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The Effect of Reading Literary Fiction on Theory of Mind in Children

Julia Werner

Theory of Mind is the ability to make inferences about the mental states of others. A positive correlation was drawn between theory of mind and language. Studies have shown that reading literary fiction positively impacts Theory of Mind abilities in adults, but no research has delved into a focus on younger age groups. This study investigates whether reading literary fiction increases Theory of Mind abilities in children. A quasi experimental quantitative method was conducted using matched sampling. Paired T-tests were run to compare pre and post test scores. The results indicate that reading literary fiction may cause an increase in children's Theory of Mind abilities at least temporarily, emulating the effect it has in adults. This research is of relevance to the recent debates on the inclusion of fiction in school curriculums and emotional intelligence in business. Further research should be conducted to ensure a more representative population is tested; these findings can be used to inform future work in this area.

Keywords: Affective Theory of Mind (Theory of Mind), Cognitive Theory of Mind (Theory of Mind), literary fiction, emotional intelligence

Introduction

First coined in 1990 by Salovey and Mayer, the term Emotional Intelligence (also referred to as EI) is defined as a type of social intelligence guiding one's abilities to observe, interpret, and react to the emotions of one's self and others. Emotional intelligence is widely researched (Institute for Health and Human Potential, 2011) and is a key indicator of success in several aspects. The importance of EI is seen in business where 70% of capabilities that distinguish top performers from one another are classified as EI capabilities (Freedman, 2010). Further Feist and Barron report, EI was four times more important than IQ in the determination of professional success (1996, cited in Cherniss, 2000).

In the last ten years, research has been conducted to investigate the relationship between literature and Theory of Mind. The term Theory of Mind refers to the ability of one to infer the mental state of others (their beliefs, intentions, desires, etc,.) and use said inferences to understand and foretell behaviors (Mark and Martin, 2018). Theory of mind is a seminal aspect in the facilitation of EI because of Theory of Mind's role in the interpretation of emotions (Ferguson and Austin, 2010). Overall, research has found that there is a positive correlation between fictional reading and Theory of Mind and that over time fictional reading can result in an increase in empathy in adults (Mar et al., 2009). Additional research supports that the reading of a single passage of literary fiction serves to at least temporarily increase Theory of Mind abili-

ties in adults (Kidd and Castano 2013). Research on literary fiction and Theory of Mind has not yet been conducted on younger age groups despite the countless educational institutions globally that are presently mandating social and emotional learning for youth.

Literature Review

The subject of reading in conjunction with Theory of Mind was first introduced by several researchers who found that the same cortex of the brain that showed activity while a participant was having a real life experience showed activity when the participant was reading about that same experience (Paul 2012). For example, a participant reading about the scent of cinnamon had very similar brain activity displayed by a functional magnetic resonance imaging (fMRI) brain scan as when the participant was actually smelling cinnamon (Bado et al., 2016). Further studies found that exposure to social interaction in text elicited the same response from the brain as real-time social interaction. This phenomenon of emotional 'transportation' into a story, is known as transportation theory (Johnson, 2012).

Further research into transportation theory examined the hypothesis of Mar et al., that people who read fiction are inclined to have better empathy and Theory of Mind abilities (2006). Such conjecture seemed plausible as exercise of the parts of the brain that process social interaction would logically strengthen and reinforce behavior and reactions. The study found that there was a positive correlation between how well a subject performed on an author recognition test and scores on empathy level tests. Author recognition tests are used to generalize a subject's reading ability (Moore and Gordon, 2015). The drawbacks of these findings are that they are purely correlational and therefore serve no role in combating the notion that people with higher empathy and Theory of Mind abilities may simply be more intrinsically attracted to fictional reading. However, in a later study, these same researchers ruled out the possibility that their test results could have resulted from pre-existing personality traits by controlling for "the big 5 personality traits [i.e. openness, conscientiousness, extraversion, agreeableness, neuroticism]" (Mar et al., 2009).

Impact of Literary Fiction on Theory of Mind

Perhaps one of the best-known and thoroughly debated studies stemming from this research is Kidd and Castano (2013). This study found that after reading only one passage of literary fiction, Theory of Mind is improved at least temporarily (no tests were done at a later date to verify permanent increase) (2013). The study tested whether nonfiction, popular fiction, or literary fiction best facilitated transportation theory with the conclusion that only literary fiction did so at all. Literary fiction is defined as incorporating themes and symbolism while tending to be more character than plot-driven. Of all categories of literature, literary fiction most consistently engages a reader in the interpretation of social situations. For this reason, Kidd and Castano proposed literary fiction is the only type of literature capable of facilitating transportation theory because it is the only type of literature that consistently features empathetic interactions between characters. However, Kidd and Castano's strongest claim was that after reading a single passage of literary fiction, Theory of Mind abilities would increase.

Multiple replications of this study have found varied results. The most prominent opposition argues that it is more likely that reading literary fiction and Theory of Mind are linked because people with strong Theory of Mind are naturally drawn to fiction or that long term reading of fiction strengthens Theory of Mind over time. Further, they argued affective Theory of Mind is not affected by the reading of literary fiction (Panero et. al., 2016). Matthijs and Veltkamp observed that empathy was raised over a one week period in participants who read and were emotionally transported into a story and lowered in those who read but were not emotionally transported (2013), suggesting that fictional reading can be a cause of increased empathic abilities, contrasting the skepticism presented in early work on Theory of Mind and literature.

Application of Future Research to Curriculum Development

Education reform calling for less emphasis on fictional reading has been passed in forty six out of fifty

of the US States (Robelen, 2010). The curriculum was designed in part by the president of the College Board David Coleman who said that English classes focus too much on self-expression and that fiction does not have a useful application in one's future (Mosle, 2012). Although well intended, since fiction is often regarded as entertaining in nature with little regard to the actual benefits that may result from reading it, the curriculum edits do not consider increases in the Theory of Mind abilities that facilitate general emotional intelligence. This shows that there is failure in even the United States education system to recognize the potential that fiction has to foster the growth of emotional intelligence in younger populations. If the research done on the positive impact of literary fiction on Theory of Mind (and therefore EI) was generalizable to younger populations, it would be research-based support not only to bring into question the recent edits to the United States Common Core Standards, but to fill a gap in the current literature concerning the impact literary fiction may have on Theory of Mind in children.

Theory of Mind Testing

There are several tests designed to quantify Theory of Mind abilities (U.S. National Library of Medicine, 2013); they have been designed for multiple age groups and by multiple institutions, and are used for many purposes, for example, to test for autism (The Autism Research Center, 2019). There are three main types of Theory of Mind: affective, cognitive, and conative. For the purposes of this literature review, only affective and cognitive Theory of Mind testing will be explicated, because conative Theory of Mind requires interaction between two or more people and thus cannot exist in a study testing a singular person and a text (Dennis et al., 2012). Affective Theory of Mind is the ability to interpret emotions expressed by the facial expressions of others (Vogindroukas et al., 2014), while cognitive Theory of Mind is the ability to understand that other people have thoughts independent from one's own and to be able to make inferences about the thoughts of others.

The most commonly used test for affective Theory of Mind is the Reading the Mind in Eyes Test or REMT (Vogindroukas et al., 2014). REMTs test affective Theory of Mind by asking participants to determine what emotion a person is feeling based on an image of said person's eyes. It has been inconsistently supported that affective Theory of Mind is increased by reading literary fiction. The work of Kidd and Castano supports such conjecture, while that of Panero rejects it. most common format of the testing is similar to that of a multiple choice test. In each question a photograph featuring a set of eyes is presented along with four words. To respond to the question, a subject is instructed to circle the word that best describes the way the person in the photograph is feeling based on the expression conveyed through their eyes. A sample question is illustrated in Figure 1 below.

Figure 1
"standard REMT test" (Autism Research Institute, 2019)
Note. test published for public use through Autism Research Institute, but designed by researchers at Cambridge University.

There are several REMTs released by Cambridge University designed for children ages six to nine years old. The difference between an adult REMT and a child REMT is the level of difficulty of the vocabulary used in the answer choices for the questions. Additionally, a subset of REMTs called the Face Test is often easier to complete because it includes a picture of a full facial expression instead of only a picture of eyes.

For cognitive Theory of Mind the false-belief test is the most common test measure (Bernstein, 2017). False belief tests ask participants to determine information about an idea being held true or false by an individual. Overarchingly, the research community supports that reading literary fiction most consistent-

ly increases cognitive Theory of Mind abilities. There are several variations of false belief tests. An example which is helpful to understand the general idea of false-belief testing is the Sally-Anne test (Baron-Cohen, 1983). The Sally Anne test is a very simple idea of a false belief test in which a scenario is explained where Sally hides her marble in a box and then leaves, then Anne moves Sally's marble to a basket. The question proposed is "where will Sally look for her marble first when she returns to the room?" The idea behind the test is that it will test the test takers ability to understand that Sally does not know the marble has been moved even though the test taker themselves knows this to be true. Refer to Figure 2 to view the Sally-Anne test.

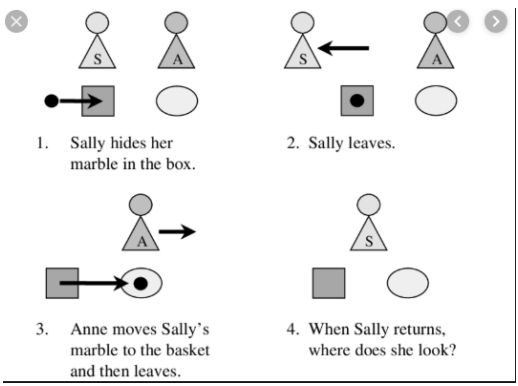


Figure 2
"Sally-Anne Test" (Baron-Cohen, 1983)

There are also versions of False-belief tests available for varying age groups. A common test measure for children ages six to nine is the Yoni Test (Bodden, 2013). The Yoni Test is a computerized version of a false-belief test adapted for children. It has a variation of questions to assess basic aspects of Theory of Mind. For example, if Yoni (the face featured in the center of every question) is looking at an object, basic principles of Theory of Mind would suggest that Yoni is thinking of said object. Refer to Figure 3 to see a sample question from the Yoni Test. A more complex question that may be asked is shown in Figure 4.

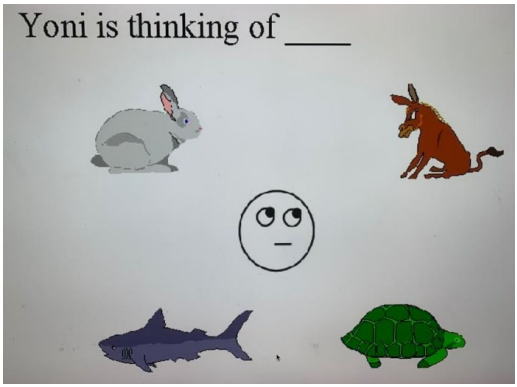


Figure 3
"Yoni Test question example I" (Bodden, 2013)

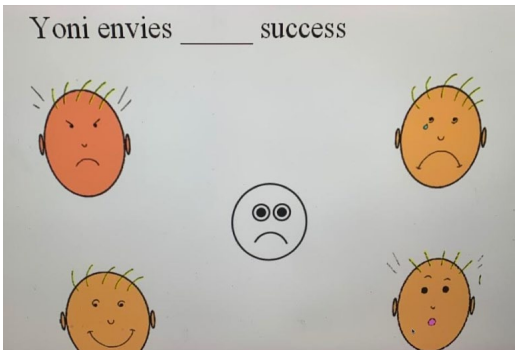


Figure 4
"Yoni Test question example II" (Bodden, 2013)

The Yoni test is made up of three parts (labeled parts A, B, and C). For part A the user answers several questions of similar difficulty, for part B the user answers questions of more difficulty than part A, and for part C the user answers the most difficult Theory of mind questions available on the test.

Gap and Significance

Although there seems to be ample research done on the adult population supporting that reading literary increases Theory of Mind, this issue has not yet been tested on younger populations. This seemed like a valuable population to test because both Theory of Mind and language develop in children, and there is

a strong correlation between language and Theory of Mind. It is widely accepted that Theory of Mind first begins to develop in children at around the age of four to five years old (Hanen Center, 2015), but some evidence suggests that even infants have a basic understanding of the principle aspects of Theory of Mind (Slaughter 2015). It is also widely accepted that language begins to develop in children from a similarly young age (National Institute of Health, 2012). Performance on Theory of Mind and language tasks have a strong correlation (r = 0.43), which is much higher than the correlation between either of the two and any other function developing around the same time (Ain et al., 2007). There are several benefits to evaluating the impact of reading on Theory of Mind in children. Not only do children have far fewer preconceptions and biases that have the potential to influence their test results, but they are significantly less literature inclined, so there should not be any unexplainably odd results due to an adult with a deviant development. Additionally, data for a younger population can be used to add to the development of curriculum promoting strong emotional intelligence to facilitate success in business and life.

Therefore, the present study aims to fill this gap in the body of knowledge by answering the following question: What is the effect of reading a single passage of literary fiction on cognitive and affective Theory of Mind in children from first through third grade? It was hypothesized that there would be an increase in Theory of Mind abilities as displayed on a Theory of Mind age appropriate test as a result of reading a single passage of literary fiction because it was assumed that the conclusion developed for the adult population by Kidd and Castano would hold true for children as well.

