˆ |  |  | החשיד | הוחשד |  |
| ט.ע.ה | טעה |  |  |  |  |  | הוטעה |  |
| י.א.ל |  |  |  |  |  | הואיל |  |  |
| י.ד.ד |  |  |  |  |  |  |  | התיידד |
| י.ד.ע | ידע |  | נודעˆ | יידע\* |  |  |  | התוודע |
| י.ח.ל |  |  |  | ייחל |  |  |  |  |
| י.ח.ס |  |  |  | ייחס | יוחסˆ |  |  | התייחס |
| י.כ.ח |  |  |  |  |  | הכיח | הוכחˆ |  |
| י.צ.ע |  |  |  |  |  | הציע | הוצעˆ |  |
| י.ק.ר |  |  |  |  |  |  | הוקיר |  |
| י.ת.ר |  |  |  |  |  | התיר |  |  |
| כ.ו.נ |  |  |  |  |  |  |  | התכוון |
| כ.ח.ש |  |  |  |  |  | הכחיש |  | התכחש |
| כ.ר.ח |  |  |  |  |  | הכריח | הוכרח |  |
| ל.ב.ט |  |  |  |  |  |  |  | התלבט |
| ל.מ.ד | למד |  | נלמדˆ | לימד\* |  |  |  | התלמד |
| מ.ד.ד |  |  |  |  |  |  |  | התמודד |
| מ.ח.ל | מחל |  | נמחלˆ |  |  |  |  |  |
| מ.ל.כ |  |  | נמלך |  |  |  |  |  |
| מ.ל.צ |  |  |  |  |  | המליץ | הומלץˆ |  |
| מ.ס.ר |  |  |  |  |  |  |  | התמסר |
| מ.צ.א |  |  |  |  |  | המציא |  |  |
| מ.ת.נ |  | מתון |  |  |  |  |  | התמתן |
| נ.ב.א |  |  |  | ניבא |  |  |  |  |
| נ.ח.ש |  |  |  | ניחש |  |  |  |  |
| נ.כ.ר |  |  |  |  |  | הכיר | הוכרˆ | התנכר |
| נ.ס.ק |  |  |  |  |  | הסיק |  |  |
| ס.ב.ר | סבר |  |  |  |  |  |  |  |
| ס.ג.ל |  |  |  |  |  |  |  | הסתגל |
| ס.ו.ג |  |  |  | סייג |  |  |  | הסתייג |
| ס.כ.מ |  |  |  | סיכם |  | הסכים | הוסכםˆ |  |
| ס.ל.ח | סלח |  | נסלחˆ |  |  |  |  |  |
| ס.מ.כ | סמך |  |  |  |  |  |  | הסתמך |
| ס.ק.ר.נ |  |  |  | סיקרן\* | סוקרן |  |  | הסתקרן |
| ע.ד.פ |  |  |  |  |  | העדיף | הועדףˆ |  |
| ע.ז.ז |  |  |  |  |  | העז |  |  |
| ע.נ.י.נ |  |  |  | עניין\* |  |  |  | התעניין |
| ע.ק.ש |  |  |  |  |  |  |  | התעקש |
| ע.ר.כ |  |  |  |  |  | העריך |  |  |
| ע.ש.ת |  |  |  |  |  |  |  | התעשת |
| פ.י.ס |  |  |  | פייס | פויס |  |  | התפייס |
| פ.ל.י |  |  |  |  |  | הפלה | הופלה\* |  |
| פ.ל.ל |  |  |  | פילל |  |  |  | התפלל |
| פ.נ.מ |  |  |  |  |  | הפנים | הופנםˆ |  |
| פ.ע.נ.ח |  |  |  | פענח | פוענחˆ |  |  |  |
| פ.ק.פ.ק |  |  |  | פקפק |  |  |  |  |
| פ.ר.כ |  |  |  |  |  | הפריך | הופרךˆ |  |
| פ.ר.ע |  |  |  |  |  | הפריע | הופרע |  |
| פ.ש.ר |  |  |  | פישר |  |  |  | התפשר |
| פ.ת.ע |  |  |  |  |  | הפתיע\* | הופתע |  |
| צ.ד.ק | צדק |  |  |  |  | הצדיק |  | הצטדק |
| צ.ל.ח |  |  |  |  |  | הצליח |  |  |
| צ.פ.י | צפה |  |  | ציפה |  |  |  |  |
| ק.ו.י |  |  |  | קיווה |  |  |  |  |
| ק.ר.ע | קרא |  |  |  |  |  |  |  |
| ר.ג.ל |  |  |  |  |  | הרגיל\* |  | התרגל |
| ר.ש.י |  |  |  |  |  | הרשה | הורשהˆ |  |
| ר.ש.מ |  |  |  |  |  | נרשים\* |  | התרשם |
| ש.א.י |  |  |  |  |  |  |  | השתאה |
| ש.ב.ע |  | נשבע |  |  |  |  |  |  |
| ש.ג.ע |  |  |  | שיגע\* |  |  |  |  |
| ש.ו.י |  |  |  |  |  | השווה | הושווהˆ |  |
| ש.כ.ח | שכח | נשכחˆ |  |  |  | השכיח |  |  |
| ש.כ.נ.ע |  |  |  | שכנע |  |  |  | השתכנע |
| ש.ל.י |  |  |  |  |  | השלה |  |  |
| ש.מ.מ |  |  |  |  |  | השמים\* |  | השתומם |
| ש.מ.ע |  |  |  |  |  |  |  | השתמע |
| ש.נ.י |  |  |  | שינה\* |  |  |  |  |
| ש.פ.ע |  |  |  |  |  | השפיע\* | הושפע |  |
| ש.ק.ר |  |  |  | שיקר |  |  |  |  |
| ת.א.ב | תאב |  |  |  |  |  |  |  |
| ת.ה.י | תהה |  |  |  |  |  |  |  |
| ת.כ.נ.נ |  |  |  | תכנן | תוכנןˆ |  |  |  |
| ת.מ.ה | תמה |  |  |  |  | התמיה\* |  |  |
| ת.מ.מ |  |  |  |  |  | היתמם |  |  |
| ת.נ.י |  |  |  |  |  | היתנה |  |  |