Methodology

The method used for this research is a quantitative, quasi-experimental design. Quantitative data were collected to determine the difference between the effects of reading a passage of literary fiction on children versus adults.

The sample was made up of 55 children from first through third grade (students ages six to nine). Although Theory of Mind and Language skills begin to develop at much younger ages, this is the earliest age group in which children can be expected to be able to read (American Academy of Pediatrics 2009), so REMTs for the age range of six to nine year old were used (Autism Research Institute, 2019) and the Yoni test with the same age range was used (Bodden 2013). In-depth testing on validity and reliability has ensured that these tests are accurate and used by reputable institutions such as Cambridge University, the Autism Research Institute, and the NHI (National Institutes of Health), as well as numerous psychology professors and PHDs (Meinhardt-Injac et al., 2012).

Participants were drawn from an elementary school in a suburban area using a convenience sample. As opposed to randomized sampling, convenience sampling was chosen for this study, because it is the quickest and most inexpensive way to obtain a sample with limited resources (2012). Convenience sampling is discouraged because without a randomized sample it cannot be ensured that the sample is representative of the population being tested; however, for pilot studies it is generally acceptable (Sauders et al., 2012). This study paves the way for randomly-sampled controlled trial research to be done (Cadete, 2018).

Before testing took place all research plans were approved by an institutional review board (IRB) at a selective magnet high school, and all students participating were required to have informed consent forms on file (see appendix F) because that is an ethical standard of all experimentation involving human participants (Knapp 2006). Testing consisted of a Theory of Mind assessment pretest (see appendix A), a reading passage (see appendix D and E), and a Theory of Mind assessment posttest (see appendix B). A paired sampling methodology was used to ensure that any observed difference came from changes in an individual's scores, not in the groups (University of Florida Health Biostatistics, 2020).

The pre and post tests were each approximately 75 questions and consisted of a concatenation of three different Theory of Mind tests. Two of the three tests were REMTs released by Cambridge University: a standard REMT and a Face Test. Both the REMT and the Face Test were used in order to provide a wide range of difficulty. Due to the nature of paired sampling in which an individual's score is compared to their own later score, a range of difficulty within the test increases the odds that students of all ability lev-

els will be able to score between the upper and lower limits of the test (Meyers 2014). The REMTs served to include the affective component of Theory of Mind on the tests. The third test included was the Yoni Test. The Yoni test was included as a component of the Pre and Post examinations in order to assess the cognitive component of Theory of Mind.

To create the pre and posttests each of the Theory of Mind tests included were divided in half, one half of each of the three tests made up the pre assessment, while the other half of each made up the post assessment. Olderback and colleagues (2015) reported that REMTs are not internally consistent, concluding that "Future revisions of the test should seek to reduce the test's reliance on one's vocabulary…(2015, cited by the U. S. National Library of Medicine National Institutes of Health)" However, the influence of vocabulary on the difficulty level of the questions was controlled for in the present study because all children were instructed to raise their hand if they did not understand the meaning of a word in any question. Since the study identified vocabulary as the principle factor influencing the difficulty of REMT test questions and this was controlled for the REMT questions were assumed to be of equal difficulty, so the first half of the questions from both the standard REMT and the Faces test were placed on the pre assessment and the second half of each test was placed on the post assessment.

The Yoni test has three different sections. Each section consists of a different difficulty level. Part A is the easiest section of the Yoni test, part B is more difficult than part A, and part C is the most difficult section. Additionally, the questions within each individual section increase in difficulty. In order to effectively divide the Yoni test in half and ensure the difficulty was consistent on the pre and post assessment, each section was divided in half in an alternating fashion (i.e., question one of section A on pretest, question two of section A on posttest, question three of Section A on pretest, etc.,). This most nearly ensured that the pre and post assessment were of equal difficulty level. This process of division was under the advisement of the research mentor. Since the Yoni test is a computerized test, in order to divide it in half, a photograph was taken of each individual question and then pasted into either the pre assessment or post assessment document along with the REMT questions.

At the time of testing, all assessments and reading passages were printed on paper. All students were read the script of instructions released by the makers of the Theory of Mind tests (the REMT script and the Yoni test script) before being given their pre assessment (see appendix C for scripts). Students were also instructed to raise their hands if they did not understand any of the vocabulary included in their assessments and to attempt every question even if they did not know the answer. To indicate they were finished with a section of the testing students were instructed to raise their hands. Students were also instructed to write their name on the pre assessment, the reading passage, and the post assessment in order to match the pre and posttests after testing was completed. Names of participants were not released in order to conform to ethical research standards (Knapp 2006).

When students raised their hands after they completed the pre assessment they were given a grade level appropriate passage of literary fiction from the "K-5 Learning" resource that has been approved by The National Parenting Center. The passages were likely of different length than the ones read by adults; however, due to the age and ability of the children being tested the ability of participants to understand the reading was prioritized over homogeneity between the passages given to adults and the ones used in the present study. Each passage came with five comprehension questions (see appendix D and E for the reading passages and questions). After the students read the passage and completed the comprehension questions, they raised their hands and were given the post assessment. When students were completed their teacher provided work for them to do quietly.

The testing was administered in a classroom setting during the English class of the students on a regular school day. All testing was completed in one sitting and the time frame ranged anywhere from forty five minutes to an hour and a half.

After all of the tests were collected each test was hand graded in comparison to the test keys provided by the test makers. All scores were recorded as a percentage because the Pre assessment had one more question than the post assessment. The scores were recorded in an Excel spreadsheet. Questions that were answered incorrectly by 98% of students were thrown out as according to guidance from a forum of school teachers (Bell, 2019). This resulted in one question being thrown out. Tests were thrown out under the advisement of the research mentor if more than five questions con-

secutively were skipped. This resulted in 16 tests being thrown out and left the sample size of 39.

Both descriptive and inferential statistics were used to analyze the data. In order to generate a mean difference, each student's pre score was subtracted from the student's post score. The mean percentage score of the pre and post assessments were also generated. Next, the descriptive statistics were evaluated by paired t-tests in order to determine the statistical difference between the mean percentage scores on the before and after assessment. P-values were then calculated to estimate the probability of rejecting the null hypothesis that there is no change between the pre and post assessments. Further, to analyze the increase of both cognitive and affective Theory of Mind specifically, the same process used to generate a mean percentage cognitive score and a mean percentage affective score. The software Minitab was used for analysis. Both Minitab and Excel were used to create all graphics.

Discussion & Results

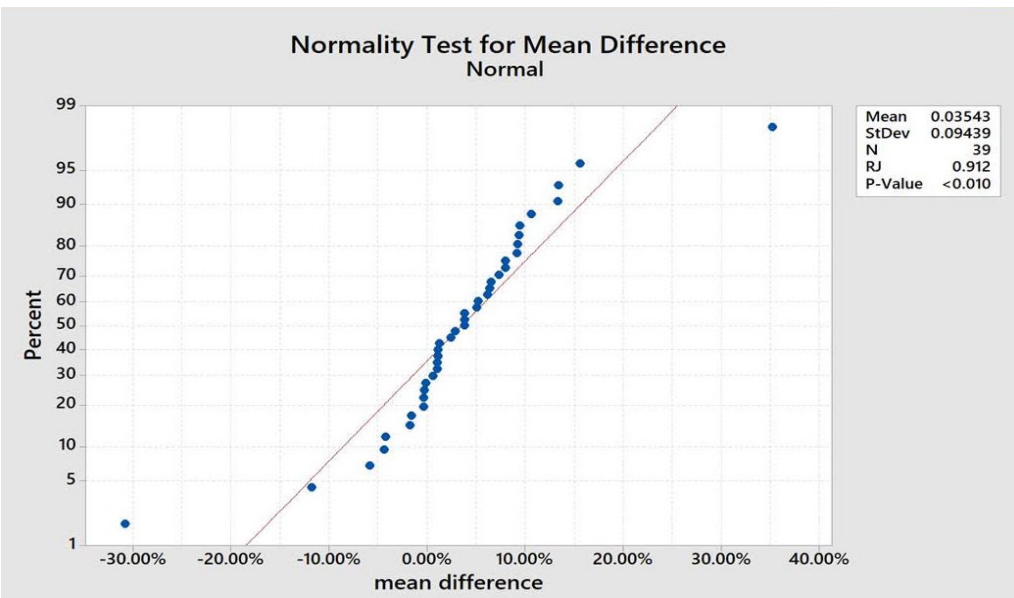
As shown in Table 1, the mean percentage score of the pretests was 72.5% and the mean percentage score of the post test was 76.04%, generating a mean increase from pre to post test scores of 3.45%. The paired T-test comparing the pre-test percentage scores and post-test percentage scores was 2.34 ($p<.05$), which indicates the pre-test and post-test percentage means are statistically significantly different. The standard deviation and the standard error mean are both relatively low indicating that the fluctuation in the percentage scores and population sample means is relatively low. Essentially, these results support the conclusion that reading literary fiction may increase Theory of Mind in children like it does in adults.

Table 1
Paired T for Pretest % - Posttest %

	N	Mean	StDev	SE Mean
Pretest %	39	0.7250	0.0828	0.0133
Posttest %	39	0.7604	0.0922	0.0148
Difference	39	-0.0354	0.0944	0.0151

95% CI for mean difference: (-0.0660, -0.0048)
T-Test of mean difference = 0 (vs ≠ 0): T-Value = -2.34
P-Value = 0.024

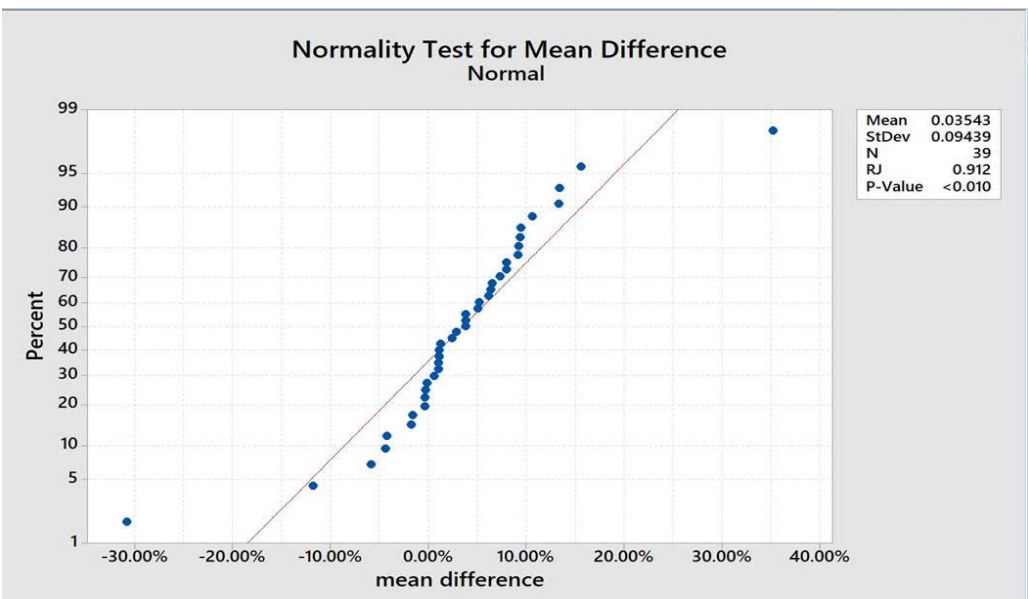
Graph 1
Anderson-Darling Normality Test of Mean Difference

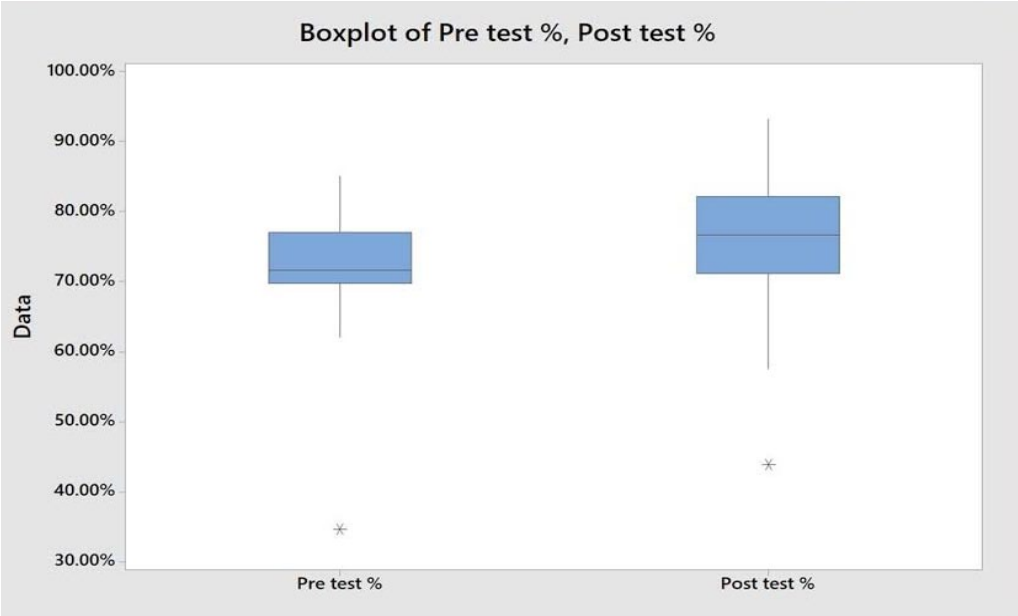


According to both the Anderson-Darling (shown in graph 1) and Ryan-Joiner normality tests (shown in graph 2), the mean difference data is not normal. The shape of the data indicates a more defined pattern than with a normal data set. What's more, the p-values for both of these tests are greater than 0.05 and therefore are not normal.