## Appendix no.8 POPE - Playground Observation of Peers Engagement

When conducting playground observations, observers should arrive at the child’s school with ample time to locate him/her. Remember to bring a clipboard, a stopwatch, a writing instrument, observation sheets, and sunglasses. In order to protect the confidentiality of the child and to avoid questions from other children (e.g. “What are you doing?” etc.), observers should wear sunglasses so children cannot see where you are looking. Should a child inquire about what you are doing, reassure him/her that you are watching kids play fun games and that he/she should go play.

Observers watch for 40 seconds and code for 20 seconds.

|  |  |
| --- | --- |
| **Engagement States:** | |
| Solitary/isolated | Child plays alone with no mutual eye gaze with other children. If the child is engaged SOLELY with an adult (e.g. teacher or paraprofessional, yard assistant, etc.) then the child is considered “solitary or isolated”. |
| Proximity | Child plays alone within 3 -foot range of peer. |
| Onlooker | Child has one-way awareness of another child. It appears the child is watching another child or group of children or a game with interest OR the intent to participate. |
| Parallel | Child and peer are engaged in a similar activity but there is no social behavior. A common example is when two children are digging side by side in the sandbox but there is no social communication, awareness, or reciprocity. |
| Parallel aware | Child and peer engaged in similar activity and mutually aware of each other during activity. |
| Joint engagement | Child and peer direct social behavior, e.g., offering objects, conversing, toy-taking, and other activities with a turn- taking structure. Children may be physically fighting or engaging in otherwise inappropriate behavior and still be considered joint engaged. |
| Games with rules | Child participates in organized sports such as 4-square, basketball, or handball and/or engages in fantasy or pretend play OR a fantasy game that the child or his/her peers have created provided all children are playing by a set of rules that the children have specified. A game has to be with ANOTHER child. Typically, waiting in line is considered part of a game if the child is attending to the children that are currently playing. If the child is staring off or not attending to the game, then standing in line WILL NOT count as “Games with Rules”. There has to be a clear indication that the child is waiting for his/her turn. He/she may converse in line and “on topic” with the other children and still be considered part of a game because the child is playing his/her role and appropriately waiting for a turn (handball, tetherball, 4 square are good examples). |
| **Discrete Behaviors:** | |
| Initiates | (|) General Initiation – These are initiations by the child that are not specifically directed to anyone in particular. Often, children will have something to say and are looking for someone to share it with, but don’t seek out another person to engage with. For example, a child could scream out “Rockets are so fast!” and no one would be around to hear him/her despite the attempt.  (+) Child directs communication to a peer/peers—e.g., offers toy, greets, asks to play game, comments, states facts, etc. and the peer responds with a nonverbal gesture or verbal language. Responses can be negative in content (e.g. “I don’t like you”, “You smell”, ‘shakes head no’ etc.) and still count as a (+) response from a peer.  (–) Child directs communication to a peer/peers and the peer does not respond or ignores the child. Typically, the target child will speak to someone’s back and will not get a response. |
| Response to Social Initiation | (+) Child responds to overture of peer with a nonverbal gesture, or verbal language  (–) Child misses an opportunity to respond to a peer with a nonverbal gesture or verbal language. |
|  | \*\*\*If the child is engaged in a conversation, record in the appropriate column whether individual initiations and responses within the conversation. For example, if the child starts the conversation then responds to the peer’s response, then that would be coded as a (+) in the “Chi Initiations” column and a (+) in the “Chi Response” column.  during that interval and then not marked unless there is a break in the conversation which then resumes in the same observing interval. |
| **Comments:** | |
| This is an opportunity to record any qualitative data that may provide a context for the child’s engagement during recess or lunch. Ideally, a person who did not observe the interaction should be able to read the comments and determine what happened at this particular recess period. Record what the child is doing (e.g., playing handball, drawing, walking, engaging in self-stimulatory behavior, talking with a friend ,etc.) and any other notes that may be helpful in understanding the child’s playground behavior. Make note of who the child engages with – gender of peers, classmates, peer models, aides etc. and any interesting or atypical behaviors. | |