Graph 3 shows two vertical box plots designed to illustrate spread of the data. The range of the pretest scores is smaller than the range of the post test scores. The median of the post test scores is greater than the median of the pre test scores, supporting the conclusion generated by the T test. Additionally, a significant amount of the pre test scores in the first quartile are concentrated at approximately seventy percent, while the post test scores are more evenly distributed. Overall, the post test scores are greater than the pre test scores; however, the greater spread of the post test score can likely be attributed to either increases in Theory of Mind ability after reading a passage of literary fiction or fatigue after being asked to complete such a long testing process at a young age. Notably, one outlier is shown in both the pre and post test data.

Graph 2
Ryan-Joiner Normality Test of Mean Difference





Graph 3

As shown in Table 2 the mean percentage pretest score attributed to affective Theory of Mind abilities is 69.91% and the mean of the post test score for affective Theory of Mind is 69.66%, which equates to a less than 1% difference from pre to post test score. The paired T-test yielded a T-value of -0.14 (p>.05), so from pre to post test is statistically insignificant.

Table 2
Paired T for Pre affective test % - Post affective test %

	N	Mean	StDev	SE Mean
Pre test %	39	0.6991	0.0933	0.0151
Post test %	39	0.6966	0.1031	0.0167
Difference	39	-0.0025	0.1056	0.0171

95% CI for mean difference: (-0.0323, 0.0372)
T-Test of mean difference = 0 (vs ≠ 0): T-Value = -0.14
P-Value = 0.887

As indicated by Graph 4, for the affective Theory of Mind data there were two outliers on opposite ends of the box plot. The data points are more condensed in the third quartile than the first. The null hypothesis is statistically supported. In essence it is shown that reading literary fiction likely does not increase affective Theory of Mind abilities in children as is suggested by Panero et al.,.

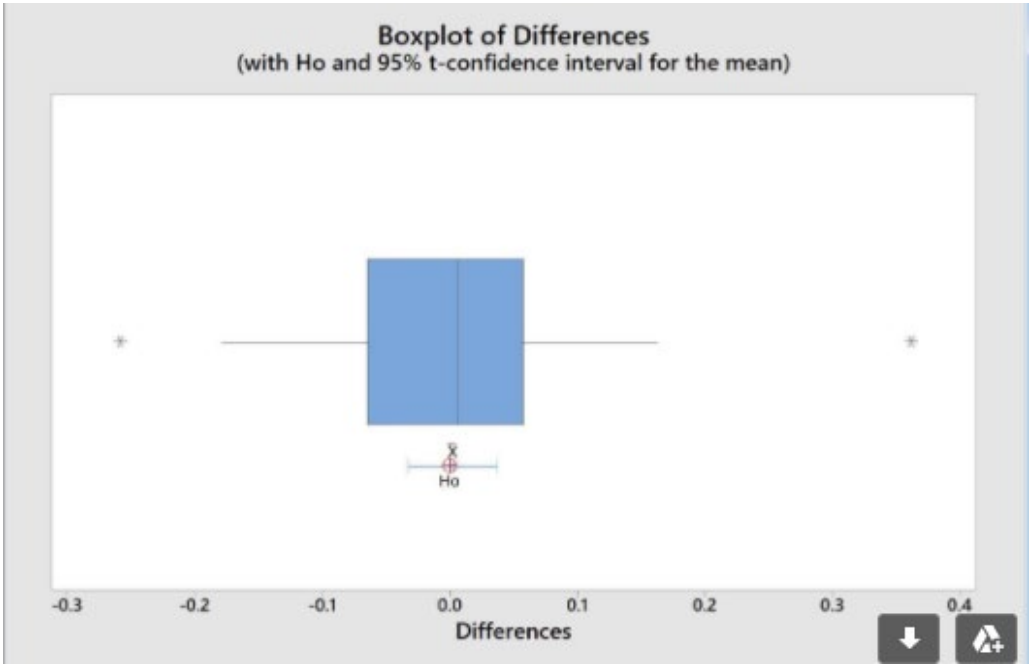
From Table 3 the results of the cognitive Theory of Mind aspect of the testing can be seen. The mean of the cognitive aspect of the pretest is 74.2%, while the mean of the cognitive aspect of the post test is 81.78%. The mean difference is 7.59%. The Paired T test generates a score of 3.98 (p>.05), which indicates a statistically significant difference from pre to post test scores.

Table 3
Paired T for Pre cognitive test % - Post cognitive test %

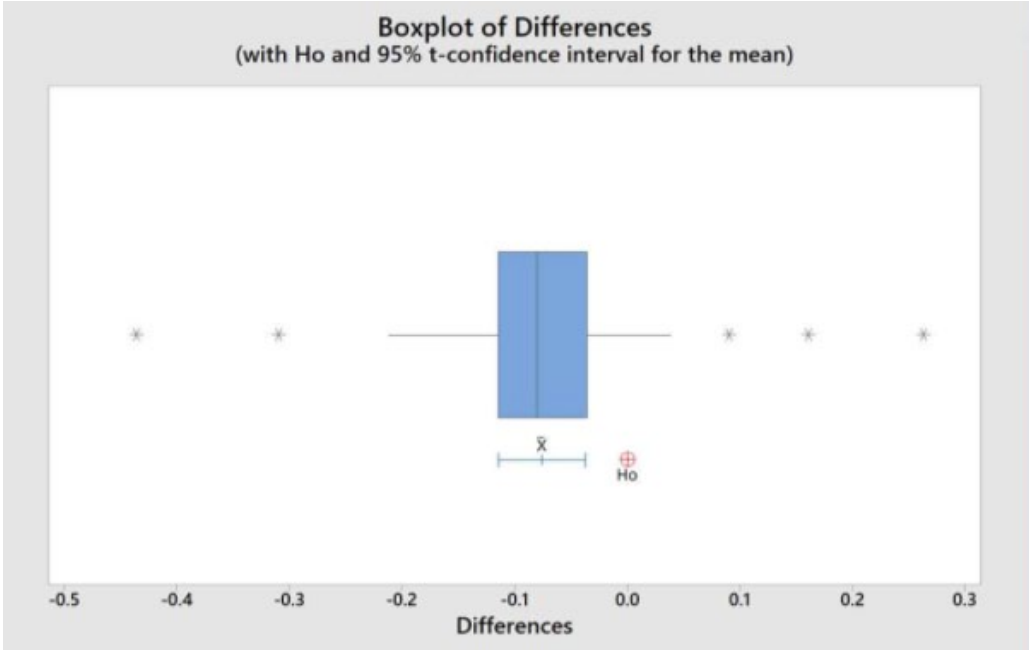
	N	Mean	StDev	SE Mean
Pretest %	39	0.7420	0.1092	0.0177
Posttest %	39	0.8178	0.1025	0.0166
Difference	39	0.0759	0.1176	0.0191

95% CI for mean difference: (-0.1145, 0.0372)
T-Test of mean difference = 0 (vs ≠ 0): T-Value = 3.98
P-Value = 0.000

From Graph 5, five outliers can be observed. The scores are more concentrated than the affective scores and have a smaller range. The high T-Value suggests that reading literary fiction does positively influence cognitive Theory of Mind in children. This is likely due to Transportation Theory, which affects cognitive



Graph 4



Graph 5

Theory of Mind skills much more directly than affective Theory of Mind skills (Johnson, 2012). Transportation Theory concerns the thoughts of characters and does little to illustrate facial expression for readers.

Ultimately, this study supports the experimental hypothesis of a new understanding that the conclusion in several studies done on adults may be generalizable to children (Mar et al., 2009; Kidd and Castano, 2013; Panero et al., 2016; Matthijs and Veltkamp, 2013). The statistical significance of the difference between the pre and post assessments scores shows that Theory of Mind is at least temporarily improved in children by reading even a short passage of literary fiction. Upon further analysis, the data supports that cognitive Theory of Mind undergoes a positive change while affective Theory of Mind sees no significant changes.

Implications

This data is the first of its kind to support the hypothesis that reading literary fiction increases Theory of Mind abilities in children at least temporarily as it does in adults. These results are of relevance to the community of academia because Theory of Mind is an essential aspect of human interaction facilitating complex social relationships and characterizing human society (Kidd and Castano 2013). Furthermore, Theory of Mind is a central aspect of Emotional Intelligence. This research generalizes the existing idea that reading literary fiction influences Theory of Mind to the youth population. This research is also relevant to the facilitation and development of the life skill EI because it suggests the addition of literary fiction to current efforts in education to foster EI; an idea previously unrecognized as indicated by the edits to the United States Common Core Standards calling for less emphasis on fictional reading in education. The conclusion of the present experiment may even be additive in the development and reform of the curriculum in order to cater to the teaching of the increasingly valued asset that is EI.

Limitations & Future Directions

Both the pre and posttest were approximately 75 questions, which is a limitation because children have difficulty concentrating; however, as each Theory of Mind measure had already been halved in order to create the pre and posttests, shortening them any further could have limited their accuracy. This is likely what ultimately resulted in 16 tests being thrown out due to skipped questions and could possibly account for the increase in range of scores from the pre to the post test. In future testing it would be advisable to find a shorter while still accurate assessment of Theory of Mind specifically for young age groups.

Additionally, a significant majority of the population tested was white and middle class. Due to the limitation on both time frame and resources presented this study did not attempt a true experimental design. This study is an indication that more research needs to be done into the subject of literary fiction on Theory of Mind in children as there is potential to be a wealth of new information to be found in the area concerning emotional intelligence development. In the future further research applying a true experimental method should be done to further solidify the conclusion and represent a more demographically accurate sample of the population.

Conclusion

The quantitative data generated represents new perspicacity about the impact of reading literary fiction on Theory of Mind in Children. While previous research has gleaned insight into the effects of reading literary fiction on Theory of Mind in adults, evaluating effects on a younger population revealed that the results are generalizable (Mar et al., 2009; Kidd and Castano 2013; Panero et al., 2016; Matthijs and Veltkamp, 2013). These results indicate that more research should be done to confirm the results of the present study using randomization to obtain a larger and more demographically representative sample. The results of this study serve to provide a foundation for further research investigating the impact of reading literary fiction on Theory of Mind in children and are the first empirical support to indicate literary fiction as relevant to the development of EI in children.