**Global Rating (regardless of time intervals)**

1. **Child Behavior Rating**

These are behaviors that the child may demonstrate to other children on the playground.

* 1. **Amount**: this is coded by checking off any of the strategies listed and defined below. Any behavior that is observed no matter the duration or the frequency should be recorded.
     1. ***Initiated to another Child***

This occurs when the child makes an effort to engage another child or group of children in a conversation or an activity/game. This can be done by asking a question (e.g. do you want to play with me, can I play too, did you have a good weekend, etc.), using a nonverbal gesture (e.g. tapping another child on the shoulder, waving them over with a hand gesture, joint looking etc.), offering an object (e.g. sharing a ball, pass them a note, etc.)

* + 1. ***Responded to another Child***

This occurs when the child responds to another child or group of children in a conversation or an activity/game. This can be done by answering a question, complying with someone’s request (e.g. joining a game when asked, giving a ball, drawing a line in the sand, etc.), using a nonverbal gesture (e.g. signing ‘okay’), continuing a conversation (e.g. making a comment to someone else’s comment).

* + 1. ***Engaged in a Conversation (4+ exchanges) with another Child***

This code documents whether or not the target child engages in a conversation with another child or group of children. It does not matter who initiated the first exchange, as long as there are 4 consecutive exchanges or more captured in one instance (not spread throughout the observation).

* + 1. ***Engaged in a Game with another Child or Group of Children***

This code documents whether or not the target child engages in a game with another child or group of children. The game need not have structured rules like handball, soccer, or hopscotch. It may also include fantasy games of games that the children have created provided all children are playing by a set of rules that the children have specified.

* + 1. ***Observed a Game of another Child/Group of Children***

This code is used when the target child watches another child or group of children engaging in an activity or game. It is clear that the target child is not participating in the game or activity, rather watching with an intention of participating or with an interest.

* + - 1. ***Amount Rating (RESAM****)*: The sum of the number of skills listed above that was demonstrated by the child. RESAM should equal 0 – 5. A “0” is given if none of the skills listed above were seen. A “1” is given if 1 of the skills listed above were seen. A “5” is given if the child demonstrated all of the Responsive Skills. If all 6 skills were seen, also assign a value of a “5”.
  1. **Quality (RESQ)**
     1. Quality is a rating that reflects the execution ability of the ***observed*** skills. This is rated on a 1- 5 Likert scale. Do not take in to account any strategies that were not seen – ***this is a rating only on the skills that were observed***. This rating requires a clinical judgment of the observed skills – how well you believe they were implemented by the child and whether there was any room for improvement. In other words, of the skills (listed above) that *were* displayed by the child, how well were they implemented?
        1. **Poor implementation** (less than 25%)

Poor implementation: this is assigned when a child displays a skill(s), but the quality is exceptionally poor. Examples would be when a child attempts to initiate a conversation but only uses one word answers or responses that may be off-topic.