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Appendix A - pre test

BORED SLEEPY

DISINTERESTED INTERESTED

jealous scared

relaxed hate

hate surprised

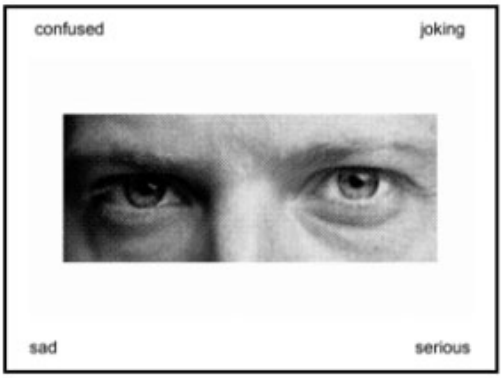
kind cross

unkind cross

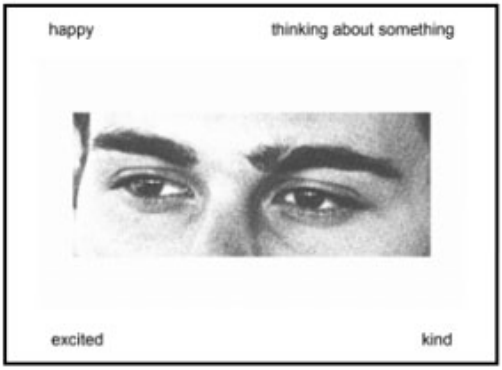
surprised sad

friendly sad

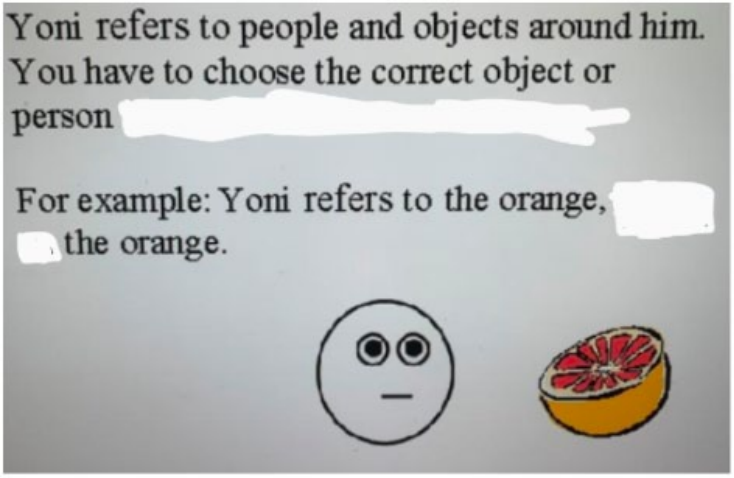
surprised worried

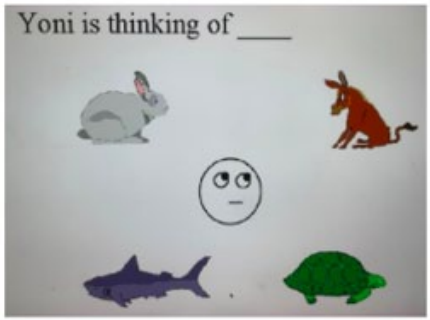

confused
joking
sad
serious

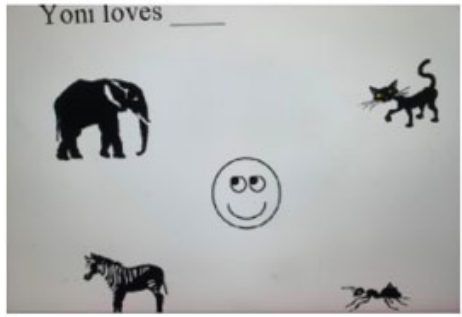

thinking about something
upset
excited
happy


happy
thinking about something
excited
kind


This is Yoni

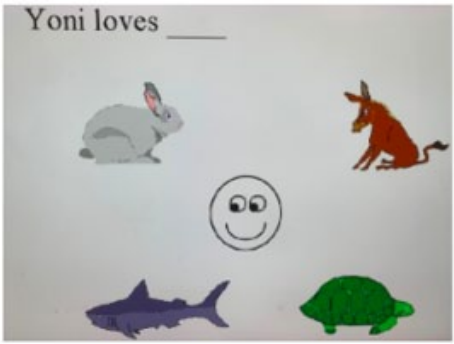

Yoni refers to people and objects around him.
You have to choose the correct object or
person
For example: Yoni refers to the orange,
the orange.

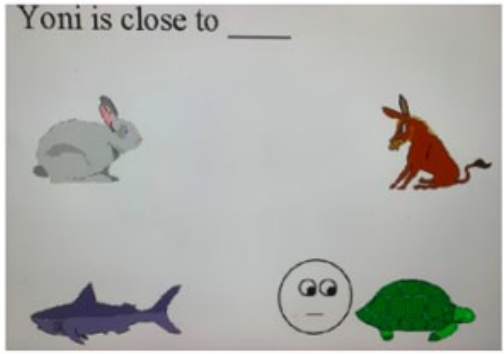

Yoni is thinking of ____

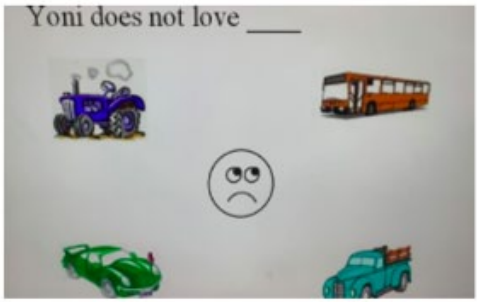

Yoni loves ____


Yoni is thinking of ____


Yoni is close to ____


Yoni loves ____

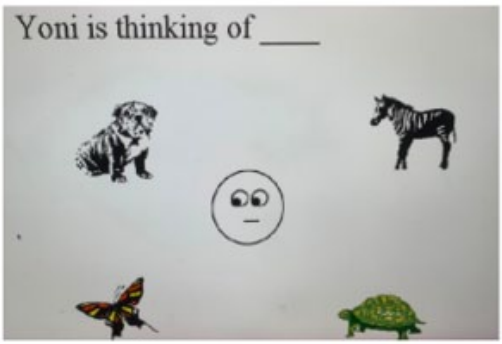

Yoni is close to ____


Yoni does not love ____

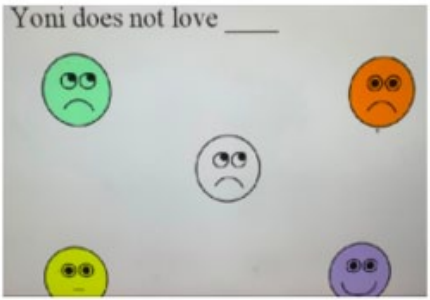

Yoni is close to ____


Yoni does not love ____

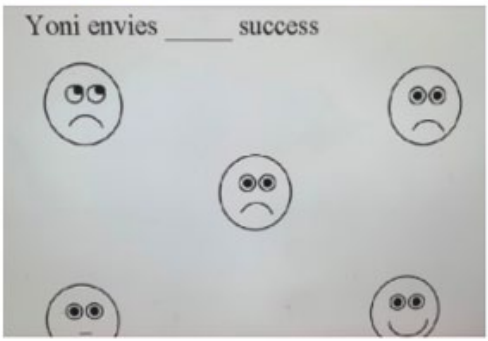

Yoni is close to ____

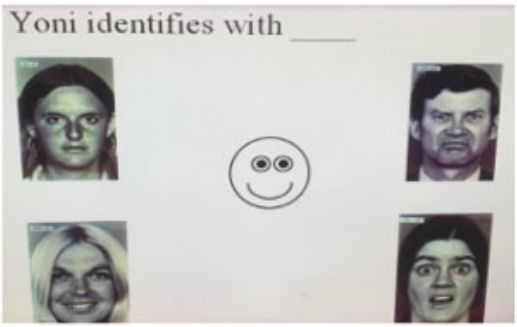

Yoni is thinking of ____


Yoni does not love ____


Yoni does not love ____

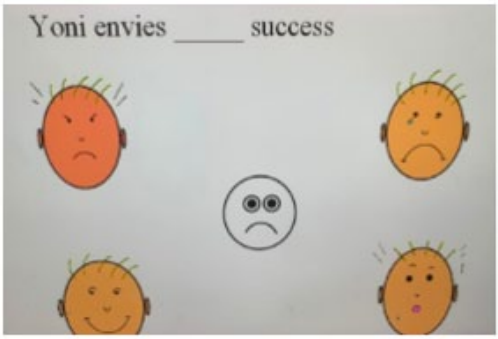

Yoni identifies with ____


Yoni envies _____ success


Yoni identifies with ____

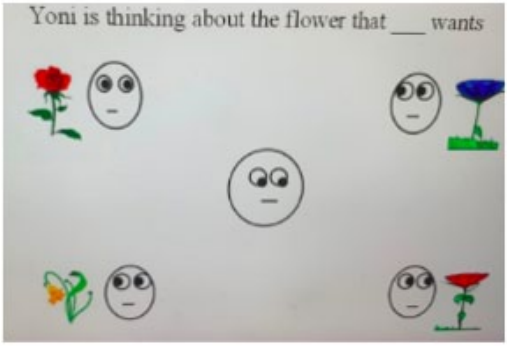

Yoni envies _____ success

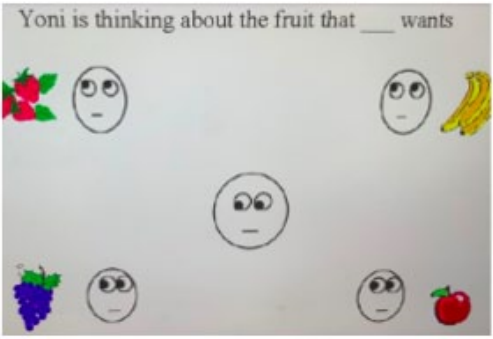

Yoni gloats over _____ misfortune

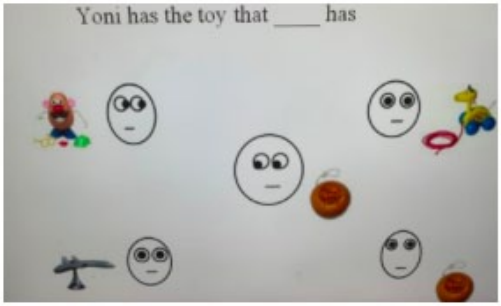

Yoni envies _____ success

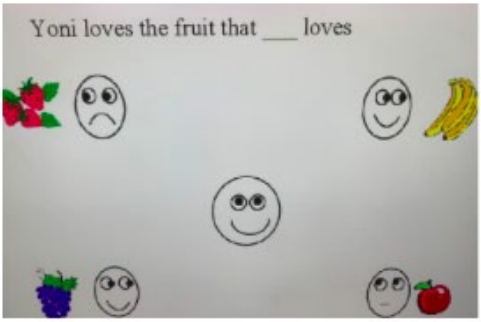
partc

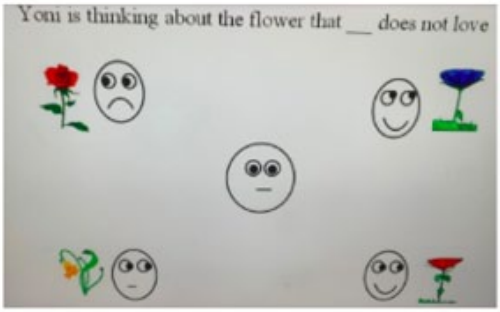

Yoni is thinking about ____

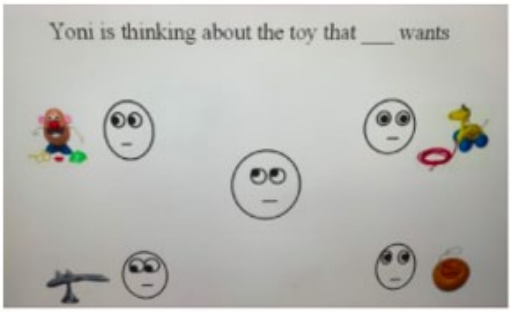

Yoni is thinking about the flower that ___ wants

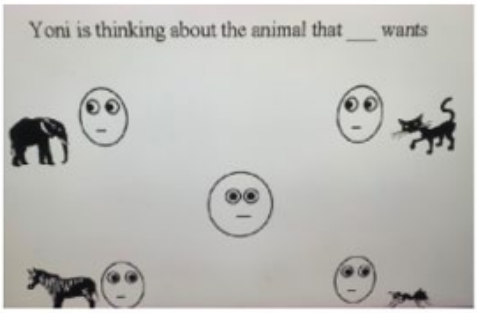

Yoni is thinking about the fruit that ___ wants

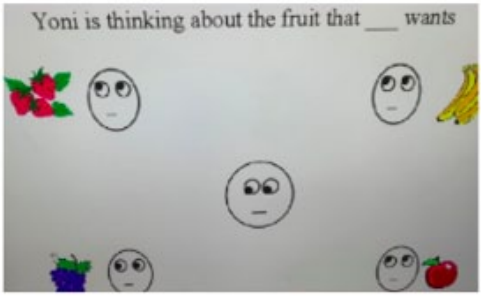

Yoni has the toy that ____ has

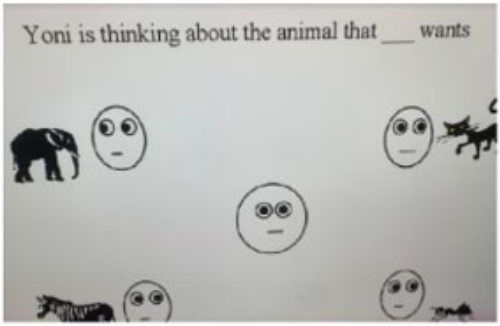

Yoni loves the fruit that ___ loves

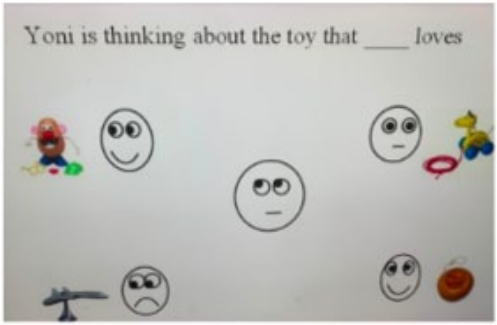

Yoni is thinking about the flower that __ does not love

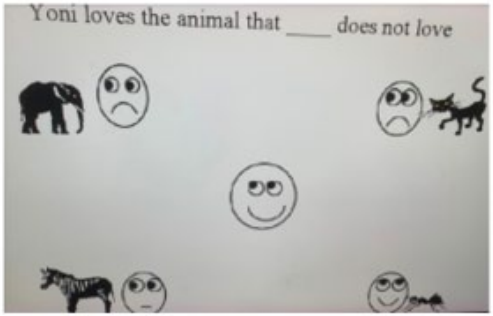

Yoni is thinking about the toy that ___ wants

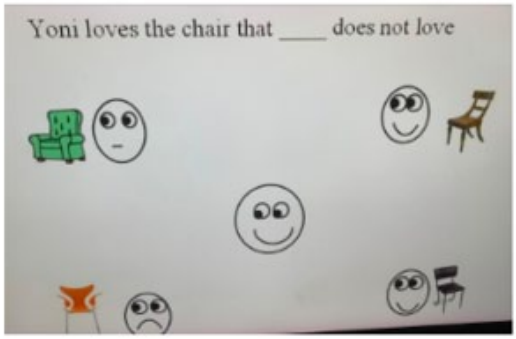

Yoni is thinking about the animal that ___ wants

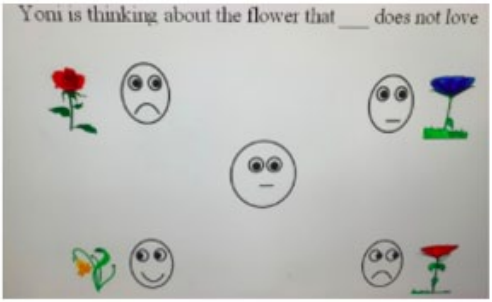

Yoni is thinking about the fruit that ___ wants

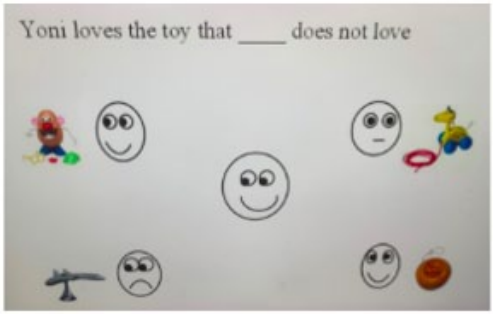

Yoni is thinking about the animal that ___ wants

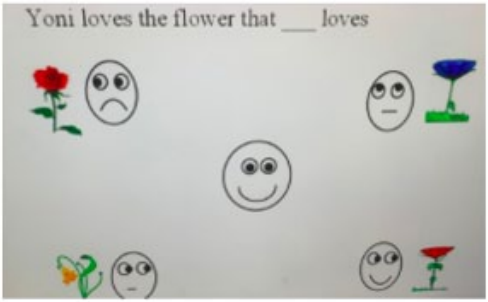

Yoni is thinking about the toy that ____ loves

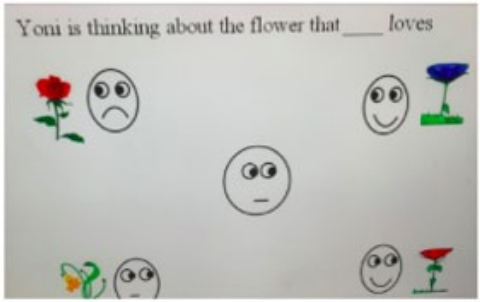

Yoni loves the animal that ____ does not love

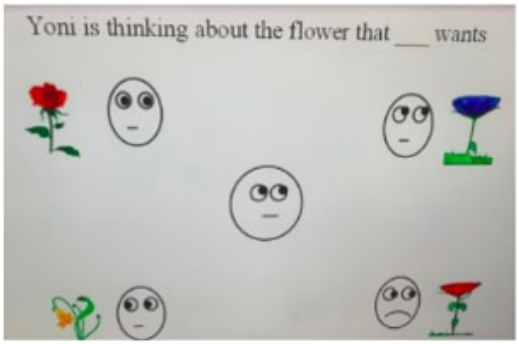

Yoni loves the chair that ____ does not love

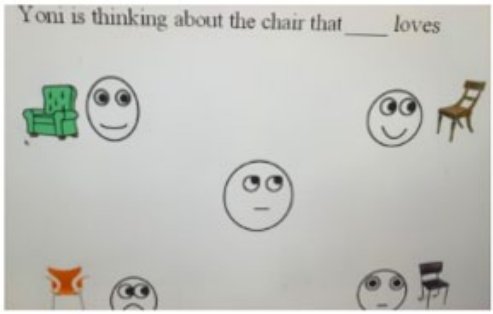

Yoni is thinking about the flower that ___ does not love

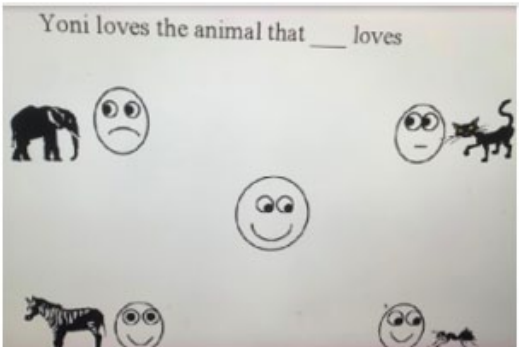

Yoni loves the toy that ____ does not love

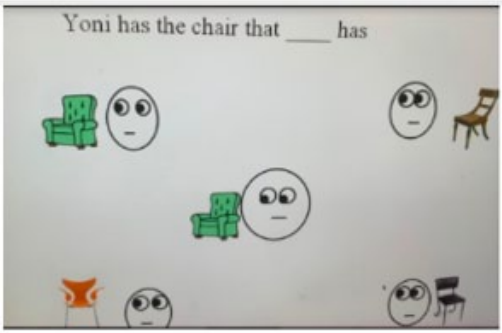

Yoni loves the flower that ___ loves

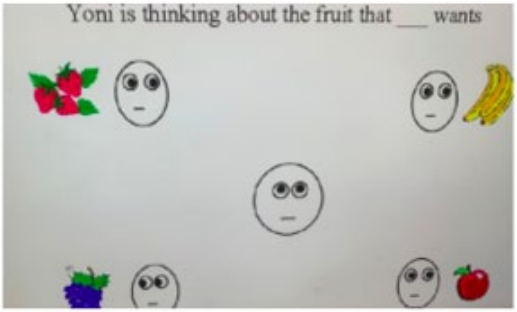

Yoni is thinking about the flower that ____ loves

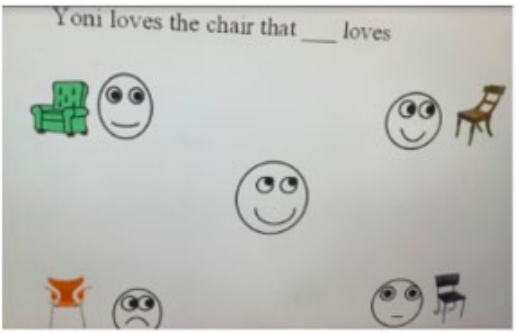

Yoni is thinking about the flower that ___ wants


Yoni is thinking about the chair that ____ loves

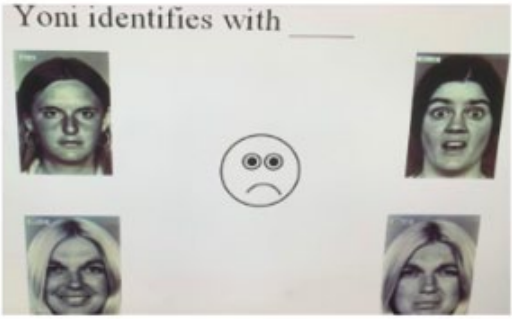

Yoni loves the animal that ___ loves


Yoni has the chair that ____ has

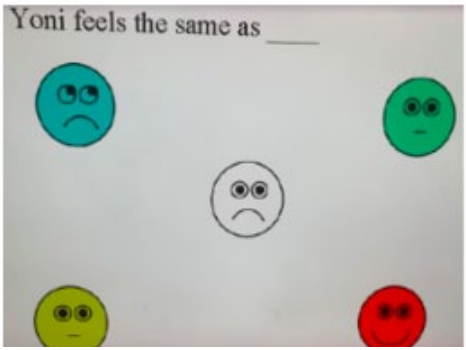

Yoni is thinking about the fruit that ___ wants


Yoni loves the chair that ___ loves


Yoni gloats over _____ misfortune


Yoni identifies with ____


Yoni gloats over _____ misfortune


Yoni feels the same as ____

Appendix B - post test

HAPPY SURPRISE

DISGUST SAD

HAPPY SURPRISE

DISTRESS SAD

SCHEMING ARROGANT

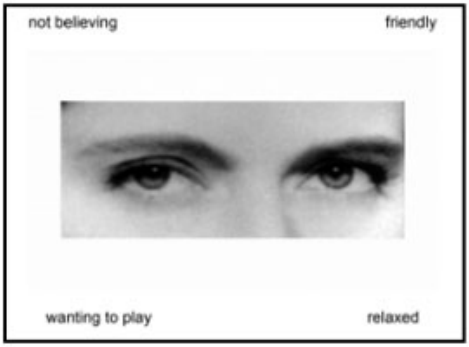
ARROGANT GUILT

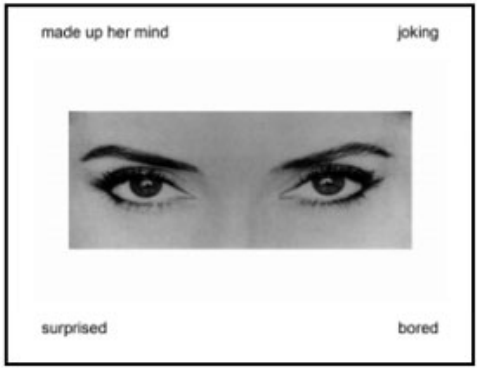
QUIZZICAL GUILTY

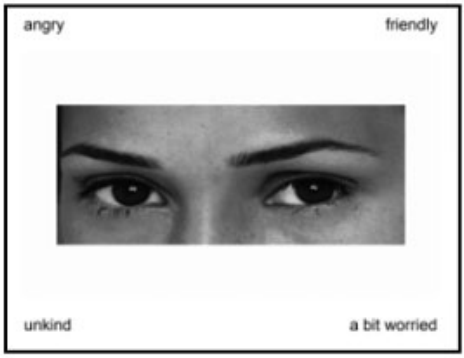
HAPPY FLIRTING

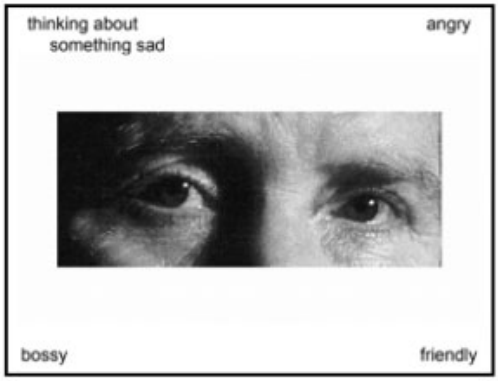
INTERESTED DISINTERESTED

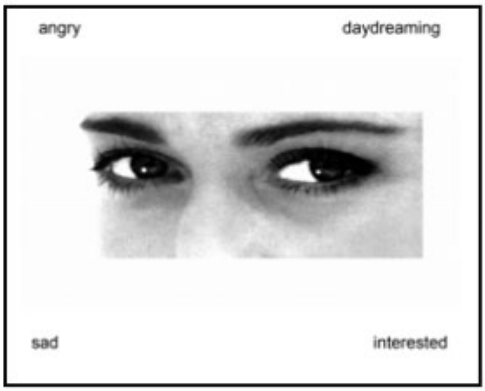
GUILTY ARROGANT

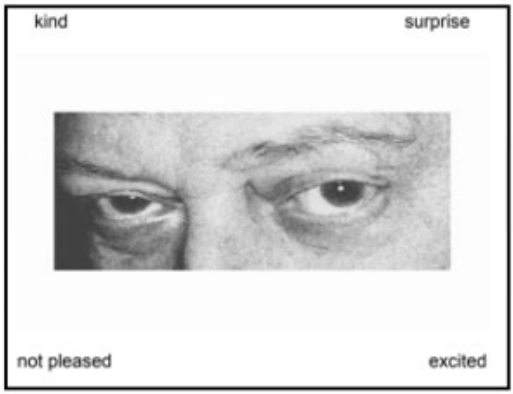

not believing
friendly
wanting to play
relaxed

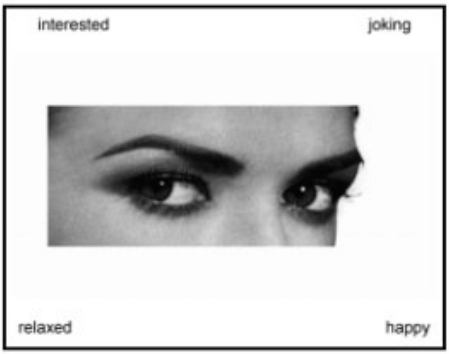

made up her mind
joking
surprised
bored

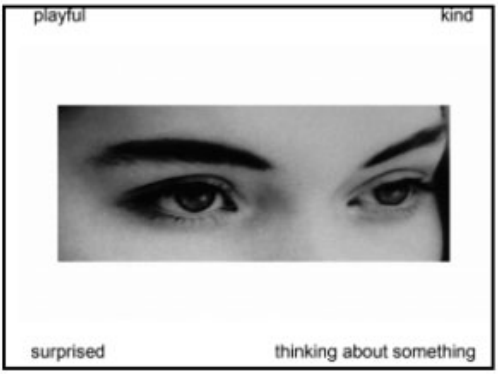

angry
friendly
unkind
a bit worried

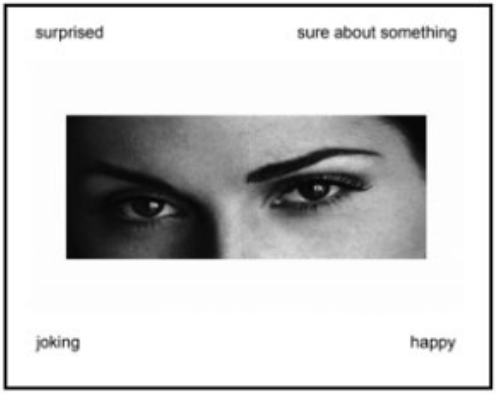