* + - 1. **Less than Adequate** (approximately 25% quality)

Less than adequate implementation: more effort and skill is displayed when implementing strategies than a “poor implementation”, but the child is still having more than occasional difficulty.

* + - 1. **Adequate** (approximately 50% quality)

Adequate: this is assigned to children whose use of strategies may be good in some instances, but they struggle at other times. This is an “average” rating – they generally are in the right direction, but may occasionally benefit from some guidance on use of strategies.

* + - 1. **Good, a couple small errors** (approximately 75% quality))

Good: the use of strategies is close to perfect, but there is a small percentage of the time when the child had some difficulty. There should only be isolated instances when additional guidance would be needed for the child to correctly and successfully implement strategies.

* + - 1. **Excellent, flawless implementation** (approximately 100% quality)

Excellent implementation: there are no suggestions that you would give on how to improve the quality of the skills displayed. Each skill demonstrated by the child was shown in expert fashion.

* 1. **Developmental Appropriateness (RESDA)**
     1. This is a rating of how accurately the child matched the strategies used to his/her developmental level in terms of ***amount*** and ***frequency***. When considering the child’s developmental level, include his or her language, attention, communication, play, behavioral, and overall functioning level.

In this rating, you may take into account any strategies that the child used, but should not have implemented or strategies that the child did not implement but should have. For example, if the child seems to desire social interaction but appear to lack the social skill to initiate on his/her own – this would be a strategy that would be considered “missed” by the child and taken into account as a mismatch of **amount** of strategies. If the child did display initiations, but not as often as developmentally appropriate for his/her age – then the child did not match the **frequency** of strategy usage that he/she could have.

* + - 1. **Poor matching of amount and frequency of strategies used** (less than 25% matching)

This rating is indicated when the child mismatched the **amount** of strategies used by 4 or more strategies; or, if the **frequency** of strategies used was severely lacking.

* + - 1. **Isolated matching of amount and frequency of strategies used** (approximately 25% matching)

Isolated matching of **amount** and **frequency** is indicated when the child selects one or two appropriate skills, but are missing three to four skills (**amount**). Another example of Isolated Matching is if the child selects appropriate strategies (**amount**) but misses many opportunities to use those strategies (**frequency**).

* + - 1. **Average matching of amount and frequency of strategies used** (approximately 50% matching)

In this instance, the child accurately matched the **amount** and **frequency** of strategies approximately 50% of the time to his/her developmental level. Another option for this code is that the **amount** of strategies was completely appropriate, but the **frequency** of those strategies being used was poor. The converse would also be true – if a couple of strategies were used with an appropriate **frequency**, but there was another one or two strategies (i.e., **amount**) that could have been used, an average score would be appropriate.

* + - 1. **Good matching of amount and frequency of strategies used** (approximately 75% matching)

Good matching of **amount** and **frequency** would be an appropriate score either when an appropriate **amount** of skills was used, but there were a couple of missed opportunities for a strategy to be used. Or, perhaps there was only one strategy (**amount**) that was missing from the child’s repertoire.

* + - 1. **Excellent matching of amount and frequency of strategies used** (approximately 100% matching)

## Appendix no.9 - educational faculty report

The report will be filled via Qualtrics:

<https://biusocialsciences.eu.qualtrics.com/jfe/form/SV_861j9Y0PrLY73ts>

School’s name:

Grade:

Unit subject:

Name of the lesson:

Did all the students attended the class?

If not, pleas specify the absent students

Was all the lesson assignment administered?

If not, please write which assignments were not administered

What is the reason some assignments were not administered?

Were the guidelines clear?

Which guidelines were nor clear in the lesson?

Did you have all of the materials for the lesson?

Please write which martials were missing

Did you have technical difficulties?

What kind of technical difficulties?

In some of the assignments you were asked to documented the activities and upload to the system, was there a record in EmotiPlay?

Please specify the reason some of the activities were not documented

Please describe the student’s behavior at the lesson (participated / enjoyed / lack of patient / level of understanding and expressiveness)

We will appreciate your opinion and suggestion for improvement