thinking about
something sad
angry
bossy
friendly

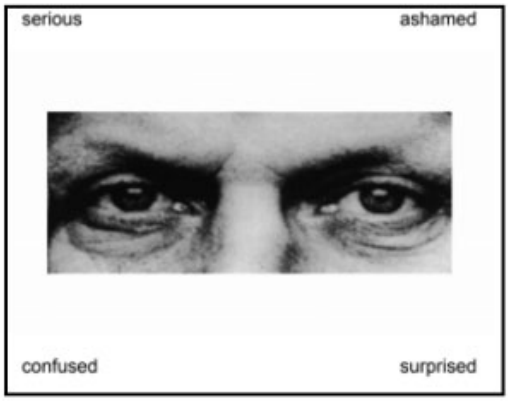

angry
daydreaming
sad
interested

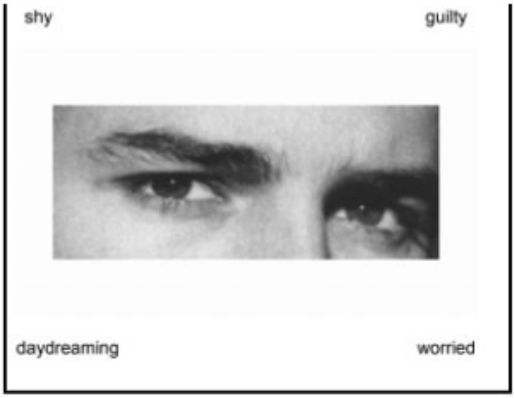

kind
surprise
not pleased
excited


interested
joking
relaxed
happy

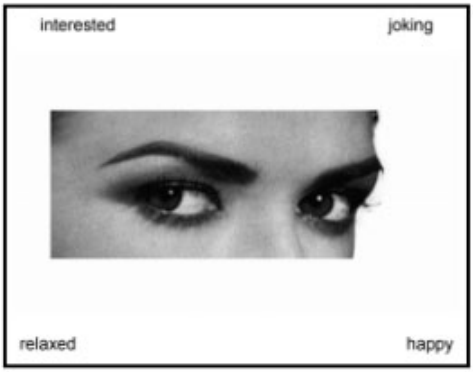

playful
kind
surprised
thinking about something

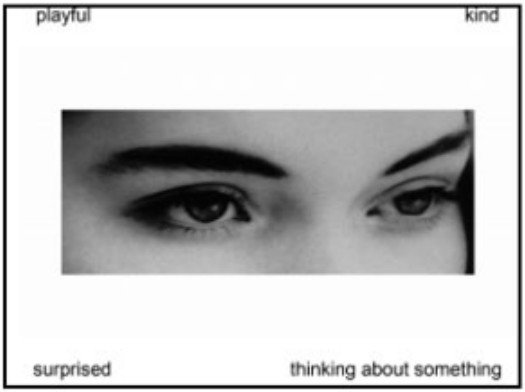

surprised
sure about something
joking
happy

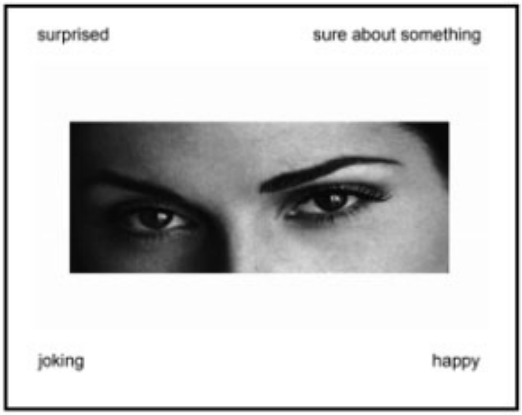

serious
ashamed
confused
surprised

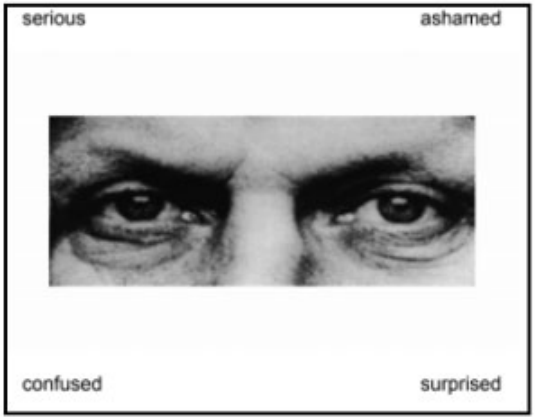

shy
guilty
daydreaming
worried

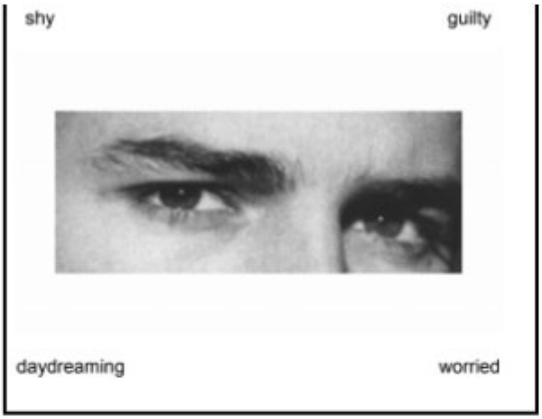

joking
relaxed
nervous
sorry


interested
joking
relaxed
happy

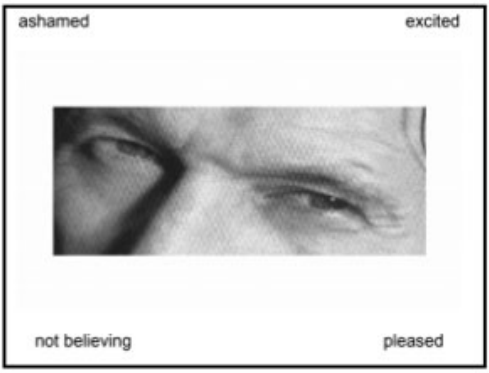

playful
kind
surprised
thinking about something

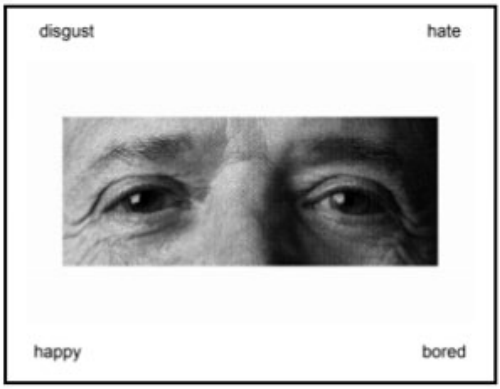

surprised
sure about something
joking
happy


serious
ashamed
confused
surprised

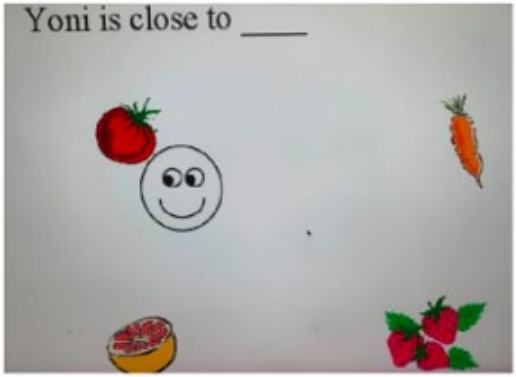

shy
guilty
daydreaming
worried


joking
relaxed
nervous
sorry

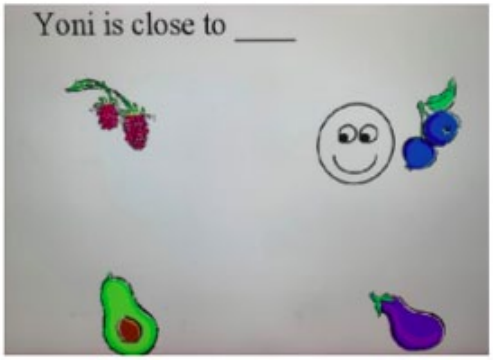

ashamed
excited
not believing
pleased

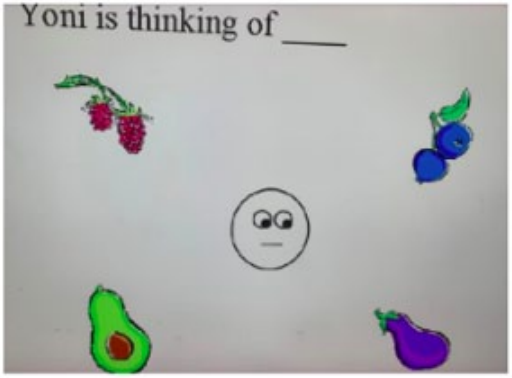

disgust
hate
happy
bored

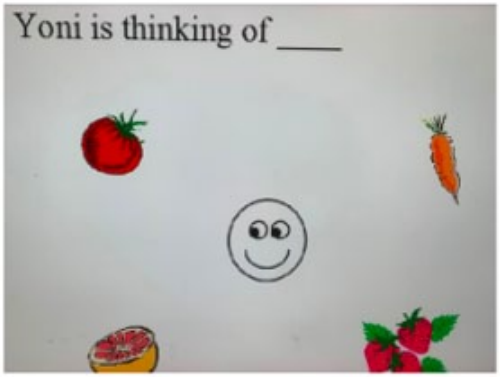

This is Yoni

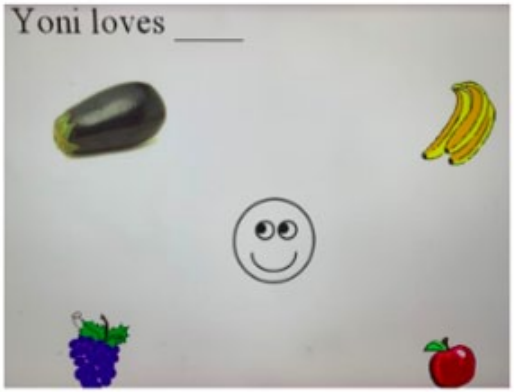

Yoni is close to ____


Yoni does not love ____

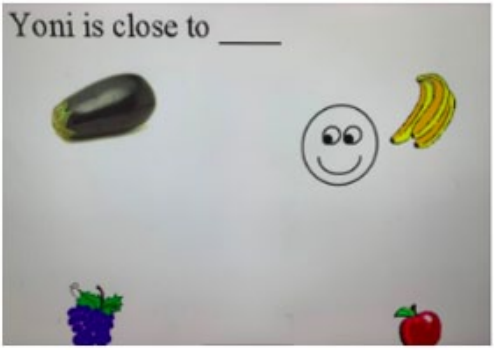

Yoni is close to ____

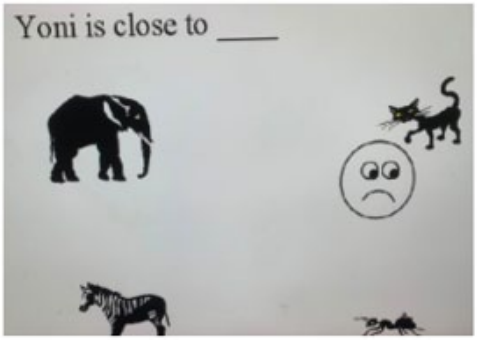

Yoni is thinking of ____

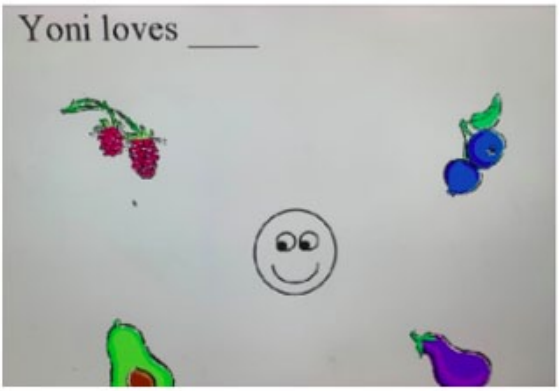

Yoni is thinking of ____

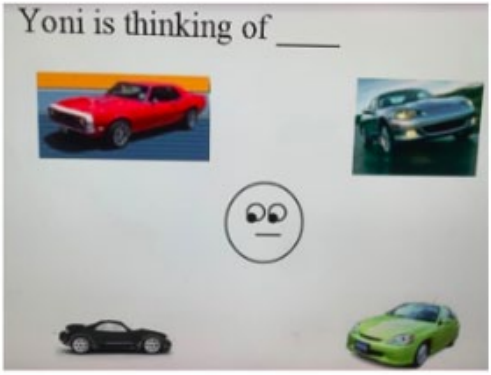

Yoni loves ____

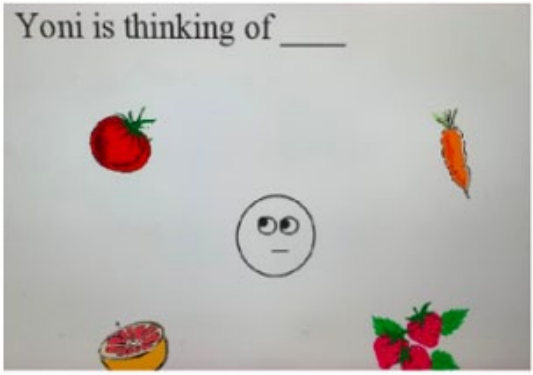

Yoni is thinking of ____

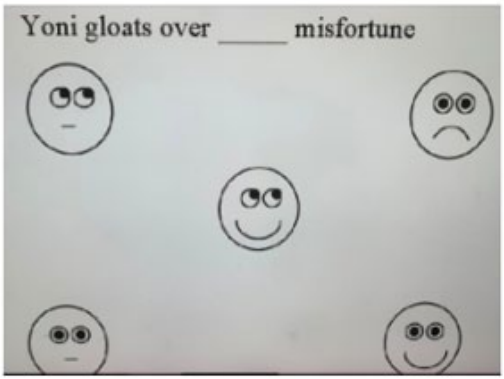

Yoni is close to ____

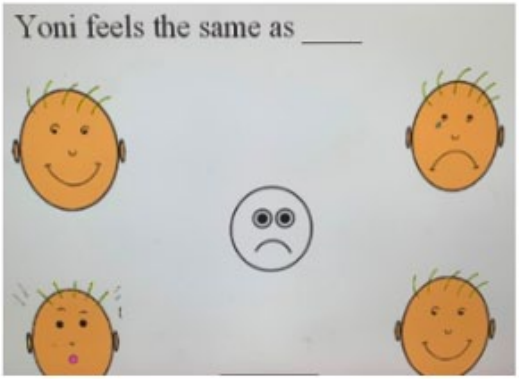

Yoni is close to ____

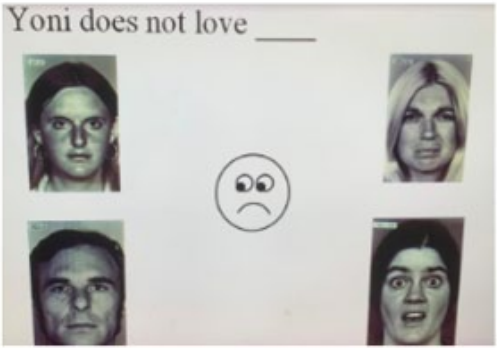

Yoni loves ____


Yoni is thinking of ____

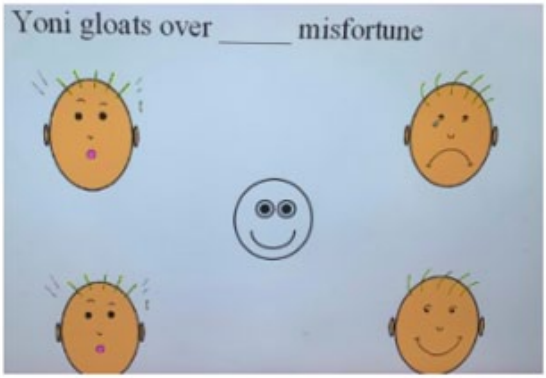

Yoni is thinking of ____

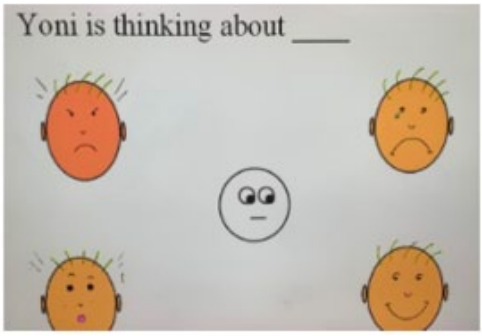

Yoni gloats over _____ misfortune


Yoni feels the same as ____

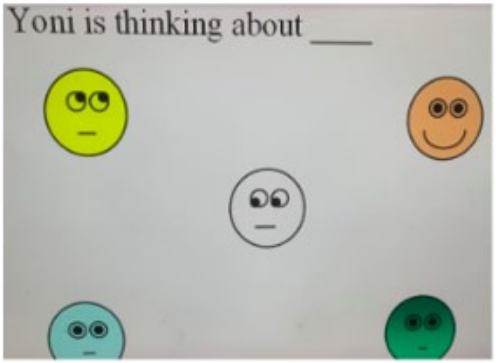

Yoni does not love ____

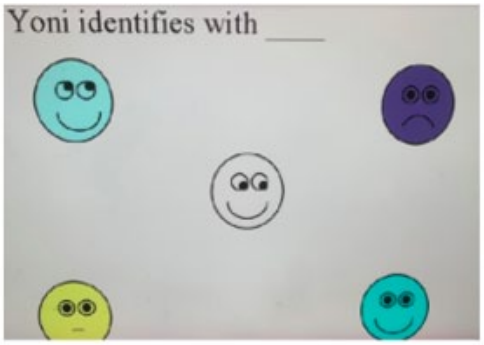

Yoni loves ____

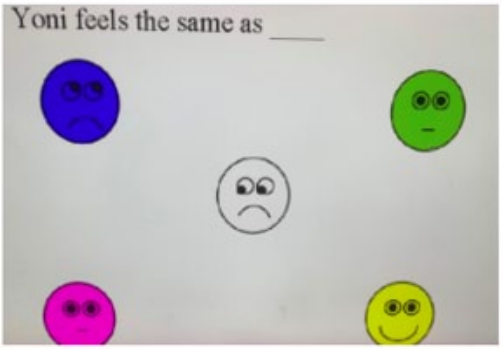

Yoni gloats over _____ misfortune

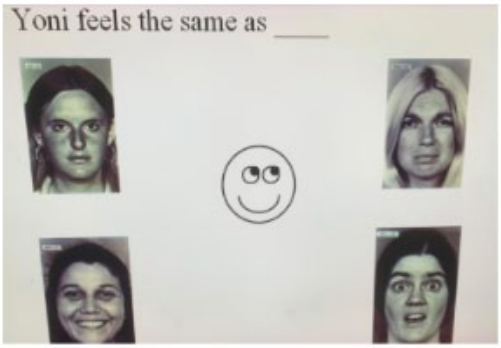

Yoni is thinking about ____

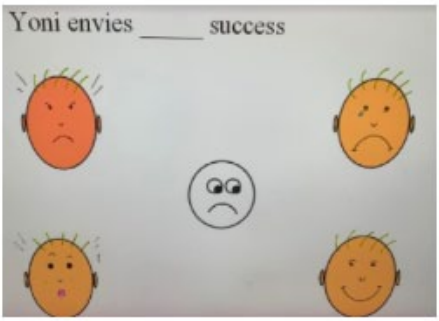

Yoni envies _____ success

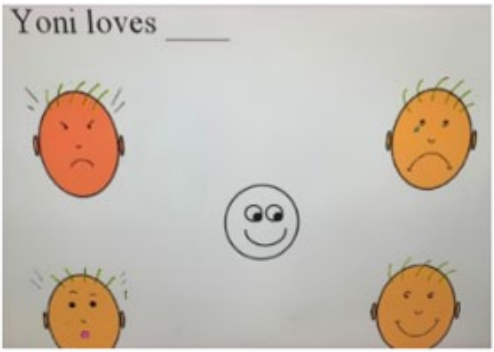

Yoni is thinking about ____

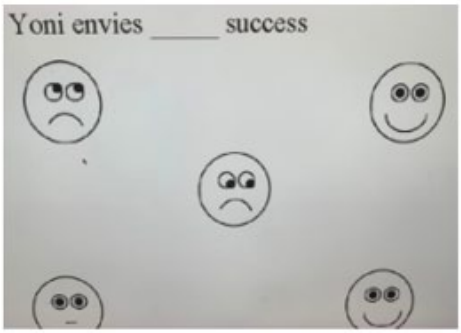

Yoni identifies with ____

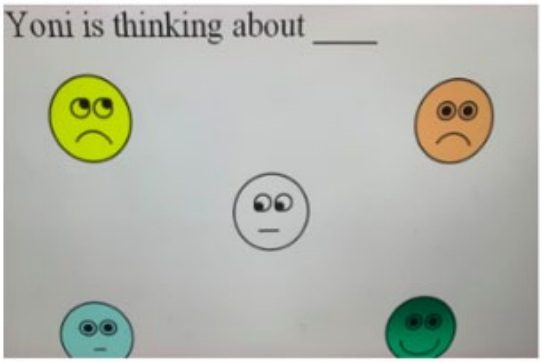

Yoni feels the same as ____


Yoni feels the same as ____


Yoni envies _____ success

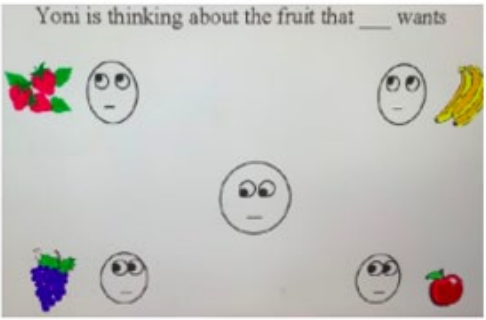

Yoni loves ____


Yoni envies _____ success

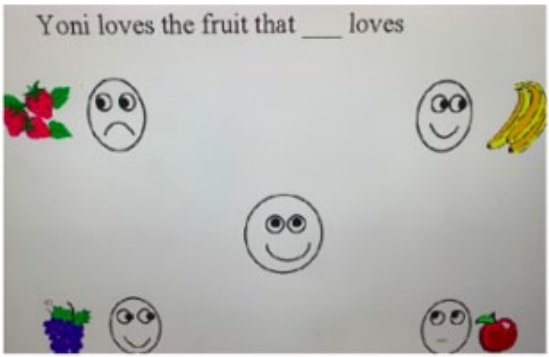

Yoni is thinking about ____

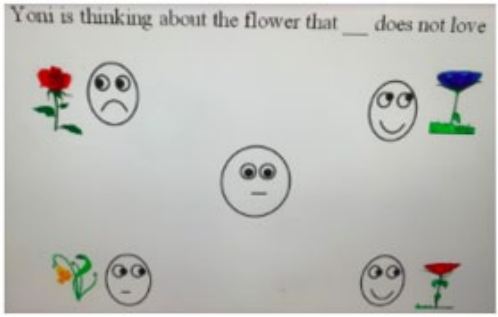

Yoni identifies with ____

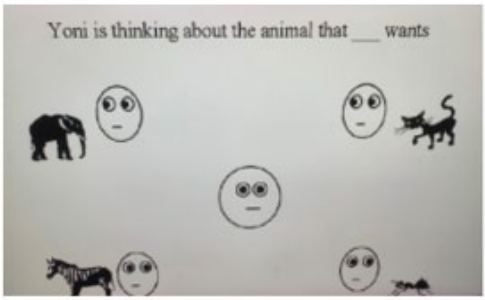
Part c

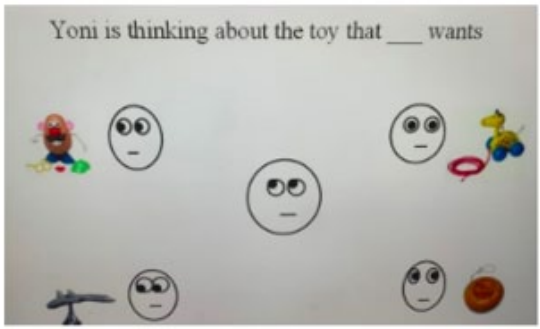

Yoni is thinking about the fruit that ___ wants

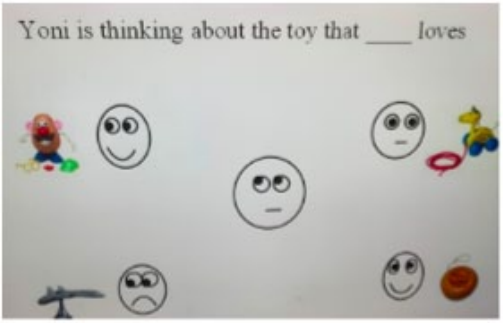

Yoni has the toy that ____ has

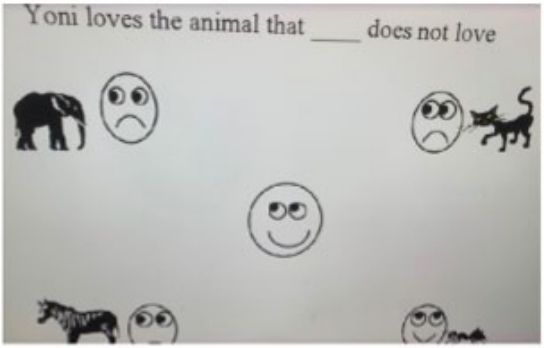

Yoni loves the fruit that ___ loves

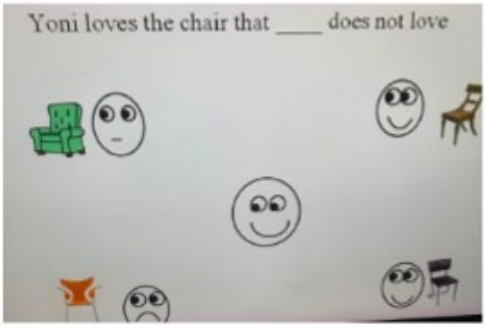

Yoni is thinking about the flower that __ does not love

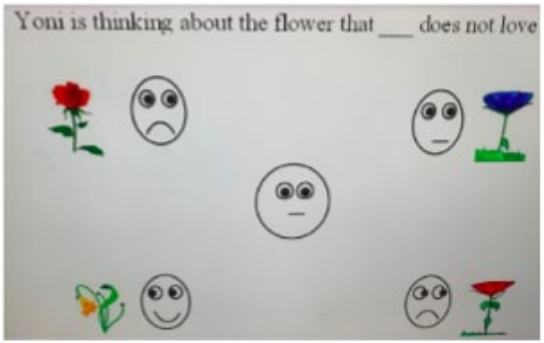

Yoni is thinking about the animal that ___ wants

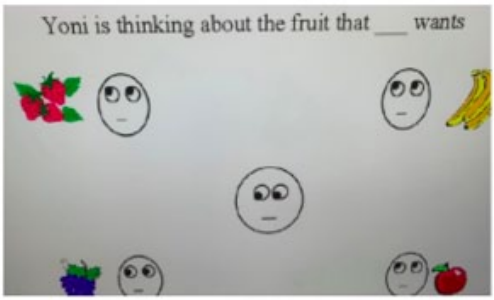

Yoni is thinking about the toy that ___ wants

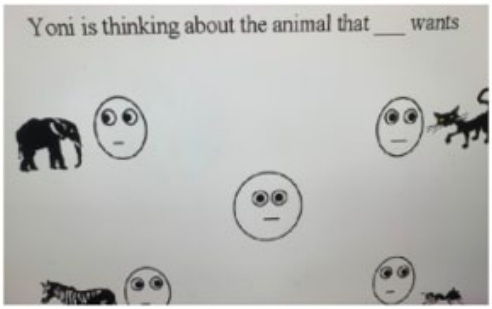

Yoni is thinking about the toy that ____ loves

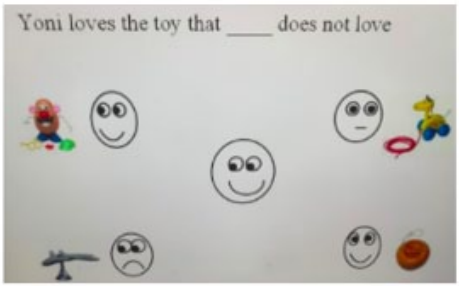

Yoni loves the animal that ____ does not love

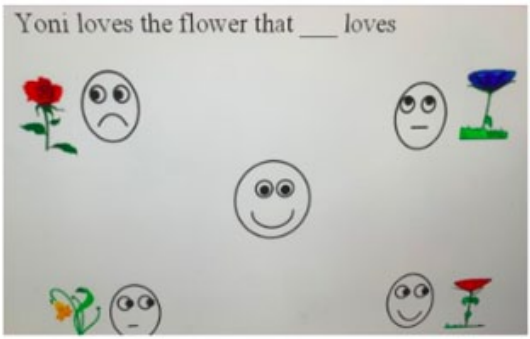

Yoni loves the chair that ____ does not love

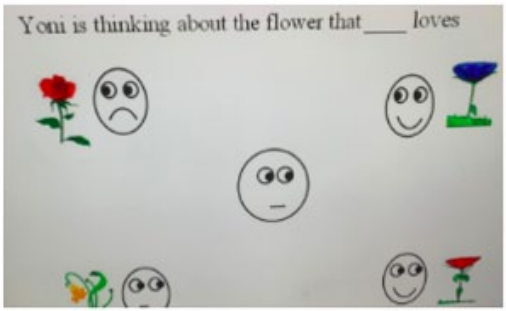

Yoni is thinking about the flower that ___ does not love

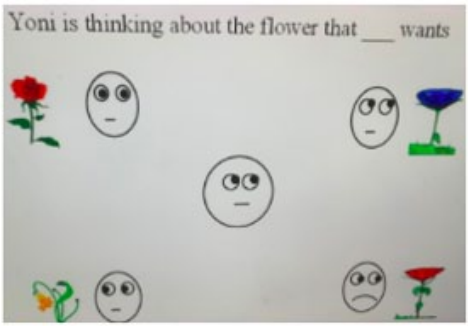

Yoni is thinking about the fruit that ___ wants

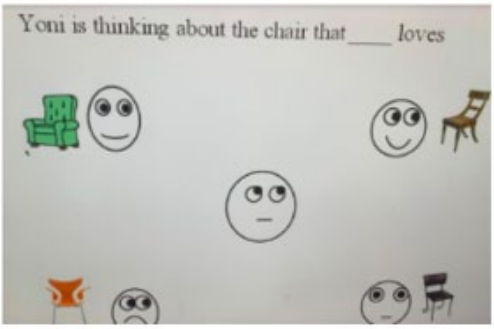

Yoni is thinking about the animal that ___ wants

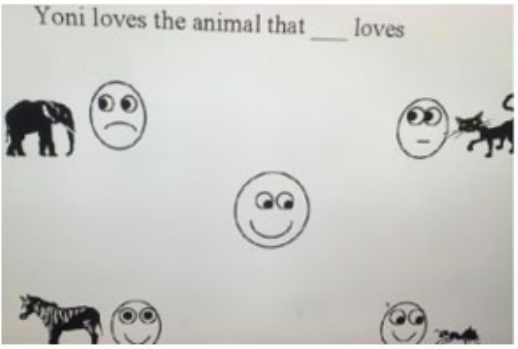

Yoni loves the toy that ____ does not love

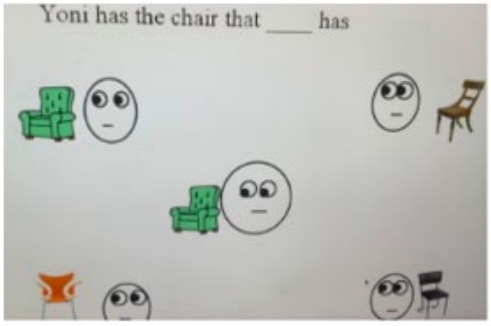

Yoni loves the flower that ___ loves

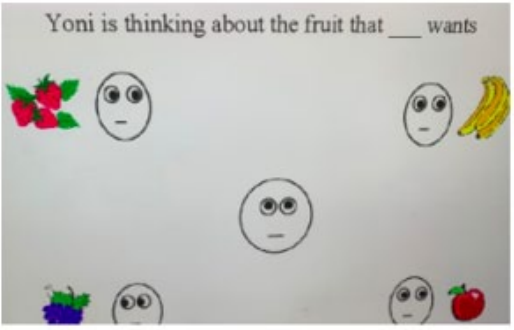

Yoni is thinking about the flower that ____ loves

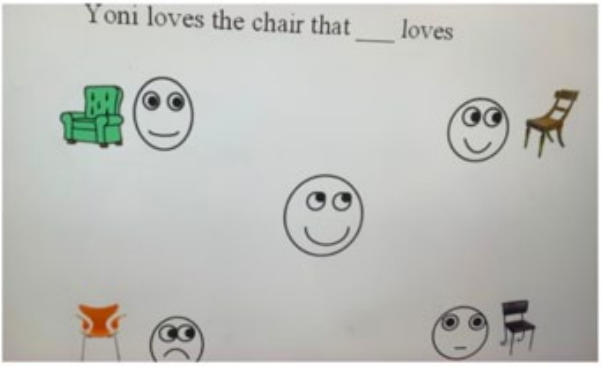

Yoni is thinking about the flower that ___ wants


Yoni is thinking about the chair that____ loves


Yoni loves the animal that ___ loves


Yoni has the chair that ____ has


Yoni is thinking about the fruit that ___ wants


Yoni loves the chair that ___ loves

Appendix C

Children's Eyes Instructions

In this folder I've got lots of pictures of people's eyes. Each picture has four words round it. I want you to look carefully at the picture and then choose the word that best describes what the person in the picture is thinking or feeling. Let's have a go with this one (practice item). Look at this person. Do you think he is feeling jealous, scared, relaxed or hate (point to words as they are read)? Make sure child picks one of the options and give encouraging feedback without revealing whether they are right or wrong.

OK, let's have a go at the rest of them. You might find some of them quite easy and some of them quite hard, so don't worry if it's not always easy to choose the best word. I'll read all the words for you so you don't need to worry about that. If you really can't choose the best word, you can have a guess. Proceed with the test items in exactly the same way as the practice item.

Appendix D

Read the short story. Then answer each question.

Monster Learns Rules

One day, a monster came to our classroom. He didn't know any of the rules!

We had to show him how to sit on the carpet. We had to show him how to use a quiet voice. We had to show him how to use supplies.

We went to P.E. class. Monster tried to sit on the carpet. No, Monster! We don't have to sit on a carpet in the gym! Monster tried to use a quiet voice. No, Monster! We don't have to be quiet in the gym. Monster didn't know what to do with the supplies. We showed him how to throw a ball.

We went to the lunchroom. Monster sat at a table. Good job, Monster! Monster used a loud voice. No, Monster! We can't be too loud in the lunchroom. Monster tried to throw his food. No, Monster! We can't throw food. Monster was confused. Poor Monster.

We went to our classroom. We wrote the rules for the different places at school. Rules are different in different places. It is tricky but it keeps us safe!

Grade 1 Reading Comprehension Worksheet

Question:

1. Who is the main character?

_____

2. Where is the monster sitting?

_____

3. What is the problem?

_____

_____

4. How do they solve the problem?

_____

_____

5. What rules would you teach Monster if he came to your house?

_____

Appendix E

Read the short story. Then answer each question.

Pen Pals

We are learning how to write friendly letters at school. I don't mind writing practice letters, but it would be more fun to write a real letter to someone Just as I was thinking about it, our teacher, Mrs. Snow said that we really are going to write a letter to someone! We all started talking at once. Mrs. Snow asked us to quiet down again so that she could finish.

She said we are going to write to second graders in England to see what life is like in England. That sounds so cool! I couldn't wait to get started. Mrs. Snow handed out the names of our pen pals, and asked us to use what we learned about friendly letters to write to our pen pal. My pen pal's name was Oliver. The only things Mrs. Snow said we had to include in our letter were two questions:

1. Which holidays do you celebrate during the year? 2. What do you like to play?

We also had to answer those questions in our letters. She said we could add any other details about things we like to do, and what school is like here, if we wanted to.

It took a few weeks, but the day we got letters back from our pen pals was an exciting one! Oliver plays video games like we do over here. Their holidays are a lot of the same holidays we celebrate, like April Fool's Day! Oliver told me about a prank he was going to play on his dad. One holiday they celebrate that I don't is Boxing Day. It was interesting to see what is the same and what is different about living in different countries. I can't wait to learn more about my new pen pal!

Grade 2 Reading Comprehension Worksheet

Questions:

1. Who are the characters in the story?

_____

_____

2. What were the two questions the students had to include in their

letters?

_____

_____

3. Why do you think it is important to talk to people who live differently than you?

_____

_____

4. How else could the main character communicate with his pen pal?

_____

_____

5. Who would you like to write a letter to? Why?

_____

_____

Grade 2 Reading Comprehension Worksheet

Appendix F

Human Informed Consent Form

Student Researcher:

Julia Werner

Title of Project:

The Effect of Reading Literary Fiction on Theory of Mind in Children versus Adults

I am asking for your voluntary participation in my science fair project. Please read the following information about the project. If you are willing to participate, please sign in the appropriate area below.

Purpose of the project:

To test to see if after reading a passage of literary fiction there is an increase in theory of mind test scores. Theory of mind is essentially the idea that other people have thoughts and feelings independent from one's own.

If you participate, you will be asked to:

Complete a theory of mind test and read passages

Time required for participation:

composite testing time will take no more than one hour

Potential Risks of Study: testing anxiety is the primary risk of the study; however, this should not exceed any feelings of anxiety resulting from already required standardized testing

Benefits:

Practice with reading and test taking skills

How confidentiality will be maintained:

All scores will be kept anonymous and no names will be collected or published

If you have any questions about this study, feel free to contact:

Adult Sponsor/QS/DS: Alesia Williams Phone/email: alesia.williams@jefferson.kyschools.us

Voluntary Participation: Participation in this study is completely voluntary. If you decide not to participate there will not be negative consequences. Please be aware that if you decide to participate, you may stop participating at any time and you may decide not to answer any specific question.

By signing this form I am attesting that I have read and understand the information above and I freely give my consent/assent to participate or permission for my child to participate.

Adult Informed Consent or Minor Assent Date Reviewed & Signed: _____
(mm/dd/yy)

_____ __
_____
_ Research Participant Printed Name:
Signature:

Parental/Guardian Permission Date Reviewed & Signed: _____
(mm/dd/yy)

_____ __
_____
_ Research Participant Printed Name:
Signature: