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by

Gray S. Atherton

August 2014

WHAT AM I THINKING?
THEORY OF MIND
DEVELOPMENT IN AUTISM

A Thesis Presented to the
Faculty of the College of Education
University of Houston

In Partial Fulfillment
Of the Requirements for the Degree

Master of Education

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Acknowledgment

To my parents for always supporting me, to Ben Lummis for his unfailing generosity, and to Dr. Susan X Day for her wisdom and kindness. It is with humble gratitude that I acknowledge the work of Dr. Francesca Happé and Dr. Simon Baron-Cohen, whose original research made my own attempt possible. Most importantly I want to thank The Monarch School community for their belief in this project. In honor of the students who allowed me into their lives:

“Look closely. The beautiful may be small.”

Immanuel Kant

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Atherton, Gray S. "What Am I Thinking? Theory of Mind Development in Autism." Unpublished Master of Education Thesis, University of Houston, August 2014.

Abstract

Seventeen adolescent students from The Monarch School of Neurological Differences with a diagnosis of autism spectrum disorder (ASD) were tested for mentalizing deficits often found in individuals with ASD using the theory of mind (ToM) battery (Baron-Cohen, 1985). Test results revealed that twelve of the seventeen students were found to have a more advanced ToM than original research suggested. These qualifying students were administered the Strange Stories Test (Happé, 1994), a series of short vignettes in which characters must interpret contradictory statements. During Strange Stories testing, students were asked to provide explanations for their answer choices. This semi-structured interview was designed to clarify specific theories surrounding ToM acquisition as well as to uncover similarities in the experiences students have had related to mentalization. All interviews were recorded and transcribed, and two researchers applied a system of consensual qualitative coding which yielded an interrater reliability of 1.0. The primary researcher determined five overarching themes yielded post-coding. Results are explained in the context of current mentalizing theories, and implications for future research are additionally discussed.

Table of Contents

Chapter	Page
I. Introduction and Lit Review.....	1
Theory of Mind.....	2
The Strange Stories.....	4
Mentalizing Theories.....	8
Central Coherence.....	8
Executive Functioning.....	9
Innate Modularity.....	11
Neural Evidence for Mentalization.....	13
Current ToM Interventions.....	15
II. Method.....	16
Subjects.....	16
Materials.....	17
Ethical Considerations.....	18
Procedure.....	18
III. Results.....	21
Theoretical Orientation.....	21
Honesty as Absolute.....	23
Sarcasm.....	28
Fantasy.....	31
Visualization.....	31
Media.....	35
Anthropomorphism.....	42
Expression and Tone.....	47
IV. Discussion.....	50
References.....	58
Appendix A Research Compliance.....	65
Appendix B Informed Consent.....	67

Appendix C ToM Testing Battery.....	75
Appendix D The Strange Stories.....	86
Appendix E Groupings for Strange Stories.....	103

Chapter 1

Introduction and Literature Review

An interest in examining the ToM construct in individuals with autism spectrum disorder (ASD) began during work with The Monarch School over the summer of 2013. The Monarch School is an educational facility for students with neurological differences, and it is composed of young Novice and Apprentice level students receiving early interventions for ASD, and Challenger and Voyager programs serving adolescents and adults with a variety of learning differences. The counseling staffs involved in the Integrated Learning Practices class with the Challenger program, ages 11-17, deliver therapeutic interventions aimed at increasing the relationship development, executive functioning, self-awareness, and academic competence of students on a daily basis. One of the most important aspects of the Monarch approach involves group work. This specifically addresses the struggle individuals with ASD, the predominant diagnosis of Monarch students, typically display in initiating and maintaining social relationships.

Over the course of the summer of 2013, observers on the Monarch staff noted an increase in the Monarch teens' peer interactions that define typical students at the adolescent stage of development—for example, more frequent use of sophisticated communication seen in typically developed young adults. This increase spurred an interest in researching what specific interventions being used at Monarch influenced students' interest in peer interaction and how the effect could be replicated to benefit more individuals diagnosed with ASD.

The first step in forming this project was researching what theories address the social differences observed in the population affected by ASD, which led to the work of Dr. Baron-Cohen of the Autism Centre of Cambridge University. Baron-Cohen (1985) first conceptualized social deficits in ASD by asking “Does the Autistic Child Have Theory of Mind?” and built upon Premack and Woodruff (1978) by incorporating specific Theory of Mind (ToM) battery tests into an assessment. The results of his work revealed a common difficulty in ToM task completion in people with a diagnosis of ASD.

Theory of Mind

The Theory of Mind *mentalizing theory* asserts that a key facet of human development involves the ability to interpret other people’s thoughts, even when their actions may seem contradictory. In other words, mentalizing involves understanding what another person is thinking even when their behavior would imply otherwise. This concept can be traced back to research by Jean Piaget (1955) on a construct he called *egocentrism* when a child is in the preoperational stage of development. Piaget demonstrated a child’s inability before the age of four to understand that their view of a small house on the side of a mountain diorama was different from that of a person who stood on the opposite side of the model. This experiment, known as “The Three Mountain Task,” is crucial to Piaget’s argument that children before the age of four are *egocentric* and lack the ability to mentalize about another person’s unique viewing experience. Tasks such as this are referred to as *first order* belief tasks (what does someone think) followed by *second order* (what does someone think I think) and ending with the most complex form of mentalizing, the *third order* belief task (what do they think I think that they’re thinking).

Baron-Cohen's work with the ASD population on ToM ability was very similar to Piaget's perspective taking task, and produced significant results (1985). His tests showed that despite typical verbal and cognitive functioning levels of children tested, individuals with ASD struggled to discern the thought processes of others as indicated in the well-known ToM assessment, the *Sally Ann* task. Based on Wimmer and Perner's false belief tasks developed in 1983, researchers show testing subjects two puppets, Sally and Ann. The puppets have been placed next to an open box in which subjects see a marble, but whose opening is just above the puppet's line of vision. The researcher manipulates both Sally and Ann, having Sally mime touching the side of the box, while at the same time Ann is moved above the box and bent so that her face is able to see the marble. The subject is then asked, "Who knows what is inside the box?" This scenario tests the participant's ability to understand both puppets' cognitive processes and imagine what both the sensory and visual inputs for each puppet would signal to their brains. If the participants do understand, they have arrived at a theory of mind. These tasks have since been reproduced in many forms for assessment diagnostic purposes, most notably in the form of the Developmental NEuroPSYchological Assessment (NEPSY), one of the most common tools for ASD diagnostics (Korkman, 1998).

Baron-Cohen's research showed significant differences in performance between subjects with ASD and control subjects. Of 20 children with ASD, only 4 passed the ToM battery, as opposed to 23 of 27 children of typical development and 12 of 14 children with Down's syndrome (DS). Comparisons between subjects with ASD and Down's Syndrome were especially significant in that individuals with Down's Syndrome had an average IQ of 64, while corresponding subjects with ASD had a mean IQ score of

82. This comparison could be considered the beginning of the eventual separation between ToM ability and other areas of intellectual functioning. Based on this work Baron-Cohen concluded that “autistic children fail to employ a Theory of Mind,” explained as a “failure to represent mental states” (Baron-Cohen, 1985, p. 43). Though these results revealed some sort of a deficit in this ability, researcher Francesca Happé (1994) was curious about the fact that 20% of Baron-Cohen’s subjects with ASD *did* pass the ToM battery, refuting the idea that all individuals with ASD can be said to be completely void of ToM.

The Strange Stories

In 1994 Happé devised a new measure of ToM called the Strange Stories. This test was developed with the intention of further examining the observed ceiling effect in Baron-Cohen’s test when administered to the upper 20% of individuals who received perfect scores. In her study, subjects were presented with a series of vignettes (“Strange Stories”) in which people in everyday situations say things that they do not mean in a literal sense. The goal of this new form of assessment was to “present a somewhat more naturalistic challenge to the subjects than did the acted out ToM battery tasks” (Happé, 1994, p. 130). As Happé hypothesized, these subtler forms of ToM did reveal a deficit in those subjects who passed simpler mentalizing assessments. Despite matching intelligence to their peers, adults with ASD identified at least one mental state incorrectly and a mean of three, while adults with typical development uniformly received perfect scores.

Happé herself, in an effort to further isolate the ToM ability from other domains, replicated her original 1994 battery with an additional component, physical control

stories in 2009, created along with researchers White, Hill, and Frith. These physical stories, which also require interpretation of contradictory information, were about natural elements such as weather. An example of a physical story that requires the sort of critical thinking also used in *Strange Stories* (White, Happé, Hill, & Frith, 2009) would be the *Storm* story. Subjects are told that a storm is gathering over a small town, and it begins to thunder and lightning. There is heavy wind, and branches begin to fall off trees. After a bright flash of lightning, followed by a crashing sound, all of the lights in the village go out. In this scenario researchers would ask participants to cite the reason that the lights went out (because lightning struck a tree that fell onto the power line). Unlike stories about people or animals, physical stories did not cause difficulties in subjects with ASD. These physical control stories were particularly compelling in that researchers could now “rule out a general comprehension problem as the same children who had difficulty making inferences about human and animal actions were able to make inferences about natural events, revealing intact text and sentence-level comprehension” (White, Happé, Hill, & Frith, 2009, p. 1107).

A key finding in Happé’s original research of the *Strange Stories* results was the frequency of mental state descriptions used by subjects with ASD in explaining answer choices. Contrary to testing expectations, individuals with ASD were just as likely to use a mental state justification for a vignette as the control groups, though answers stood a greater chance of being incorrect (Happé, 1994).

Incorrect responses within answer sets are believed to stem from “a weakness in processing mental state information in context” (Jolliffe, & Baron-Cohen, 1999, p. 403). An example of this would be in the “white lie” strange story where Peter tells his aunt

that he likes her ugly hat. The reason Peter tells this white lie is not to make his aunt laugh, as one of the more common responses that he was “just joking” would imply, but to avoid hurting her feelings. The correct justification for Peter’s statement can be found only by understanding the contextual clues embedded in the story such as “Peter loves his aunt very much” and “Peter thinks his aunt looks silly in it” (Happé, 1994, p. 269).

Happé provided an interesting observation for incorrect justifications in her original study, noting a consistent pattern of the same mental state answers for a variety of questions. Happé mentions three subjects specifically, the first who used the justification of “having a joke” for 15 of the 24 stories, the second with a full scale IQ of 85 answering 14 of 24 stories with the prefix verb root “to think” such as “He thinks a lawn mower cut her hair” for the joking story, and the third using the answer “He/she made a mistake” repeatedly (Happé, 1994, p. 143). Happé refers to this as “preservative responding” that had no relationship with test conditioning, such as continuing to use an explanation of joking because that was the first testing conceit. Instead, this repetition is most likely a result of subjects’ learning to assimilate into society. Happé observes that

It therefore seems that these subjects came to the test situation equipped with one or two explanations for why people say puzzling things. It is possible that these explanations had been told to the subjects in response to questions about particular situations, and the subjects noted them without understanding the precise nature of the context in which they apply. (Happé, 1994, p. 143)

Indeed, of the many studies that have used the Strange Stories to assess for ToM in the population affected by ASD (Fletcher, Happé, & Frith, 1995; Jolliffe, & Baron-Cohen, 1999; Dyck, Ferguson, & Shochet, 2001; Heerey, Keltner, & Capps, 2003;

Sullivan, & Ruffman, 2004; Rogers et. al., 2007; Kaland et. al., 2008), all have revealed the same frequency for providing a mental state justification as their peers with typical development. The discovery that mental states are of the same availability to individuals with ASD as those in the general population has corrected misconceptions surrounding the communication differences within ASD. Furthermore, this information directs appropriate avenues for therapeutic interventions, and may indicate a need for supplementing techniques such as operant conditioning for treating the ToM deficit in ASD. Common examples of the conditioning approach would be using Applied Behavioral Analysis or ABA, a technique borrowing from behaviorism developed by Dr. Ivar Lovaas in 1987.

Happé's battery, especially the high scores on the physical control stories interlaced in the Strange Stories, have served as powerful foil to behavioral explanations for ASD. By scoring identically to control groups on physical stories, individuals with ASD have been shown to possess the cognitive ability to problem solve using abstractions, only struggling when stories were specifically used in a social context. As to a suspected lack of motivation to guess at mental states, Happé's test revealed that participants with ASD were just as likely to give an answer that involved a mental state as the control subjects, showing that people with the disorder are indeed as aware of the reality of other's cognitions as their typically developed peers (White, Happé, & Frith, 2009).

Mentalizing Theories

Central Coherence.

Researchers have many theories about how individuals conceptualize the mental states of others. Some believe that mentalizing is multifaceted and that ToM affects many neural systems simultaneously which together form a central coherence (Saxe, Carey, & Kanwisher, 2004; Frith & Frith, 2006). Specifically, in order to accurately process information a person must have the ability to locally and globally attend to structures and patterns (Happé, & Booth, 2008) Kanner, who in 1943 first identified ASD, describes individuals with ASD possessing an “Inability to experience wholes without full attention to the constituent parts ... A situation, a performance, a sentence is not regarded as complete if it is not made up of exactly the same elements that were present at the time the child was first confronted with it” (Kanner, 1943, p. 246). The conclusion that individuals with ASD struggled to globally extract information due to a preoccupation with detail was supported by studies that showed high performance on the Embedded Figures Test (Shah, & Frith, 1983) and the Block Design Test (Shah, & Frith, 1993), in which it is beneficial to “see the whole design in terms of its constituent parts” (Happé, & Booth, 2008, p. 51).

Similarly, Sigman, Kasari, Kwon, & Yirmiya (1992) conducted a study with preschoolers that revealed mirror system irregularities in children with ASD. In their study the amount of time a subject spent playing with a toy that elicited a fearful reaction from their parent and a researcher were measured, along with the time spent observing the child’s presentations of distress. A significant negative correlation was found between the amount of time spent observing the adult’s reactions and time spent playing with the

toy. Children with ASD were measured as having spent the least amount of time attending to adult fear responses (less than half looked at them at all, as opposed to all of the control subjects), and therefore spent the most time actively engaging with the robot. Interestingly, the more time a subject with ASD spent monitoring the adult reactions, the less time they spent playing with the toy. As this study illustrates, the child appeared to poorly integrate the *global* meaning of the mother's fear response as having implications for their own safety, instead attending to the *local* processing of the toy's physical properties.

Executive Functioning.

Happé describes executive functioning as “an umbrella term covering a range of higher-order cognitive abilities necessary for flexible and adaptive behaviour in the service of novel goals” (Happé, & Frith, 2006, p. 17). Those who use an Executive Functioning delay to explain mentalizing cite common difficulties in shifting attention from the more salient details to process for global meaning. Such a deficit could explain why the details in stories or conversations that reveal hidden meanings about mental processing are attended to at their most basic meaning rather than further developed (Shallice, 1988, Gillott et. al., 2002). Executive functioning involves memory retrieval, inhibition, and organization of thoughts. The theory that EF houses ToM has been questioned by the Strange Stories in that participants were able to coherently organize information, as well as remember salient details and inhibit their attention to detail to extract the global meaning of events occurring in the physical stories. Another study that gives similar results when contrasting general executive functioning with unique mentalizing capabilities was conducted by Blair, Frith, Smith, Abell, & Cipolotti (2002).

In this study 12 subjects with ASD were compared to 12 control subjects, who were matched for verbal IQ and chronological age. Of interest was the comparative performance of subjects with ASD on executive functioning tasks as well as their ability to recognize “unfamiliar human faces, cats, horses, motorbikes, leaves and buildings” (p. 112). This study found that

The comparable performance of the individuals with autism to the age comparison group reflects their comparable level of speed of processing and the intact development of those aspects of visual memory concerned with non-moving and topographical stimuli. In contrast, we believe that the individuals with autism are dysfunctional in those regions of temporal cortex, particularly superior temporal sulcus, that are crucial for encoding faces, moving objects and goal directed behavior. (p. 116)

However, though individuals with ASD have been shown to possess typical executive functioning skill in some areas, their difficulties with mentalizing have yet to be proven to exist independently of executive functioning. Therefore it is of interest to investigate why executive functioning would be affected negatively when individuals with ASD mentalize and not when they are extracting global meaning about things without agency. Essentially, researchers struggle to understand why is it that individuals with ASD struggle to “adapt attentional strategies to the demands of the task” in an effort to “shift from features of the whole, switch between processes of analysis and synthesis, and ignore an irrelevant level” simply because the focus of the task involves people rather than things (Happé, & Booth, 2008, p. 56).

Innate Modularity.

Baron-Cohen, along with fellow Cambridge researcher Alan Leslie (2004), holds the opinion that ToM is an innate module. Fodor (1983) used the term modularity to describe cognitive processes that mimic architectural modularity. In this metaphor for cognitive processing, certain information inside the module is not accessible outside the module and vice versa. Essentially, certain modules are only able to process specific types of data that are unable to be accessed in any other part of the brain. Theorists with a belief in innate ToM modularity believe that ToM operates kinetically with other neural systems, comparable to the type of cognitive activity used to describe vision or speech, and is a system housing almost instantaneous synaptic activity. This module, comparable developmentally to the vision module requiring a light stimulus, also requires a very specific type of data input to progress.

These stimuli may have been presented throughout the individual's lifespan, but due to developmental delays in other areas such as executive functioning are only later able to be retrieved by the ToM module. Leslie describes this innate module as developing tangentially to executive functioning, and requires the EF module's output of organized knowledge to guide its output of a correct mentalizing conceptualization (Leslie, 2004). When examined in this light, EF and ToM have a connection, but are still separate entities that serve different purposes and supply different information.

The study described previously concerning a preschooler with ASD's interaction with the toy robot illustrates the kind of early delay in EF that could affect a ToM module's developmental trajectory. For instance, the experiment demonstrated that the children with ASD displayed significantly lower inhibitory responses when confronted

simultaneously with the robotic toy and the adult's expression of fear. Instead of attending to the adult's responses they focused entirely on the new plaything, and therefore missed important clues provided in their environment. Similarly, the study proved that the longer a child observed the adult's reactions, demonstrating inhibition, the less time they spent playing with the toy. Using Leslie's belief in specific stimuli necessitating ToM development, and Gerran and Stone's 2008 description of "a ToM deficit [that] is best explained by a lower-level input deficit occurring early in development" (Gerrans & Stone, 2008, 133), this experiment could be interpreted within a theory of modularity. For example, a modular theorist would assume that a child with ASD's lack of inhibition, possibly compounded with other EF delays such as difficulty assimilating the adult's reactions into a "fear" *schema*, would prevent that child from receiving an adequate amount of exposure to "facial gazing," which would be the specific stimulus needed for the module's development.

The specifics of these stimuli are yet to be operationally defined, and perhaps until observations of neonatal subjects with ASD can be studied, any conjectures are at this point purely speculative. Theories range from gestational experience to time spent attending to eye movement. Perhaps it is most aptly put by Baron-Cohen (1999) when he posits that "lower level perceptual mechanisms" such as those involved in executive functioning "extract relevant social information, which provide critical inputs to developing ToM" (Baron-Cohen, 1999, p. 9). One of the aims of this study is to understand the stimuli that high-functioning teens with ASD use to extract social information.

Two studies provide particular support for the theory of an innate ToM module: Sabbagh et. al.'s 2006 study "The development of executive functioning and theory of mind: A comparison of Chinese and US preschoolers" and Happé's own Strange Stories battery. In Sabbagh et. al.'s study, Chinese preschoolers were compared to American children in their performance on EF and ToM tests. The study found that while Chinese preschoolers developed the EF skills of their American counterparts approximately 6 months earlier (age 3.5 in Chinese children opposed to age 4 in U.S.), ToM capabilities remained the same (both acquired competency of ToM at age 4) (Sabbagh et. al., 2006). These findings may illustrate researcher Sabbagh's belief that ToM may initially depend on developed EF, but it eventually requires further stimuli to continue maturing.

Similarly, Happé's original 1994 study in which the Strange Stories were first introduced can also be used to support the innate modularity theory of ToM based on the data collected from the study's control group of typically functioning adults. This 1994 study, along with the other studies replicating the Strange Stories with an adult control group, have not had a single person over the age of 13 miss a question, indicating a threshold of ToM knowledge. Furthermore, Happé's test is unique in that it has proven itself through control stories interlaced in its ToM battery that effectively separate mentalizing from executive functioning (EF) and central coherence (CC).

Neural Evidence for Mentalization

Another example of the stability of ToM functioning within the general adult population is illustrated in the scoring properties of the Strange Stories. With interrater agreement of almost perfect levels (the mean of 98% was not 100% due to a misreading of the question which was quite easily corrected), judges of correctness for answers are in

universal accord. This reliability also supports a claim of a ToM module showing independence after a period of critical development. As shown in everyday experiences with forgetful individuals, executive functioning levels vary greatly within the adult population, yet past the age of 13 the concepts of other people's mental states when objectively assessed with tests such as the Strange Stories these skills are quite uniform.

Recent advancements in neuroimaging, specifically in the development of functional brain imaging, have provided evidence for a distinct mentalizing region of the brain. These areas have been shown to exist independently from areas that control inhibition and syntactic processing. Functional magnetic resonance imaging (fMRI) measures the brain's varying blood oxygenation levels and uses its varying levels to determine the correlation between neural activity and psychological processes. Studies have found through this imaging that the areas of the brain involved in executive functioning are distinct from areas involving mentalizing (Gallagher & Frith, 2003; Frith & Frith, 2006). The regions shown to be active during tests such as the Strange Stories are the pSTS/TPJ, the medial prefrontal cortex and the temporal lobes, while EF is housed in the frontal lobes (Frith, & Frith, 2006; White, Happé, & Frith 2009). Furthermore, these mentalizing areas have been seen to undergo activity during ToM batteries such as Happé's Strange Stories (Happé 2009). The significance, therefore, in using the Strange Stories is that there is neurological evidence that this test has the ability to stimulate the mentalizing areas of the brain.

Current ToM Interventions

One of the most prominent assessments of ASD being used today, the CARS2-HF (Childhood Autism Rating Scale, 2nd Edition, High Functioning, 2010), lists two

interventions for their newly added qualification for diagnosis, Social-Emotional Understanding, which includes both ToM deficit and lack of central coherence. The first intervention is what is currently being examined in this study, which is providing a zone of proximal development for individuals with ASD to interact with others and learn social-emotional understanding in a naturalistic setting. The second intervention is one that has been examined in various forms since Baron-Cohen's initial investigation into ToM deficits: teaching through pictorial representations of other people's mental states using comic-book type illustrations that explicitly show thought processes.

Several programs are being used currently to specifically improve ToM functioning in individuals with ASD, and all revolve around similar concepts of teaching mentalization through the use of visual representations. One of these programs is the thought-bubble training developed by Baron-Cohen in 2002. Thought-bubble training was built around individuals with ASD's common need for visual organization and engaging stimuli. Though the various programs have found success in increasing some mentalizing skills, these skills have yet to be proven generalizable to mentalizing functioning in everyday life. Essentially, they have only proven to increase ToM ability in the domain of thought-bubble activities.

An examination of thought-bubble ToM training is useful in that it further illuminates the importance of studies that examine naturalistic interventions promoting mentalization. Though explicitly teaching ToM skills would appear to be the most direct form of intervention, no study thus far has been able to prove generalizability between the skills learned in a program and real life application. For example, in a ToM social skills class given over the course of 4.5 months, participants became adept at answering

ToM questions correctly, but in a real life setting, where a greater ability to mentalize would presumably enhance relationships, parents reported no change in interaction with family members or peers (Ozonoff & Miller, 1995). Similarly, a 1997 study by Baron-Cohen specifically targeting the effects of ToM training on conversation showed a disconnect between in-class performance and real-life social competency (Hadwin, Baron-Cohen, & Howlin et. al., 1997). The implications of these findings encourage the development of programs that aim to improve these skills in a naturalistic rather than devised setting. Providing individuals with opportunities to interact with others, thus spurring a need for relatedness, places the development of ToM in a more practical and meaningful context. Furthermore, promoting group interaction provides individuals with ASD an opportunity to experience the mental health benefits, such as stress alleviation and positive mood enhancement, correlated with belonging to a larger social network (Cohen et. al., 1985).

Chapter 2

Method

Subjects

The ToM battery was given to 17 students, all of whom were identified by Monarch School applicant files as having received the diagnosis of ASD by qualified medical professionals. Medical records submitted to the school were read by a school administrator with access to applicant files, and subsequent diagnosis of ASD was released. All students were between 12 and 17 years of age. Students who correctly passed all ToM battery questions were then administered the Strange Stories test. Of the 17 students, 12 were eligible to take the Strange Stories test.

Materials

The ToM battery used to test students for first and second-order belief tasks were obtained from the original ToM battery used by Happé (1994). Questions were reworded to reflect an American dialect. Materials used for first order beliefs tasks included a female puppet referred to as “Suzy,” a parrot hand puppet referred to as “Greedy Parrot,” an empty Mentos tube containing a crayon, and three wooden boxes with corresponding lids displaying either a red heart, gold star and blue circle, and two quarters. Both first and second order tasks utilized a male Lego referred to as “John,” a female Lego referred to as “Mary,” a plastic chest, plastic barrel and a small Lego “coin,” all of which were borrowed with permission from The Monarch School. The puppets, boxes, and Mentos were purchased separately. The second-order beliefs tasks involved a Lego village featuring a playground, church, park, two houses, and a zoo. Six additional Lego characters as well as “John” and “Mary” were used as characters in the second-order beliefs tasks.

The Strange Stories test was also derived from the original Happé (1994) study. Some wording was also changed to reflect the American vernacular. The original Strange Stories consisted of 24 Stories which tested 12 distinct ToM conceits. In the interest of the tester 12 stories were chosen to represent each of the 12 conceits. An additional three stories involving the natural world were chosen from Happé (2009) to ascertain how well the subject could process information about physical rather than mental states. All interviews were recorded on an Olympus digital audio recorder.

Ethical Considerations

In accordance with the International Review Board at the University of Houston (see Appendix A for the research compliance form) all Monarch students with a diagnosis with ASD were shown in February 2013 a PowerPoint presentation to gauge interest in participation. These presentations were held during each student's daily Integrated Learning Practice class in groups of 5 to 10. After the presentation, which explained the purpose of the research as well as possible risks and rewards, students were asked on separate pieces of paper to write their names and circle whether they desired to participate. Students who expressed interest in participating were given Parent Permission forms to return with their parent's signature. After receiving parental permission students were then individually asked for their assent to participate in research, where they were again reminded of the nature of the project as well as the possible risks and rewards (see Appendix B for informed consent documents).

Procedure

Students were tested individually in a quiet classroom in The Monarch School. All students were told that the battery would be read to them from a script and their answers would be marked accordingly on the sheet (see Appendix C for the complete battery). The testing took an average of 20 minutes, and all students were able to complete the tasks in one session. As all tasks involving characters required participants to use some degree of imagination or suspended disbelief in believing that the puppets and Lego characters were animate objects, initial questions validating the use of imagination were employed. For example, in the first task in which Sally the puppet is told by the researcher that she must "go back to class" and is then portrayed as waving

goodbye while she descends under the table, subjects were asked “Can Sally hear what we are saying?” by the researcher. All students correctly identified Sally as nonsentient once she had waved goodbye and was hidden under the table. Students and researchers occupied exact seating arrangements per testing session, and were tested during their respective Integrated Learning Practices class, at the school’s request. All ToM battery questions were read in identical order for each student.

Students who proceeded to the Strange Stories interview were tested individually in another empty room in The Monarch School. The twelve ToM stories with associated constructs were *The Telephone* (pretend), *The Cough* (figure of speech), *The Hat* (white lie), *The Dog* (joke), *Christmas Eve* (appearance vs. reality), *The Prisoner* (double bluff), *The Picnic* (irony), *Mrs. Peabody* (misunderstanding), *The Lunch* (persuasion), *The Art Competition* (contrary emotions), *The Vase* (lie), *Absent* (forgetting), and three stories with purely physical events: *The Apple Orchard*, *Winter*, and *Rocky Mountains* (see Appendix D for the testing questions).

Stories were first sorted into groups of three, and then randomly sorted into groups of five with even distribution throughout the subject pool to ensure variation between story order (see Appendix E for further information on the groupings). For example, the “double bluff”, “irony,” and “misunderstanding” stories were grouped together throughout each interview along with the other 5 consistent groupings, but the order this group appeared in the interview was counterbalanced with the order in which it was presented to the other 11 subjects. Stories were grouped with respect to the original findings showing percent missed by subjects, thus indicating difficulty. Groupings were compiled of a combination of difficult and easy stories with the exception of group C.

This group contained only stories previously found in Happé (1994) to be challenging to subjects. This was done in an effort to avoid an interview in which a student only spoke about mentalizing constructs found to be relatively simple.

The researcher began each interview by welcoming the student and explaining that this portion of the research would be tape recorded. After obtaining assent for the audio recording, the interviewer began the Strange Stories test and read aloud instructions. Subjects were told that there are no right or wrong answers, and that after three stories read aloud to them, they will be asked which story they liked best. They were then asked more questions about that particular story, a total of five times. Students were read the Strange Stories battery with the illustrations from Happé's original document. Materials were always left in plain sight so that students could refer back to the story if necessary. Answers were marked on the page as well as audio-recorded. After being asked which story out of the three read they liked best, this story was used as the focus of that portion of the interview. The average time spent by each participant on the Strange Stories interview was 50 minutes. Only one student extended the total time by a total of 20 minutes, and one student necessitated an interview to be completed on a separate day.

A total of two researchers then independently reviewed each interview and assigned each text fifteen independent themes related to the research question "What justification do participants give for the thoughts, feelings, beliefs, and actions of others?" Themes were then compared and discussed to consensus, resulting in an interrater reliability of 1. Themes were then compounded by the principle researcher into a total of five overall themes.

Chapter 3

Results

Five major themes were of particular importance in the interviews; polarization between *honesty* (positive) and *lying* (negative); positive *a posteriori* justifications for sarcasm developed in the context of humor that bridges honesty and lying; quality of mentalization related to fantasy; anthropomorphism; and finally the importance of tone and body language in mentalizing success.

Theoretical Orientation

Immanuel Kant (1724-1804), one of the central figures in modern philosophy, had an insight into the science of experiential knowledge in his 1781 treatise *In Critique of Pure Knowledge*. Kant defined “knowledge that is absolutely independent of all experience” as *a priori* knowledge.”(Kant, 1781, p. 43)

A priori knowledge is how individuals justify experiences by rationalizing them into universal laws and principles they view as self-evident, while *a posteriori* justifications are garnered from experiences with the external world. The amalgamation of these concepts was eventually coined by Kant as a *schema* which has been used by Piaget (1976) to describe a sort of “script” people develop for reacting to sensory information. Using the terms *a priori* justification and *a posteriori* justification in the context of human development, Piaget reasoned that when an individual is unable to assimilate their new experience into a previously established *schema* (or justify their new experience based upon their existing structure of understanding) they accommodate this new information by changing their previous *schema* so they can reach equilibrium. Equilibrium is term that signifies when a *schema* is competent enough to acquire most

new information through assimilation alone. This concept harkens back to Kant's earlier work in which he states that truth lies in the balanced use of interpreting experience by rationalization unless an experience proves the rationalization incorrect. In his *Critique* Kant declares that

When we get beyond the bounds of experience, we are of course safe from opposition in that quarter; and the charm of widening the range of our knowledge is so great that, unless we are brought to a standstill by some evident contradiction, we hurry on undoubtingly in our course. This, however, may be avoided, if we are sufficiently cautious in the construction of our fictions. (Kant, 1781)

Essentially, it is the nature of humanity to construct *schemas* beginning in infancy that eventually face disequilibrium—for example, the *schema* of *nursing* will not fit all nourishment when milk alone is no longer the offering. There are of course many benefits to accommodation of food to a *feeding schema*; eating can include new flavors and textures and increased satiety. However, the infant must also navigate bibs, mess, a high chair, and the loss of skin to skin contact with their mother. With development comes high risk and high reward, and it is the accommodation of mentalizing *schemas*, the revision of *a priori* justifications, that appear to challenge the subjects of this study. This revelation is certainly not new; Piaget himself asserts that “when assimilation outweighs accommodation” the child moves in “an autistic direction” (Piaget, 1976, p. 19). Of interest in this study are not simply the *schema*-preserving aspects of ASD but also the moral justifications given for this reliance on assimilation, and the many instances when

students were actively seeking *a posteriori* justifications, contrary to most researchers' speculations about individuals with ASD.

Honesty as Absolute

Throughout my interviews conducted at The Monarch School I found evidence that students overly relied on the assimilation of experiences into *schemas* representing *honesty* and *dishonesty*. This appeared to create polarization of their cognitions of self and others when understanding intention. Their *a priori* justification that that telling the truth is inherently “good” or “nice” while any form of deceit or misrepresentation was inherently “bad” or “mean” appeared to stem from a resistance to accommodation, which seems to have been strengthened by negative social experiences. These *a posteriori* justifications or external conditions that, in these instances, left students emotionally damaged, served to further strengthen their original *schema* that anything less than the whole truth was so unappealing it was foreign to their *schemas* of self. In contrast, every student mentioned some variation on the concept of *logic honesty* and a reliance on *common sense*.

One strong example of the difficulty students faced when attempting to incorporate deceit into anything other than a negative *schema* occurred when a student explained his feelings on the Strange Story *Christmas Eve*. In this story a girl discovers her neighbor dressed up as Santa at the local department store, and when she asks him who he is he replies, “I’m Santa.” This particular student when explaining his reason for choosing *Christmas Eve* as his favorite among the three stories initially said that he liked Christmas, but believed that adults telling children that Santa exists is “something representing niceness and care but the way they do it is like a giant lie that destroys your

childhood.” When asked if it indeed destroyed his childhood the student responded that “It only destroyed a portion of it ... like everything I knew like Santa and now like Oh God looking back it’s just not the same.” When asked if he would ever tell his children about Santa, he replied that he is “Going to tell them the truth ... there's no Santa ... from the day they start saying ‘Oh, what’s Santa? I’m going to be like it’s a lie.’”

The student goes on to say that he believes his mother was a liar for telling him Santa exists, and that his father “thought it was stupid” and it made him uncomfortable. It seems as if the student has not only categorized deceit into a negative *schema*, but additionally felt disequilibrium about his own *schema*, and what believing a lie said about himself. An *a priori* judgment revision would be based on the *a posteriori* experience of having believed in Santa, then experiencing disappointment upon realization that Santa is imaginary: the revision would accommodate this concept into a new *schema* of “Santa” as a lie told to children, but one told “to represent niceness and care.” The general revision would be that lies can be told for positive reasons.

Another student had a similar *schema* in that honesty represents maturity, and lying results in trauma that is born from ill will. The student begins by telling me that

There’s a lie that’s about to be thrown out. And of course, this is with women again. When I did my Driver’s Ed. three teenage women that I know, well one of them, her name was S--, one of her friends, her name was A--, was a girl that I met and for some reason S-- decided to say, oh, K-- should go out with this woman. She’s like, so effing hot. They started rumoring that I had engaged in sexual intercourse with A-- ... I found these girls to be very inferior to my mindset. And they’re already sophomores.

When asked why the student believed these girls made up this lie, the student first refers to it as a “sick joke,” but when asked to elaborate he characterizes their actions as “plotting” and believes that “They would tell [other people] that I had sex with A--, and I would probably be war shipped as some sort of banger or someone who would take pride in that, which really no.” Like the previous student’s mentalizing on the impact of dishonesty in adults who tell children about Santa Claus, this experience and the motivations for this “rumoring” has a more irrationally harsh mentalizing than the situation necessarily suggests. The student admits initially that though the joke was “sick” it was intended for humor, which seems more probable when objectively reading the description. However, an escape into an *a priori schema* that dishonesty is done intentionally and maliciously with the intent of widespread destruction is immediately referenced, and is almost certainly at odds with the student’s alternative that it was done in jest. Clearly his conjectures that these girls would purposely try to slander him throughout an entire student body are not grounded in any part of his description. The accommodation of this event into a narrow *schema* where a “sick joke” falls in the same category with calculated and widespread character assassination further isolates this student. Based on his narrow *schema*, jokes such as these (which though certainly unkind are nonetheless not to be taken too seriously) create a unduly harsh reality.

The paradigm of honesty being logical and superior, while lying is illogical and inferior without regard to the motivations of the liar, is mirrored in the interviews of almost all the students. Furthermore, the lack of mentalizing when discussing lying points to student’s denials of immorality in regard to themselves. When asked about their own propensity towards dishonesty, students replied, “It’s just that I really don’t see the point

in lying about something unless of course it's necessary. Like if you have to lie to calm a friend down. Anyway. Well not that I've been, not that I've been in any of those experiences." Or, "I don't know. I don't think there would ever be any situation happening in the future. If I were lied to by somebody who says, oh I didn't do anything, that would be childish of them." One student believes "I'm kind of like a lie detector sometimes. And there's times when I can't believe anybody or, um, or I believe in them too much. I don't have too much experience with that anymore, though. I mean with believing people a lot. Um, you know. It's just the story was really easy for me to figure out."

One student recounts an experience with lying when her friend congratulated her after the student placed above her in an art competition, but then went home and told her mother she was sad. When the student's mother spoke to the friend's mother on the phone she was told "her daughter was upset about not winning." The student then said

And so I got really mad at my friend because she didn't tell me the truth. Like, I thought that she told me a lie, but really she was telling the truth, both her mom and me the truth. Like, she had mixed emotions and so it was super confusing. I just avoided her. I didn't talk to her. Kind of like the silent treatment.

Here there appears to be evidence that the student's *a priori* justification for truth and lies has successfully been revised by the *a posteriori* knowledge that her friend was indeed happy that she won but also sad that she lost. In other words, the student successfully accommodated *mixed emotions* into a new *schema* that includes two honest and contradictory emotions being experienced at the same time.

However, like the two students in the above examples who acknowledge a possibility of a new *schema*, but eventually defer to their simpler original justification, this student similarly returns to her *a priori* definition of honest when she says if she was ever in her friend's shoes she would "probably just try to confront them about it instead of lying." She also responds by cutting off the friendship, attending to the dishonest elements rather than the honest ones in her friend's mixed emotions. Here she reveals a difficulty to permanently accommodate mixed emotions into a *schema* that is neither honest nor dishonest. She instead focuses on the most negative aspect of the story, that her friend told her mother something that contradicted an earlier statement, which no longer hold the complexity of a mixed emotion but is simply dishonest.

Her difficulty integrating this ambiguity into her life is further highlighted when she says "I'm kind of like a lie detector sometimes. And there's times when I can't believe anybody or, um, or I believe in them too much. I don't have too much experience with that anymore though. I mean with believing people a lot." A lie detector of course works by identifying supposed objective evidence by measuring heart rate to determine whether the person monitored is telling the truth or lying in absolute terms, and its unreliability for this very reason has eliminated it from courtroom evidence.

Sarcasm

Though developmental understanding of behavior in the interviews often concerned the positives and negatives of human motivation involving honesty, one area that showed sophistication in a broader definition was the students' use and praise of sarcasm. Sarcasm was found to be humorous, mature, and complex. Unlike underdeveloped *a priori* justifications such as those connected to unadulterated deceit, in

which students were unable to justify people's motivations with any specificity, students were very aware of why people use sarcasm, and how they acquired knowledge of the construct. One student says sarcasm "works pretty well. It helps me understand people. But what's really funny is like, if I didn't know what sarcasm was I would probably take things more seriously." Another says, "What would the world do without sarcasm ... the world's greatest invention." When asked about how old he was when he learned it, he says,

"I'd say ten. Yeah, I never actually really did it, though, until I was ten, I guess. Not that I remember but everyone was doing it and it seemed kind of funny to me. For crying out loud, the woman was angry at the boy who said it would be sunny. And yet she said a positive comment in a silly way. It's obviously sarcasm. What would the world do without it?"

This student was referring to the story *The Picnic* in which Tom asks Sarah to go on a picnic with him, during which it begins to rain, causing Sarah to sarcastically comment on what a lovely day it is. The use of mentalizing in this instance is poignant in view of this particular student, who unlike all other students mostly gave short and hostile answers (the word 'duh' was used twenty times), indicating apparent boredom surrounding other forms of mentalization.

One student was able to elucidate a current example of his struggle understanding sarcasm:

I still sometimes don't understand joking if it's with adults. Because, oh, like one time one of the teachers here said, oh, you just wanted to get pizza, and she was smiling and I didn't see the smile, because I was like, no, I just came to show him

this. And she was like do you not notice I'm smiling? So I have to like snap out of it to get that joking.

Another student remarks describes his view of sarcasm development:

Well, I like The Picnic. Well, I like how it talks about, you know, it talks about what would happen. It talks about what happens when you're older like this. Because sometimes you'll probably hear sarcastic comments. When you get older. Starting around your teenage years. Before that I thought they were, before that, I could, well, I could sort of tell they were not true, but sometimes not. And I didn't know what they were. I didn't know what that was. Now I know ... Well, they would say things like that, some older kids. Back then I was in a, it was, in a mentorship group with some kids who were older than me.

Both of these narratives about sarcasm are important in their description of a willingness to supplement an *a priori* explanation for honest or dishonest behavior with an *a posteriori* justification that a statement that is not true can serve a positive purpose: humor. Furthermore, the *schema* for *dishonesty*, saying one thing but meaning another, has taken on more complexity in that students now believe that a sign of pending adulthood involves flexibly interpreting language in the context of the speaker's intent.

Rigid statements that reflect immaturity were still present when students claimed that in any situation "I would act honest" or that dishonesty completely disappears during maturation at the age of "about nine." One student said, "I don't lie, period. I've learned and I just know lying is not right. I don't lie to people." Another student believes that "Especially when we're younger, you want things. And we can, and we want them so bad that we make lies and excuses for them sometimes. It changes when you get older

because you develop.” Last, the student who spoke about his experiences in Drivers Ed. remarks at the end of his interview that “Values and morals. If everyone had them then everyone would just get along just fine. Everything would all be about honesty. Everything would be true. There wouldn’t be such thing as an evil or bad things.”

It appears that sarcasm, in contrast to the strongly reinforced *schemas* students have regarding honesty and morality, is a bridge from this moral absolutism to moral relativity. There is also evidence that this ability to see humor in contradictory thoughts and statements is an opportunity for both mentalization and socialization. Despite numerous incorrect answers in which students believed that Strange Stories characters and indeed people in their own lives were intentionally trying to mislead them to cause harm through a literal interpretation of the *truth* in a statement, sarcasm was an area in which students demonstrated mastery and positive association. Inspiring students to ponder the intricacy of adult behavior through the initial vehicle of sarcasm could be a way to push students to view other experiences with people that may be more negative as more subjective than they previously realized, allowing for richer and more thoughtful relationships.

Fantasy

Visualization.

A common characteristic of individuals with autism involves their disposition toward fantasy, the imaginary world of characters in fiction that becomes reality. Indeed these interviews showed that students were able to imagine visual details not described in the story with uncommon visual detail, and seemed to greatly enjoy building upon their imagery throughout the interview. For example in response to *The Prisoner*, where a

blindfolded soldier tells the other army where his tanks are hidden because he knows they will not believe him, a student was able to describe “that this was a really old war, because if they were smart they would have had like, not airborne, what are they called, drones to go find the tanks. Instead of like saying we’re going to ask this dude. Why don’t we just fly around until we see them?” In *The Picnic*, where a girl says to her date “nice weather we’re having” as it rains a student was able to picture that “rain was dripping down the girl’s long hair. Not to mention in his wet pants.” *The Orchard* was one of three physical stories in which students must determine the cause of thumps being heard at the apple orchard towards the end of the summer. One student said he “pictured not only the hot summer day but just like it’s a bright sunny day and you’re like, in the apple orchard. And you like hear a lot of sounds, maybe some birds chirping or something, or some apples or something dropping on the ground.”

Of key interest is the finding that mentalizing during a student's fantasy of a purely fictional scenario was limited and less complex than their reflection on personal experiences involving mentalization. For example, one student when becoming firmly planted in his visualization of a space expedition, seems to lose a grip on reality:

R: What we do is, we’re trying to set up camp. I’m trying to set up camp on a certain planet. Not Mars. I forget what it’s called Planet X. I’m not sure. I hear it on like, Jacob told me that there is a planet called Planet X and it was basically based off of--not based off but had like water and food and stuff, I think. I: Do you think anything would be easier if you were out in space? *Like in terms of people or stuff like?* R: *I don’t know. I don’t know, really.* Like I want to build a space army because I have been studying a couple of incidents in this US ...

Here, when he is asked to directly comment on the mentalization of either himself or others at this space colony, it appears to be difficult to change his train of thought, and image content obscures his ability to mentalize.

In contrast, when this same student begins to talk about experiences he has had with a peer he is able to vividly mentalize, saying:

I'm more of a big brother for 30 people in this school. So I can walk up and talk to them and they can give me some information. But like, I'm kind of worried that one of the other kids is trying to get to that point. Which I know it's probably not going to happen ... Trying to be like me, because I know-- I'm sad, like, I'm sorry about saying this. But I'm still his friend. I'm his friend. And like, a lot of kids, like, a couple more kids don't like him at all. And he strikes and stuff. And I'm like, dude. And he kind of makes stuff up a lot but I guess it's because he's uncomfortable a lot.

Here the student is not only able to mentalize about the thoughts of others, but he is able to mentalize about himself to a point that most people are unable to reach, admitting jealousy and fear that his relationships are in jeopardy. The vivid imagery he uses has to do with real situations, and when compared to the fantasy he slips into when describing a voyage to Mars, this student appears more balanced and insightful, both in his understanding of himself and others.

When imagery is unconnected to personal experience it can even promote frustration. The following student responded angrily when asked

I: Were you kind of thinking about it in words? Or what did your thoughts look

like? R: I don't really know. I: Did you have like an image of it in your mind? R: I

guess, yeah. I: What did that image look like? R: It just looked like a boulder or an avalanche rolling down a mountain. And then a rock hits a lake. I: Was it an image of something that you're kind of familiar with? R: No. Because I've never encountered anything that would be familiar to this.

In contrast, the same student said,

Well, I was thinking about how apples, like horses seem to like apples. And like, oh, I work at a horse farm, so. And then it kind of translated into me thinking about the horse farm I work at. Probably just because I enjoyed it. And back then that was like one of the few happy memories I had, since school was really what I really hated the most.

Here this student's mentalization works seamlessly with personal imagery, and brings about deeper insight into his own emotions, which were detached when having to describe an event he could not picture from experience. This situation seems to be in accordance with the findings that students in these interviews struggle with accommodating information into new *schemas*, and instead revert to assimilating new information into earlier and therefore underdeveloped constructs. Such constructs are by their very nature difficult to adjust, and it takes a rich experience to cause the mind to accommodate rather than to simply assimilate. Interactions with people that not only provide great sensory detail but also carry implications for new relationships appear to be the most effective means for students in this interview to successfully accommodate new mentalizing concepts into more complicated *schemas*.

Take for example one student's explanation of The Telephone:

Well, it's not a telephone. It's not a telephone, she doesn't have any vision problems, most likely, and it doesn't even work. And she knows it's funny because she's just kidding around. It kind of looks like a telephone, though.

Though he is correct in that the character is "kidding around" he is unable to move to a rich description of this mentalizing construct: that the girl is pretending to talk into a telephone that is in reality a banana because it's fun to pretend. By focusing on the visual aspect of the story "she doesn't have vision problems", "it doesn't even work" this student misses the more intrinsic concept in human behavior that has to do with pretend play, what it is rather than is not.

In contrast, when speaking about a personal experience with which he is very familiar the student becomes much more typical in his line of exploration:

Well, later on it was, later on we resolved this, came to a conclusion. We're friends again. We came to a conclusion that A-- was doing something on purpose. Because he had, because he had been, because all those times he ran away he had a smile on his face and he wanted to run away from me. It was confusing. And he was like, he was mad at me and yet he was smiling and running away from me. Exactly. Yeah. He was doing, we came to the conclusion later that he was doing something on purpose to believe, or he was believing D-- on purpose to, you know, make me mad or something.

Here the student is able to incorporate evident physical clues "smiling yet running away" with larger concepts but with great detail. "He was believing D-- on purpose to make me mad." Unlike the banana telephone where the student is unable to conjecture more than it

is a joke because it is illogical, this real life experience elicited a thought-provoking *schema* for passive-aggressiveness as well as motivation.

Media.

Fantasy in these interviews appeared to reinforce or create simplistic *a priori* justifications due to its lack of rich connection to past experience in real life. Students referenced media in the same way they used visualization during the Strange Stories; as a way to quickly establish explanatory mentalizations that took less effort than discussion of life events. Explanations that involved references to media or references to visualizing the story based purely on fantasy had underdeveloped or incorrect mentalization. It would seem that answers to questions supplied directly by media and indirectly by fantasy reduced the need or the salience of mentalization, and seemed to make moving beyond the literal more difficult. For example, in response to The Orchard, “There’s not a monster out there. I don’t believe in monsters. Or demons or witches or vampires. I believe in ghosts. The only thing I believe in ghosts is because I’ve seen real pictures of them.” The student becomes lost in this imagery, and at thirteen years old seems atypical for his age. Typically at thirteen one would imagine that the *schema* that not all pictures are real would have been developed, but it appears that the sensory overload of imagery and its salience has delayed this process for this student, who goes on to talk about his belief in Santa after having seen a video of the North Pole, as well as an elf who watches him at his house.

This same student displays this bypassing of mentalizing even more dramatically when recounting a fantasy and exposure to religious imagery when asked

I: How does that work in your mind when you believe in something? R: I just think of it. I have a picture of God and Santa Claus. I believe in God more than Santa Claus. And I've actually heard him talk to me before. I have this feeling and I hear this voice saying you shouldn't do this, or I love you, where I have this warm nice feeling in me. I: And what is happening in your brain when that happens? R: I have a picture of him talking to me. He has a robe, sandals, tall, white skin, hair and a beard. Dark, dark, I mean dark beard and dark long hair. R: Yeah I've seen lots of pictures, so now that's why I believe that's what He looks like. I'm a powerful Christian and I don't like doing anything bad.

In this instance his brain is like a movie screen, a one-dimensional image of a man with dark long hair and sandals telling him his thoughts essentially. The student is the output for a foreign body inputting thoughts and motivation, and the dissociation between thought and agency is significant. The desirability in imagining pleasant imagery delays the acquisition of new *schemas*, specifically those related to his own mentalizing.

Another student talked about his presence online, and the sexual imagery that he has been exposed to on the Internet involving the characters in My Little Pony. This exchange centers around fan art that depicts these cartoon ponies engaged in sexual activity referred to as *clop*. Throughout the interview this student appears conflicted about his obsession with My Little Pony (MLP). He recounts the challenges he faces with his father, :

My dad's seen that sometimes before and he's always worried that I'm going to look at that or whatever, and I'm like Dad I'm not into like bestiality or whatever. I'm not going to look at that stuff. And he just gets worried. I'm not into

interspecies stuff. And so he's like, I'm worried. And I'm like, why are you worried? I don't believe in interspecies sexuality.

When he is asked why people look at *clop* his explanation is

I guess they find it intriguing. I guess they somehow find it pleasurable. Well, I know they somehow find it pleasurable, thanks to logic and common sense. But I just think it's unreasonable to look at *clop*, because if you look at it too much you're going to expect to find someone who's like that. And then you get those ulterior motives that you don't even know about and you, and you're like, you just end up getting disappointed because there's no such thing as a part animal part human unless of course someday we could come up with it, like a Furry/human being.

Here the student is finding it difficult to attend to the mentalizing aspects of the question rather than the concrete visual details, which are clearly a strong part of his *schema* for My Little Pony. Instead of coming up with a mental state justification that addresses the complexities of this form of sexual gratification, specifically the interest in a show he admits is geared towards young girls but is mostly watched “by older guys,” he instead continues to focus on the concrete or *a priori* reasons that looking at *clop* is “unreasonable.” Similarly, towards the end of the interview the student tells me about an instance when an online friend

Told me a story, um, that um, he was in a bar one day. And he met this girl who was addicted to My Little Pony. This girl around his age. And so basically he goes and has a session with her, but she starts acting all like Flutter Shy from My Little Pony ... he kind of got weirded out, and he's like, OK, I can't do this

anymore. And he said it kind of laughing at the same time. And he had a voice recording going on the entire time, so when I heard it I'm just like oh god, this is just ridiculous.

When asked about the mentalization that that occurred for both him as the listener as well as the friend who recorded a woman without her knowledge, the student says

I didn't feel bad per se because she was kind of being a little weird. And I wouldn't say she deserved it but I'm saying it kind of, I'm saying she could probably learn a lesson from doing it and probably not do it again ... I guess she was trying to stay in character, is what we say in the bronx community. So when people do something like that in real life, something stupid like that in real life, we just go, hey, they're really in character.

It appears that the *a priori* justification that fantasy is tolerable as long as you do not stay "in character," and admit that MLP is "not real" allows for him to insulate himself from unfavorable mentalizations. His father's fears for his son are unfounded because MLP is "not real," *clop* is harmful only because people will be disappointed it is "not real," and the girl deserved to be tape recorded unknowingly needs to be reminded that MLP is "not real." Of course this is why fantasy is appealing on some level to all people, it allows people to reinforce *a priori schemas* they find appealing without having to accommodate for a posteriori knowledge that is unpleasant or confusing. In this case the student is able to shelter himself from examining what lies at the heart of his obsessions, as well as the realization that not all bronies believe in "a whole new cult thing that it's like everything is based upon love and tolerance." This point is particularly

important as it illustrates the need for this student in particular to have meaningful interactions in the real world to enhance his understanding of others.

As Kant (1781) describes the perils of Plato,

Abandoning the world of sense because of the narrow limits it sets to the understanding, ... he did not reflect that he made no real progress by all his efforts; for he met with no resistance which might serve him for a support, as it were, whereon to rest, and on which he might apply his powers, in order to let the intellect acquire momentum for its progress. (p. 31)

When slipping back into fantasy after this break the student again appears much more agitated and bizarre, saying that he would like to physically engineer his body to be engineered into a creature that was “part human, part animal, part human, part pony” in order to appear as a martyr for people who may be bullied. His conjectures that other people would

Know I am different, really different, especially after that, and then they could say well this guy probably has a worse time than me from how he looks. It would give other people the chance to ridicule me even, more so other people, like my friends, could understand that even when people are ridiculed that much they can still have friends, they can still get along with people.

Here the student leans upon the rather bland “brony” definition of friendship involving sacrifice “like a cult.” He seems to abandon the less dramatic yet more detailed life experiences he has had with real peers in vivo in which he describes enjoyable time spent in pursuit of commonplace pleasures such as having conversations, playing video games,

practicing the guitar. These real-life experiences were told with what appeared to be a much greater amount of enjoyment than bronynhood held.

Likewise the student who believes his thoughts are largely supplied by divine intervention rather than mentalizing also appears to fall prey to the human temptation to “finish the imposing edifice of thought as rapidly as possible, and then for the first time to begin to examine whether the foundation is a solid one or no ” (Kant, 1781).

This student himself admits to his “brain moving fast” later in the interview, and being a “series of fast moving images” that could indeed hamper his ability to thoughtfully investigate the structures of his mental *schemas*, such as his God *schema* controlling his thoughts:

Yeah, He knows everything. And then when sometimes I do it anyway because I'm in a rush. And I don't believe in the devil anyway. I don't think that place exists. I only believe in heaven. But when I get this feeling in me and I do it anyway, and it's not a good feeling. Yeah. They say when you're not a Christian you don't hear anything. And you don't believe. And you go to the bad place if you've done like really bad not-Christian things. I: But you said you don't believe in the bad place. Why don't you believe in that? R: Because I just don't like it. The picture looks ugly. It's like this big tall demon with fire out of his mouth, and he has people down there. It's awful. I: And so you decide to? R: Ignore it. I: To ignore it. R: Yeah. I like pictures of heaven. There was actually a picture of God and the Devil having an arm wrestle. I want the Devil to be out of it. I like a picture of God when He's like holding His arms up and He's like hugging a person. That's my favorite part.

There are many contradictions in these observations about God that perpetuate mentalizing deficits. The most obvious is that he acknowledges that he actively chooses to believe in some things (hearing God) but not in others (the devil). The dangers in his intense visualizations are that because they exist outside of the realm of reason, he is not confronted with his contradictions. An example of this is that hell exists for non-believers, but he doesn't believe in it, but he does because there is a picture of the devil and God arm wrestling, but he wants the devil out of it. This narrative does not follow a logical course, and the narrative, like My Little Pony, serves to distance the student from the typical thought patterns of others, and decreases his ability to mentalize about himself. This student is able to mentalize about himself quite well later in the interview, when he shares his experiences learning jokes from others and testing them out on others. He is also able to mentalize well about his mother as well as himself when he asserts that his brain "would probably look like thinking. Jokes. It would look like all these pictures going through words." This is in direct contrast to when talking about the God narrative when he is asked

I: How does that work in your mind when you believe in something? R: I just think of it. I: You think of it. What does it look like when you think of it? R: I have a picture of God and Santa Claus. I believe in God more than Santa Claus. And I've actually heard him talk to me before. I: Wow. What does he say? R: I have this feeling and I hear this voice saying you shouldn't do this, or I love you, where I have this warm nice feeling in me. I: And what is happening in your brain when that happens? R: I have a picture of him talking to me.

In both instances described above it appears that though fantasy is a powerful source of entertainment for these students, it is not being pursued to a healthy degree, but rather leads to a reduction in mentalizing when fantasy becomes the sole source of insight.

Anthropomorphism

A specific form of fantasy touched upon in almost every student interview was the use of anthropomorphism, or the assigning of objects or animals human characteristics. Some references to the anthropomorphism of animals were more literal than others. For example one student describes her dog as being able to “tell I’m upset, when I’m sad. Well same thing. But she can tell when I’m happy, she can tell when I’m mad. She can tell, like all my emotions.” Another describes an incident when he knocked over a vase “and I don’t know, my dog found this hilarious or something; she was like going crazy.” Many students made reference to their identification with animals, such as one student citing that dogs “consider the people who own them a pack. They kind of consider that, I always kind of consider my mother the leader of the pack.” Another student says that his identity and mentalizing is similar to that of a dog in that

I know a lot of like feelings, and I can--I don’t really have to know if the person--the person really doesn’t have to give me a sign to know that they’re feeling. I can sense it. I’m like a dog, basically ... It’s like, I call it a sixth sense. Because like, I can sense feelings, basically. R: Wow. And what do you think goes on in your mind when that’s happening? R: I don’t know. It just, I guess I go up to them. My brain kicks in and says go up to them. I can turn that sense off and on. I can turn it off when I feel like it.

One student uses a disjointed series of projections into the natural world as her justification for thumps being heard in *The Orchard*:

Because if you're planting apples they're going to fall off the tree one way or another. So it's just like when people have a hard time. I mean, you have to, like, you can't just sit there and leave someone when they're having a hard time. You have to sit there and be there for them. You can't sit there and drop apples, even though you did drop the apples. It still means, you're still, you know, you've got to be nice to the apple or something. I mean, you have to be. I mean. It's not the apple's fault it fell down.

Several students used a sort of reverse anthropomorphism, such as the student who when asked if he had a dog replies "Yes. And let's just say both of us dig out of the trash." He also goes on to anthropomorphize his stomach, saying that "I heard my first expression when I was eating a lot, blah, blah, blah. I: And what happened? R: Let's just say I didn't care how much I ate. I: And? R: I met Olaf" (after which he points to his stomach). He also states "Well I do have big mouth, and it does love to eat. Ooh! Tape recorder! Um-num-num."

Perhaps the most extreme example of anthropomorphism in the interviews comes from the student with the interest in *My Little Pony*. This student shifts from anthropomorphism and reverse anthropomorphism with apparent conflict. Initially he is purely anthropomorphic, making reference to the animal and elemental characters in the show as possessing human behavior:

Uh, basically the joke is that usually Mother Nature in real life--well supposedly; it's called Mother Nature apparently in real life--basically melts the snow. But the

joke in My Little Pony is that the ponies wrap up winter, basically. And so they basically clean up after winter. So it's a joke.

As the interview progresses he then begins to describe a hope for a future world where

We invented this form of, um, um, this gene modification thing and we turned ourselves into ponies, animated looking ponies ...I would mostly feel great for the rest of the world because then there would be finally peace, in my opinion.

Because animals don't have their own mental capacity to be violent by nature.

Mostly animals are violent by how they learn things.

In the above excerpts it appears that students relate to motivation in the natural world as similar to their own; animals clearly have thoughts but they are unable to communicate them effectively. Likewise animals are born inherently good, and must be actively taught to accept *a posteriori* knowledge, similarly to the first theme found in these interviews. This, however, does not mean that they are necessarily inferior; if anything, they are perhaps more fulfilled and possess greater thought than may be evident (like the students themselves, perhaps). It is animals who students repeatedly reference as providing comfort, and humans who are often the bearers of pain and suffering at the expense of the students. As one student describes it, a dog is "one of the most craziest of all animals, yet they're so cute and innocent. But we still blame stuff on them for our own sake." This very description appears to incorporate students' *schemas* of themselves: unpredictable in their thoughts and behaviors but nonetheless innocent and deeply capable of love and being loved. They are also regularly labeled, as one student describes "about my past. When people think, like, oh that guy's a [hospital] patient, or oh that guy's a psycho." This is of course a constant battle. As one student puts it, "I usually

have to try really hard to not act like or look like I have autism or anything. Mm, just not do anything strange or out of the ordinary.”

The previous excerpts illuminate the ability that students have for complex mentalization, yet this ability may not be evident in their everyday interactions, and so their *schemas* of themselves cause them to strongly associate with simpler, instinctual animal mentalizations. There is evidence that students also identify with this deficit in animal communication; they too feel as if they are unable to communicate their thoughts and that this leads to other’s misjudgment of their intelligence. One student when asked if he knew what his tormentors who “exploded milk cartons” on his head were thinking replied that, in fact, “They don’t know what I’m thinking.” When asked, “What if they did know what you were thinking?” the student replies, “Well, that would be screwed up [laughs]. That would be like, um ... There would probably just be really celestial mental breakdown.” Another student who describes apples as people begins to clearly draw a comparison between herself and the thumping apples in *The Orchard*. The student says she relates to the apples because “They have meltdowns, they struggle, they run out of class. I mean, that’s how I think of it. I mean, not that they’re an apple. I’m just saying that they drop.” When asked if she thinks in pictures like this a lot, she replies, “Yeah, to me and to other people. And just the way they phrased it I thought of it.”

Intrinsic to students’ broad use of fantasy is their use of anthropomorphism to create a world in which animals, who are unconditionally loving, are capable of more complex thought than may be evident. Not only would this provide deeper connection to beings unlike people (who have rejected students based on their shortcomings), but it would also symbolize the type of narrative that students believe true about themselves;

that behind an exterior lies a richer meaning than may appear, or as one student puts it, “They took the look on the outside, they took the picture and didn’t look behind it.”

For example, the student who frequently speaks about My Little Pony describes estrangement from a friend by describing how

We don’t hang out that much anymore. I haven’t been able to get in contact with him in a while. I don’t know why. But maybe he’s busy like my cousin P-- is busy. And I’ve known him for a long time and he’s been busy for a long time and I haven’t been able to catch up with him ... Every time I call his house number and his cell phone number he just, it just goes straight to voicemail. And I’m like, did something happen to him, or is he busy or is he not wanting to talk to me? And all these mixed feelings go on. And I’m like, does he not want to be my friend anymore? And I’m like, what the hell did I do wrong? And it turns into annoyance. He’s never on Skype anymore. So I try to call his house phone and he never answers, no one ever answers. And, um, it gets really depressing.

All students describe hostility they have experienced from other people, and bafflement at the specific cause, yet accept that they must alter certain aspects of themselves such as their overreactions or obsessions. As to why, however, they are unable to pinpoint precisely what it is about these tendencies that is so exasperating to others. Only that it makes them undesirable. Their connections with universally desirable creatures (cute dogs, pretty ponies), animals who also have underdeveloped mentalizations, yet are loved and cared for nonetheless, gives them hope and relief.

Expression and Tone

One of the most important aspects of this study was to gain insight into not only what students believed people thought, but what justifications they used for mentalizing. Previous research such as that of Simon Baron-Cohen places great importance on the role of facial expression, and his current work involves the use of comic book characters to visually support mentalization in individuals with autism. The Strange Stories used with students similarly had illustrations, which allowed students to look at the character's face. One student describes his interpretation of The Vase by referencing the illustration, noting, "Well from the looks of it I can't tell if her eyes are on the dog or, well, it looks like she believes her. Judging from the picture." Many students were able to move beyond the drawing, and described visualizations of the stories and their subsequent mentalizations that were entirely of their own creation, like this student when talking about The Prisoner

R: Well it was more realistic than that. But there was, um, a guy, the prisoner. He was sitting in a chair, he was tied up. He didn't have just a chair, but he was tied up and he had duct tape on his mouth. They ripped it off and they asked him. And one of the soldiers, like, yelled it. And so of course he was shaking. And he answered the truth, because he started thinking about it. And he smirked. And he said, "It's in the mountains." And then they let him go, but of course he thought it was funny because they actually believed him. They actually went to the sea. I: You said he smirked. R: Yeah. Well, because it's, like easier to, like, since he did that it made me know that he was not telling the truth. I mean, he was telling the truth. But they didn't think he was telling the truth.

However, complexities about meaning that moved beyond simple *schemas* were when students began to process auditory cues, which appeared to refine their ability to mentalize. For instance, when this student describes his difficulty with understanding sarcasm:

But like when the teacher, like I said, was like oh you just wanted to get pizza from this one kid. And I'm like no. And she was smiling the whole time. I'm like. And she was like, you did not notice I was smiling? Like, what? You were smiling? So it's hard for me to tell because sometimes their joking actually sounds realistic. More realistic.

Here the student clearly describes what makes subtle communication such as sarcasm so complex; though the teacher in question was smiling, it was her tone that suggested a more available *schema*. Because her tone was serious, the student first attended to this clue, and it immediately activated his *schema* related to a statement said with sincerity rather than jest. Similarly, a student upon hearing sarcastic comments among older students, describes how “sometimes I couldn't even tell, sometimes I even thought they were true. But, and sometimes I thought they were not. But now I know how this happens. Like, now I know that this happens when they say it with a really, you know, sarcastic voice.” Another student makes the connection between tone and mentalization when she describes her true feelings about her friend's boyfriend (B): “I can talk to B-- and be normal. But when I see him and M-- (friend) I back off.” The student describes how when she sees the couple she forces herself “to go talk to someone else” so that she does not “lash out” and “shut down” which means “not talking.” The act of talking to someone else, incorporating auditory as well as visual clues, to these two people who she

also wants to protect from her jealousies protects her from their discovery of her true feelings. She is able to effectively assimilate into her role of outwardly happy friend, and girlfriend of a different student, despite her mixed emotions due to a complex *schema* of emotional concealment that contains not only visual but auditory clues in the form of communication with others. As she aptly puts it, this skill allows her to be at peace “because M-- and him are so happy and M--’s been my best friend, so if I went with B-- it would be a disaster at school. Not to think of the whole community.” Though it may seem as if deception may be a sordid skill to acquire, it indispensable to controlling communication. Had this student been unable to control tone along with appearance, it would have been evident by her “shutting down” the nature of her true feelings, which she indeed has rather noble justifications for concealing.

Another student reports that

Uh, I could say something and end up upsetting them accidentally and not meaning what I said, and say something that sounds like something else that I didn’t mean, that I didn’t mean for it to sound like. But when you’re online there’s no tone to use.

References to the importance of tone throughout the interviews seems to be crucial to the students’ ability to effectively accommodate rather than assimilate new concepts for mentalization. When students actively avoid direct communication, such as the student above who stays online to insulate himself from having to both use tone and interpret it, effective mentalizing and communicative competency is delayed. It can be conjectured that while students have come up with many novel ways to deduce mentalizing visually, it may be the addition of tone that is most effective in helping their

mentalization accuracy. Though students perhaps imagine animals capable of thought, and in fantasy such as cartoons they are capable of speech, the tone taken on by either animal or human always provides clues about mentalization and is always human. No animal speaking in a cartoon is really an animal, and while students may be able to employ their suspension of disbelief for the time being, the *schema* that will be enacted upon hearing this tone in the future will be when it appears in human conversation, and is therefore a more reliable form of *a posteriori* justification than facial expression alone. Indeed, future research may want to explore the effect of people with autism expending their energies toward the interpretation of tone expressly, as it may be a more effective way for students to mentalize.

Chapter 4

Discussion

In 1781, when science was reaching an age of Enlightenment, Immanuel Kant cautioned society about the notion of an absolute truth. Rather, he believed “that neither concepts without an intuition in some way corresponding to them, nor intuition without concepts, can yield knowledge” (p.17). It is important to note that the nature of this study, a qualitative rather than quantitative inquiry, allowed students to justify their unique process of mentalization. This was done in line with Kant’s original belief that the study of concepts without studying the *context* will end unsuccessfully. Previous research on the relationship between global and local processing in ASD has in many ways been behaved in accordance with the dysfunction they study; researchers have examined localized information or “pieces” of their subjects’ cognition (performance on specific tests) rather than seek global justification from the individuals themselves. This study

however, attempted to use broad questioning in the hope that students would have an opportunity to freely formulate how local and global processing influenced their ToM. This form of inquiry offered insight into the narrative or context of the processing that has so far been overlooked by purely quantitative research.

The broad use of the terms *a priori* and *a posteriori* are vital to the understanding of this study, and are used in accordance with the terms global and local processing, though students appear to move less linearly between global and local processing than “top-down” theories on such processing would suggest (Happé, & Frith, 2006). Rather, students demonstrated that these terms do not do the complexity of their mental processing justice. Take for example the student’s *a priori* justifications concerning truth and deceit. In these instances students appeared to initially process global information correctly (Santa represents niceness and care, the girls at Drivers Ed were telling a sick joke, the friend had mixed emotions). However, as these interviews progressed the students began to vividly process the individual parts of situations (Santa Claus is made up, the girls at Drivers Ed said this specific thing, the friend told her mother something contradictory,) which then resulted in assimilating these “pieces” into old, more simplistic *a priori* schemas (honest is good, deceit is bad).

It appears in that in regards to a strong *a priori* justification for honesty above all else, along with a subsequent overreliance on fantasy, and the use of anthropomorphism in contrast to the successful integration of sarcasm and tone, emotion and motivation play a vital role in the student’s ability to revise *a priori* justifications. This is a factor not previously explored in studies concerning individuals with ASD’s propensity for local vs. global processing. Throughout the interviews students were found to consider adjusting

their *a priori* schemas when it was conducive to developing and maintaining positive relationships. When relationships were viewed as negative, or when there relationships were non-existent such as in fantasy, the reliance on localized processing gave limited global information on mentalization. In contrast, opportunities for friendship appeared to inspire students to explore the relativity of previously rigid concepts about mentalization, and global processing was enhanced.

This finding supports an executive functioning theory of ToM. The fact that students were able to selectively locally and globally process information dependent on how it made them feel supports the executive functioning theory of ToM through which a person demonstrates “an increased ability to adapt attentional strategies to the demands of the task. Such strategies may include the ability to shift from a feature to the whole, switch between processes of analysis and synthesis, and ignore an irrelevant level” (Happé, & Booth, 2008, p. 56). Examples of this are explored not only in failures to effectively mentalize but also in the advancements students have made in understanding constructs that employ humor and positive peer development. The specific motivations that the individuals in these interviews have for preserving childhood *a priori schemas* of honesty vs. dishonesty appear to have greater significance than a neurological theory for central coherence may explain. Students report being aware of their social differences and also aware that this has made them the victims of bullying and loss of friendships. It appears that this trauma, along with the knowledge that they are different than others their age, makes attending to simpler local processing more salient, and allows these individuals to escape having to globally process complex reasons that they are unhappy.

The students' ability to produce vivid imagery that is visually engaging is clearly a strength in which they feel confident. Having this ability allows them to locally process information which shields them from confusing and ultimately unpleasant global realizations. This is quite clear in the interviews of the two students who have accepted engaging philosophies that they connect to visually. The student who had a strong image of God continually telling him avoided globally processing why he finds it difficult to communicate without adequate preparation and why he is unable to control his own thoughts. Similarly, the student who has a strong connection with My Little Pony retreats to an online world where his fellow "bronies" are almost unfailingly kind, just like the characters on their beloved television show. This shelters him from having to globally process the unkindness of others, which may suggest something about his own limitations.

Anthropomorphism is an important example of how these students local processing to shield themselves from hurt that they may feel when analyzing ToM on a global scale. Localized processing about animal mentalizations, especially humanized animals, allows for students to avoid having to make global inferences about people while still relating to active agents. Animals with human characteristics are a way students can guarantee that local processing of mentalization will lead to positive global processing. They similarly do this when talking about themselves as they, like animals, are viewed as unfailingly honest in that they too follow their instincts. Additionally, the students have had positive personal experiences with animals, and this makes them comfortable when attempting to globally interpreting animal mentalization. As this study has demonstrated, students are interested in mentalization. However, they often feel

threatened by harmful mentalizations and so they cope by attending to localized information. By trusting that animals have positive characteristics these students use anthropomorphism as a way to indulge in global processing. This gives them a sense of companionship with animals. It also allows them in some respects to distance themselves from people, who have in instances caused them great pain, while still maintaining ties to the social world.

It is important to further examine students' ability to overcome their preference for localized processing when it advanced relationships. This happened notably when students attended to the global meaning of sarcasm instead of locally processing a sarcastic comment as untrue. Most students assert that they regularly understand and use sarcasm, and not only find it an important means of communication but an essential component of development. This justification for technically untrue statements, because the intent of the statement is humorous, creates a bridge between the polarities of rigidity these students usually display in attending to the most literal aspects of communication.

Students have been able to show some developmentally appropriate levels of executive functioning in that they attend to and remember clues in real life, such as tone of voice and the circumstances that would make a comment sarcastic. This appears to be preceded by a desire to connect to peers. This refutes both Leslie's theory of innate modularity, which claims that individuals with ASD are unable to control whether certain ToM stimuli are processed by their respective neurological structures, and goes against a central coherence framework in which individuals with ASD are unable to successfully attend to both specific moment-to-moment sensory clues as well as global meaning such as intention. Every student not only understood and enjoyed sarcasm when it was used by

others but used it themselves, and their statements showed that they both related to sarcasm in their personalities but also in moment to moment interactions. Students acknowledged that people who were important in their lives--friends, teachers, family members--had sarcastic personalities and that people used sarcasm with the intent of humor not harm. Several students viewed themselves as sarcastic, and all viewed it as a crucial part of their development. The fact that students not only recognized the motivation but wanted to be a part of it has great import for how peer interactions can directly aid ToM development. In accordance to a theory supporting executive functioning it appears students purposefully developed strategies that allowed them to process sarcasm in relation to the communicative intent of the speaker by delineating the steps they took when attempting to understand the comment.

Auditory rather than visual clues, especially in the context of extracting global meaning, were an important aspect of these interviews. Current interventions such as thought bubble training rely on primarily visual clues, which serve in these particular interviews to reinforce local processing. Narratives of students' personal experiences with mentalizing, in which complex thought processes of both themselves and others were explored, were most clear to students when visualizations were low and auditory clues such as tone and language were investigated. An interesting future investigation would be to explore how individuals with ASD can work on expanding their competency in areas where they are not as competent in an effort to expand globalized justifications. The danger here is further promoting individuals with ASD to further split their world into parts rather than viewing it as a whole. Therefore strategies that incorporated the development of relationships, which appear to motivate students to look for global

meaning in an effort to emotionally connect, would be an important addition to this approach.

Another interesting direction for research on autism involves of the role of moral development, and its relationship with local and global processing. Though global meaning in relation to morality was often justified by attention to only a part of an interaction, students were nonetheless consistent in their globalized justifications that held honesty as positive and manipulation or deceit as negative. All students valued their personal integrity and desire for a world where others are treated with respect. Negative experiences as well as generalizations about mentalizations garnered from well-established *schemas* strengthened their rigid views on morality, yet positive experiences within the realms of friendship and dating taught them through experience that the world is not always black and white, and that intention may overcome stereotyped responses. It would be interesting to explore how an interest in morality, perhaps in regards to relationships, could motivate individuals with autism to “switch between processes of analysis and synthesis” (Happé, & Booth, 2008, p. 56)

In conclusion, it is again important to emphasize that the conclusions reached in this study concerning local and global processing in the context of executive functioning were examined qualitatively. With the exception of the initial battery which served as a delineation between students with high and low ToM, this research was conducted without any puzzles, flashcards, dioramas or any other form of modern assessment. Instead, students were asked to talk about their lives, and in doing so they taught the research community not only about their ability to mentalize on a local processing level, but also on a global level. That is, when looking beyond each individual interview and

instead forming a whole it is evident that these students have a great drive to connect to other people, a concept not often thought to be characteristic of a person with ASD.

Indeed, these students showed that they are willing to revise strong *a priori* schemas in an effort to not only have a friend, but to be a friend. Additionally, students were actively engaged in examining mentalization at both local and global levels during this study.

Rather than lose focus after being asked to globally process their local information, even when it involved delving into painful topics, students were eager to connect again and again. Interventions that can help individuals with autism form relationships, through which they can receive additional motivation to globally rather than locally mentalize, in addition to expanding inquiry on moral reasoning, are of great interest. A longitudinal study examining the efficacy of such interventions that utilizes qualitative inquiry would possibly allow for a more coherent understanding of what individuals, rather than investigators, view as important to their development.

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Appendix A

Research Compliance

(Appendix A document)

UNIVERSITY of HOUSTON

DIVISION OF RESEARCH

March 18, 2014

Gray Atherton
c/o Dr. Susan Day
Educational Psychology

Dear Gray Atherton,

The University of Houston Committee for the Protection of Human Subjects (1) reviewed your research proposal entitled "What Am I Thinking? Theory of Mind Development in Autism" on January 6, 2014, according to federal regulations and institutional policies and procedures.

At that time, your project was granted approval contingent upon your agreement to modify your protocol as stipulated by the Committee. The changes you have made adequately fulfill the requested contingencies, and your project is now **APPROVED**.

- **Approval Date: March 18, 2014**
- **Expiration Date: March 17, 2015**

As required by federal regulations governing research in human subjects, research procedures (including recruitment, informed consent, intervention, data collection or data analysis) may not be conducted after the expiration date.

To ensure that no lapse in approval or ongoing research occurs, please ensure that your protocol is resubmitted in RAMP for renewal by the **deadline for the February 2015** CPHS meeting. Deadlines for submission are located on the CPHS website.

During the course of the research, the following must also be submitted to the CPHS:

- Any proposed changes to the approved protocol, prior to initiation; AND
- Any unanticipated events (including adverse events, injuries, or outcomes) involving possible risk to subjects or others, within 10 working days.

If you have any questions, please contact Alicia Vargas at (713) 743-9215.

Sincerely yours,



Dr. Daniel O'Connor, Chair
Committee for the Protection of Human Subjects (1)

PLEASE NOTE: All subjects must receive a copy of the informed consent document, if one is approved for use. All research data, including signed consent documents, must be retained according to the University of Houston Data Retention Policy ([found on the CPHS website](#)) as well as requirements of the FDA and external sponsor(s), if applicable. Faculty sponsors are responsible for retaining data for student projects on the UH campus for the required period of record retention.

Protocol Number: 14165-01

Full Review: ____

Expedited Review: X

316 E. Cullen Building Houston, TX 77204-2015 (713) 743-9204 Fax: (713) 743-9577
COMMITTEES FOR THE PROTECTION OF HUMAN SUBJECTS

Appendix B

Informed Consent

(Appendix B documents)

UNIVERSITY OF HOUSTON
CONSENT TO PARTICIPATE IN RESEARCH

PARENTAL PERMISSION

PROJECT TITLE: What Am I Thinking? Theory of Mind Development in Autism

Your child is being invited to participate in a research project conducted by Gray Atherton from the Department of Educational Psychology at the University of Houston. This research will fulfill the Master's Thesis requirement and will be conducted under the supervision of Dr. Susan X Day.

NON-PARTICIPATION STATEMENT

Your child's participation is voluntary and you or your child may refuse to participate or withdraw at any time without penalty or loss of benefits to which your child is otherwise entitled. Your child may also refuse to answer any question.

PURPOSE OF THE STUDY

The purpose of this project is to study the development of theory of mind in students at The Monarch School. The entire study will be conducted over a four month period.

PROCEDURES

Your child will be one of approximately 35 subjects to be asked to participate in this project.

Students will be given a series of verbal tests describing story characters in a variety of everyday situations. They will then be asked to describe the thought processes of these characters. Two testing sessions of this nature will be given, each lasting approximately one hour. Following the second tests your child will be interviewed about their answer choices for approximately one hour over audio recording. The maximum time commitment from your child will be three hours over a two-week period. The minimum time take would be 20 minutes over a one-week period.

Tests will be administered during ILP class time. Due to the reflective nature of this study, directors Dr. Tara Devine ,Dr. Neal Sarahan, and Head of School Dr. Debra Hall believe this research supports ILP work.

Two tests will be given within one week of each other. An interview will be administered directly following the second test asking participants to explain their

reason for giving certain answers to test questions. This interview will be audio-recorded and later transcribed by the researcher. All recordings and subsequent transcriptions will be secured in a locked filing cabinet in the office of Dr. Susan X Day at the University of Houston. This data will be kept for a minimum of 3 years following completion of this study. The study is complete when all data analysis is finished.

INCENTIVES

At the end of the study students will receive a \$10 gift certificate to Yogurtland. Yogurtland is a yogurt shop with gluten free options, and is located within 5 miles of The Monarch School.

CONFIDENTIALITY

Every effort will be made to maintain the confidentiality of your child's participation in this project. Each child's name will be paired with a code number by the principal investigator. This code number will appear on all written materials. The list pairing the subject's name to the assigned code number will be kept separate from all research materials and will be available only to the principal investigator. Confidentiality will be maintained within legal limits.

RISKS/DISCOMFORTS

Individuals always carry a risk of discomfort when asked questions of a personal nature in an interview. However, all students will be told prior to the study in their Assent to Participate that they are encouraged to pass on any questions that cause discomfort.

BENEFITS

This study may carry direct benefits from participation in this study in that they will be practicing communication strategies and critical thinking in the form of a theory of mind testing battery. In addition, his/her participation may help investigators better understand the development of a theory of mind in autism.

ALTERNATIVES

Participation in this project is voluntary and the only alternative to this project is non-participation.

PUBLICATION STATEMENT

The results of this study may be published in professional and/or scientific journals. It may also be used for educational purposes or for professional presentations. However, no individual subject will be identified.

AGREEMENT FOR THE USE OF AUDIO TAPES

If you consent to take part in this study, please indicate whether you agree to your child being audiotaped during the study by checking the appropriate box below. If you agree, please also indicate whether the audio tape(s) can be used for publication/presentations.

- I agree to my child being audiotaped during the interview.
- I agree that the audio tape(s) can be used in publication/presentations.
- I do not agree that the audio tape(s) can be used in publication/presentations.
- I do not agree to my child being audiotaped during the interview.

Unfortunately, your child cannot take part in the research if they do not agree to the audiotaping.

SUBJECT RIGHTS

1. I understand that parental consent is required of all persons under the age of 18 participating in this project. I understand that my child will also be asked to agree to participate.
2. All procedures have been explained to me and I have been provided an opportunity to ask any questions I might have regarding my child's participation.
3. Any risks and/or discomforts have been explained to me.
4. Any benefits have been explained to me.
5. I understand that, if I have any questions, I may contact Gray Atherton at gsatherton@uh.edu. I may also contact Dr. Susan X Day, faculty sponsor, at (713) 303-7195 and sxday1@gmail.com.
6. I have been told that my child or I may refuse to participate or to stop his/her participation in this project at any time before or during the project. My child may also refuse to answer any question.

7. ANY QUESTIONS REGARDING MY CHILD'S RIGHTS AS A RESEARCH SUBJECT MAY BE ADDRESSED TO THE UNIVERSITY OF HOUSTON COMMITTEE FOR THE PROTECTION OF HUMAN SUBJECTS (713-743-9204).
8. All information that is obtained in connection with this project and that can be identified with my child (student) will remain confidential as far as possible within legal limits. Information gained from this study that can be identified with my child may be released to no one other than the principal investigator Gray Atherton. The results may be published in scientific journals, professional publications, or educational presentations without identifying my child by name.

NAME OF CHILD: _____

I agree to allow my child to participate in this research project:

YES _____ NO _____

Signature of Parent/Guardian: _____

UNIVERSITY OF HOUSTON
ASSENT TO PARTICIPATE IN A RESEARCH STUDY

STUDENT ASSENT

PROJECT TITLE: What Am I Thinking? Theory of Mind Development in Autism

You are invited to participate in a research study conducted by Gray Atherton, a graduate student at the University of Houston.

You can say no if you do not want to participate in this study. Adults cannot make you participate in this study if you do not want to. If you agree to participate in the study now, but change your mind about it later, you can stop being in the study, and no one will be mad at you.

WHAT IS RESEARCH?

Research is a way to learn information about something. Researchers study different subjects the way you study English or math as a subject in school.

There are many reasons people choose to be in a research study. Sometimes people want to help researchers learn about ways to help people or make programs better.

You should understand why you would say yes to being a research participant. Take the time you need to decide if you want to be in this study. You can ask Ms. Gray and your ILP teacher any question you have about the study.

WHY ARE WE DOING THIS RESEARCH?

In our research we want to learn about how we learn about the way other people think.

WHAT WILL HAPPEN DURING THE STUDY

This study will take place during your ILP class. The amount of time it may take you depends. It may take as little as 20 minutes during just one ILP class, or you may be asked to come back for more questioning, in which case it may take 3 hours over a two week period. During this project you will hear a series of stories about imaginary people and try and describe what is happening to them and why they do or say the things they do. I will record our conversation on a tape recorder, but no one will be able to listen to it but me. Unfortunately, a student cannot participate in this study unless they agree to be recorded. After the study is finished I will give participants a \$10 gift certificate to Yogurtland.

COULD GOOD THINGS HAPPEN TO ME FROM BEING IN THIS STUDY?

This study will be helpful to you right away, because you will be practicing skills such as describing feelings and thoughts, and you might think that the questions and stories are interesting. In the future this study will hopefully answer some important questions about how we learn about other people, and how we can improve our social skills and relationship development.

COULD BAD THINGS HAPPEN TO ME FROM BEING IN THIS STUDY?

This study will have questions in the interview that are personal, such as your thoughts and experiences involving other people. Sometimes this can make people feel sad or stir up other emotions that may be hard to think about. However, it is always your choice to answer a question, and if you ever feel uncomfortable or embarrassed you can always say “pass”. Your answers to questions will not be shared with parents or teachers, and only with other researchers.

DO I HAVE OTHER CHOICES?

You can choose not to participate in this study, and you can decide you no longer want to be in the study at any time. You may choose to not answer any question that you are not comfortable with. If you choose not to participate at any time, you will not be penalized.

WHAT IF I HAVE QUESTIONS?

If you have any questions or worries about the research, you can ask Gray Atherton at gsatherton@uh.edu before, during, or after your completion of the survey. If you wish to talk to someone else or have questions about your rights as a participant, call the University of Houston Committee for the Protection of Human Subjects at (713) 743-9204.

DOCUMENTATION OF PARTICIPANT'S ASSENT

I agree to participate in this study called: What Am I Thinking? Theory of Mind Development in Autism.

Signature of minor participant: _____

Date: _____

ANY QUESTIONS REGARDING MY RIGHTS AS A RESEARCH SUBJECT MAY BE ADDRESSED TO THE UNIVERSITY OF HOUSTON COMMITTEE FOR THE PROTECTION OF HUMAN SUBJECTS (713-743-9204). ALL RESEARCH PROJECTS THAT ARE CARRIED OUT BY INVESTIGATORS AT THE UNIVERSITY OF HOUSTON ARE GOVERNED BY REQUIREMENTS OF THE UNIVERSITY AND THE FEDERAL GOVERNMENT.

Appendix C
ToM Testing Battery

(Appendix C document)

First-Order False Belief Tasks

1) True belief task (Leslie and Frith, 1988)

“We have here 3 boxes, and as you can see they are all empty. This is my friend Suzy. Suzy has been working very hard and has earned a coin for her allowance. She is going to put the coin in one of the boxes. It looks like she is going to put it in the blue circle box. She says ‘remember, I have put my coin in the box with the blue circle.’” Now Suzy needs to go to class.

“Now that Suzy has gone can she see what we are doing?”

Yes

No

“While she's out I'm going to put another coin in the gold star box.”

“Where did Suzy put the coin?”

Blue circle

Red Heart

Gold Star

“And where did we put the coin just now?”

Blue circle

Red Heart

Gold Star

“When Suzy comes back, where will she think her coin is?”

Blue circle

Red Heart

Gold Star

2) *The Smarties Task (Perner et al, 1989)*

El shows the subject a sealed Mentos tube, and asks; "What do you think is inside here?"

The subject answers "Mentos" or "Candy". El then opens the tube and shows the subject that it in fact contains a pencil.

"What is this?" *crayon*

The pencil is put back in the tube, and the lid replaced. El then asks the subject;

"In a minute, Suzy is going to come in. She hasn't seen this tube yet. When she comes in I'm going to show her this tube, closed up just like this. I'm going to ask her "What's in here?". What will she say?"

Candy/Mentos

Crayon

"What is really inside the tube?"

Candy/Mentos

Crayon

3) *The Sally-Ann Task (Baron-Cohen et al, 1985, adapted from Wimmer & Perner, 1983)*

The subject is introduced to two figures;

"This is Mary and this is John. Mary has a chest and John has a barrel. Mary has a coin.

She is going to put her coin in her chest to keep it safe when she goes out".

The subject sees the toy figure put the coin in her chest and go out (under the table).

"But while Mary is out, John takes Mary's coin out of her chest and he puts it in his barrel!".

The figure of John does this and then goes away.

"Where is the coin really?"

Barrel

Chest

"Where did Mary put the coin in the beginning?"

Barrel

Chest

"When Mary comes back, where will she think her coin is?"

Barrel

Chest

4) *The Three boxes Task (Leslie and Frith, 1988)*

As in the True Belief task, there is the experimenter, the puppet Suzy, and three boxes.

As before Suzy goes out after hiding a coin in the heart box. But while Suzy is out, El in this task moves that same coin to one of the other boxes.

"Where did Suzy put the coin?"

Blue circle

Red Heart

Gold Star

Where did we put the coin just now?"

Blue circle

Red Heart

Gold Star

Where will Suzy expect her coin to be when she comes back?

Blue circle

Red Heart

Gold Star

First-order Deception Tasks

5) *Sally-Ann and Baddie Task (after Wimmer & Perner, 1983)*

“Again, Mary hides the coin and in her chest and leaves, then John moves the coin to his barrel. Then Mary comes back.”

"Where does Mary think her coin is?"

Barrel

Chest

If incorrect the subject is prompted: "Did she see John move the coin?". The subject is told the correct answer if prompts fail.

“This is Burglar Bill, and he wants to steal Mary's coin.” He is going to ask her where it is. Mary does not want him to get the coin, and wants to keep it for herself.” Burglar Bill asks Mary; "Where's your coin, in the barrel or the chest?"

“Remember, Mary does not want him to find the coin.”

"Where will Mary tell Burglar Bill to look for the coin?"

Barrel

Chest

"Where is the coin really?"

Barrel

Chest

"Where did Mary put the coin in the beginning?"

Barrel

Chest

6) *Three Boxes Deception Task*

“Suzy has earned another coin for allowance. She is going to hide it in the red heart box, and go to class. While she is gone I am going to move the coin to the blue circle box.

Where does Suzy think the coin is?

Blue circle

Red Heart

Gold Star

Suzy comes back into the room and is met by Greedy Parrot (a hand puppet), who asks Suzy; "Where's your coin? I want it so I can buy crackers!" Now remember, Suzy does not want the parrot to find her coin.

"Where will Suzy tell the parrot to look for the coin?"

Blue circle

Red Heart

Gold Star

Where is the coin really?

Blue circle

Red Heart

Gold Star

Where did Suzy put the coin in the beginning?

Blue circle

Red Heart

Gold Star

Second-order False Belief Tasks

7) The Ice cream van Task (Perner & Wimmer, 1985; Baron-Cohen, 1989)

The subject is shown the toy village scene, and the park, church, playground, stable and John and Mary's houses are pointed out. The subject is introduced again to the John and Mary figures used earlier, and shown that this time they are in the park. The following story is told as the figures act out the events:

“Today Mary and John are in the park. Along comes the ice cream van. John wants to buy an ice cream, but he has not got any money with him. He'll have to go home first and get his money before he can buy an ice cream. The ice cream man tells John, "It's alright John, I'll be here in the park all day. So you can go and get your money and come back and buy your ice cream. I'll still be here." So John runs off home to get his money. But, when John has gone, the ice cream man changes his mind. He decides he won't stay in the park all afternoon, instead he'll go and sell ice cream outside the church. He tells Mary, "I won't stay in the park, like I said I would. I'm going to the church instead".

- 1) “Did John hear the ice cream man tell Mary that?” *Yes* (Subject is prompted if they answer incorrectly; eg. subject is asked, "Is she there? Can she hear?").

“So in the afternoon, Mary goes home and the ice cream man sets off for the church. But on his way he meets John. So he tells John, "I changed my mind, I won't be in the park, I'm going to sell ice cream outside the church this afternoon". The ice cream man then drives to the church. (Comprehension Check 2)

“Did Mary hear the ice cream man tell John that?” *No*

“In the afternoon, Mary goes over to John's house and knocks on the door. John's mother answers the door. Mary asks, "Is John in?". John's mother says, "Oh, I'm sorry Mary, John's gone out. He's gone to buy an ice cream".

"Where does Mary think John has gone to buy an ice cream?"

Park

Church

"Why does Mary think that?"

"Where was the ice cream man in the beginning?"

Park

Church

"Where is the ice cream man now?"

Park

Church

8) The Simon Story Task

"Here Mary and John are in the playground and meet Simon. Simon is a very good student and Mary wants him to help her with her math homework. But she has not got her homework with her. Mary leaves and Simon decides not to stay in the playground as he had told Mary, but to go to the zoo. He tells John "I am going to the zoo instead of staying here in the playground."

Does Mary hear Simon say this? No

Simon bumps into Mary on the way to the zoo and tells her "I am going to be at the zoo instead of the playground." John goes over to Mary's house and is told by Mary's father that Mary has gone to meet Simon.

"Where does John think Mary has gone to meet Simon?"

Zoo

Playground

"Why does John think that?"

"Where was Simon in the beginning?"

Zoo

Playground

"Where is Simon now?"

Zoo

Playground

Second-order Deception Tasks

9) The Burglar Bill Story Task Using the same village scene, the following story is narrated and acted out:

"This is Burglar Bill. He has just robbed a shop and he's making his get-away. He's running away from the police. He's running away as fast as he can when he meets his brother. This is Burglar Bill's brother, Bob. He says to Bob, "Don't let the police find me, don't let them find me!". Then he runs and hides in the church. Remember, he's hiding in the church.

Just then the police arrive. They have looked everywhere for Burglar Bill; everywhere except the church and the park. They are going to ask Bob, "Where's Burglar Bill? IS he in the church or in the park? But the police recognize Bob and they know he will try to save his brother, Burglar Bill. They expect him to lie, and wherever he tells them, they will look in the other place. But Bob is very very clever, and he wants to save his brother. He knows they do not trust him."

"Where will Bob tell the police to look for Burglar Bill? In the church or in the park?"

Park

Church

"Why will Bob tell them that?"

"Where will the police look if he says that?"

Park

Church

10) John and Mary Double Bluff Story The following story is told and acted out:

This is John and this is Mary. Mary has stolen John's coin and she has hidden it in the zoo. But John doesn't know where the coin is. He has looked everywhere for his coin, except the zoo and the playground. Now he has caught Mary and he's going to ask her, "Where's my coin? Is it in the zoo or in the playground?" But John knows that Mary will not want to tell him. He expects her to lie. But Mary is very clever, and she knows John expects her to lie.

Deception Question: "Where will Mary tell John to look for his coin - in the zoo or in the playground?"

Zoo

Playground

"Why will Mary tell him to look there?"

"Where will John look for his coin if she tells him its there (location mentioned by subject)?"

Zoo

Playground

Appendix D

The Strange Stories

(Appendix D document)

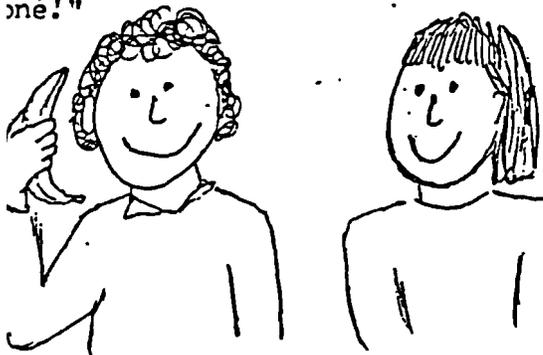
"Strange Stories" Instructions

On the following pages you will find some very short stories, each one followed by some questions. I will read the stories carefully, and then ask you to answer some questions. There are no right or wrong answers. Some of the questions ask; "Is it true...?" After these questions there are three possible answers for you to choose from; YES / NO / DON'T KNOW. Please draw a ring round the answer you think is right. Please only circle DON'T KNOW if you really cannot decide, try otherwise to answer YES or NO. This is not a test, and no grades will be given. It is just to see what you think about my stories.

After we have read each story and you circle an answer I will ask you to choose which story out of three you like best. I will then ask you more questions about this story. We will do this five times, and our time together will be tape-recorded. Remember, everything that you say is confidential and will only be listened to by me."

The Telephone

ne!"



Katie and Sarah are playing in the house. Sarah picks up a banana from the fruit bowl and holds it up to her ear. She says to Katie, "Look! This banana is a telephone!" Is it true, what Emma says?

YES / NO / DON'T KNOW.

Why does Emma say this?

The Dog



Today James is going to Claire's house for the first time. He is going after school, and he is looking forward to seeing Claire's dog, which talks about all the time. James likes dogs very much. When James arrives at Claire's house Claire runs to open the door, and her dog jumps up to greet James. Claire's dog is huge, it's almost as big as James! When James sees Claire's huge

dog he says, "Claire, you haven't got a dog, You've got an elephant!"

Is it true, what James says?

YES / NO / DON'T KNOW

Why does James say this?

The Vase

Anna says, "The
dog isn't my fault!"
What will her mother say?



One day, while she was playing in the house, Anna accidentally knocks over and breaks her mother's favorite crystal vase. She knows that when her mother finds out she will be very angry! So when Anna's mother comes home and sees the broken vase and asks Anna what happened, Anna says, "The dog knocked it over, it wasn't my fault!" Was it true, what Anna told her mother?

YES / NO / DON'T KNOW

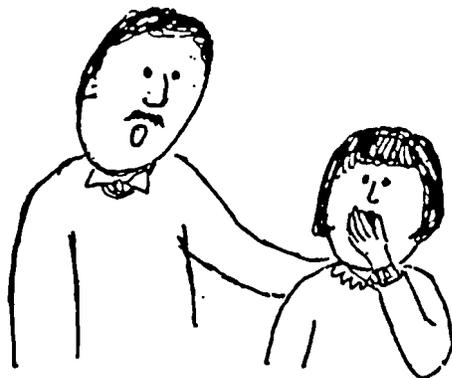
Why did she say this?

The Hat



One day Aunt Jane came to visit Peter. Now Peter loves his aunt very much, but today she is wearing a new hat; a new hat that Peter thinks is very ugly. Peter thinks his aunt looks silly in it, and much nicer in her old hat. But when Aunt Jane asks Peter, "How do you like my new hat?", Peter says, "Oh, it's very nice." Was it true what Peter said? YES / NO / Don't KNOW
Why did he say it?

The Cough



Emma has a cough. All through lunch she cough and coughs and coughs. Her father says, "Poor Emma you must have a frog in your throat!" Is it true, what Emma's father says to Emma?
YES / NO / DON'T KNOW.

Why does he say that?

Mrs. Peabody



Late one night old Mrs. Peabody is walking home She doesn't like walking home alone in the dark because she is always afraid that someone will attack her and rob her. She is really a very nervous person! Suddenly, out of the shadows comes a man. He wants to ask Ms. Peabody what time it **is**, so he walks towards her. When Mrs. Peabody sees the man coming towards her, she

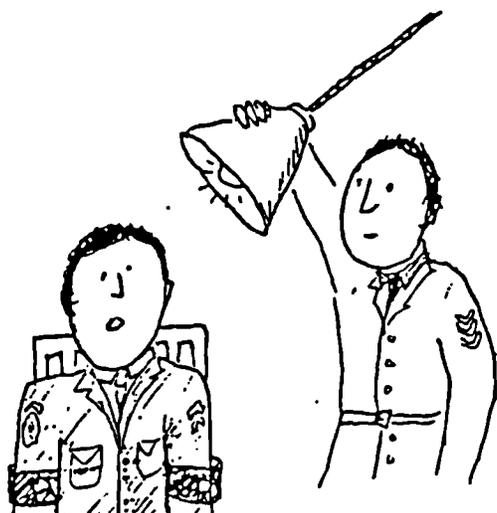
starts to tremble and says, "Take my purse, just please don't hurt me!"

Was the man surprised at what Ms. Peabody said?

Y7S / NO / DON'T KNOW

Why did she say that, when he only wanted to ask her the time

The Prisoner



During the war, the Red army captures a member of the Blue army. They want him to tell *them* where his army's tanks are; they know they are either by the sea or **in** the mountains. They know that the prisoner will not want to tell them, he will want to save his army, an: so he will certainly lie to them. The prisoner is very brave and very clever, he will not them find his tanks. The tanks are really in the mountains. Now when the other side ask him where his tanks are,' he says, "They are in the mountains".

Is it true what the prisoner said?

YES / NO / DON'T KNOW.

Where will the other army look for his tank? BY
THE SEA / IN THE MOUNTAINS.

Why did the prisoner say what he said

The Picnic



Sarah and Tom are going on a picnic. It is Tom's idea, and he says it is going to be a lovely sunny day for a picnic.

But just as they are unpacking the food, it starts to rain, and soon they are both soaked to the skin. Sarah is annoyed. She says, "Oh yes, a

lovely day for a picnic alright!"

Is it true, what Sarah says?

YES / NO / DON'T KNOW

Why does Sarah say this?

The Lunch



Brian is always hungry. Today at school it is his favorite meal – hotdogs and French fries. He is a very greedy boy, and he would like to have more hotdogs than anyone else, even though his mother will give him a snack when he gets home. But

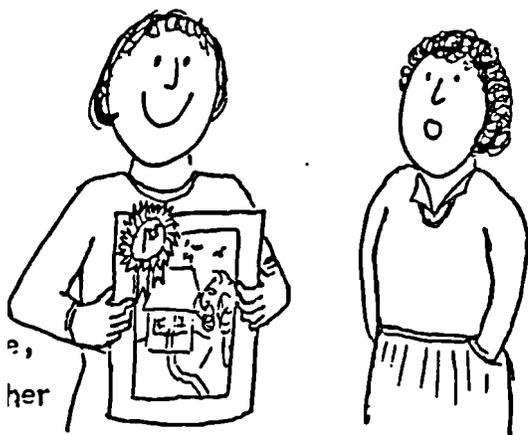
everyone is allowed two hotdogs and no more. When it is Brian's turn to be served, he says, "Oh, please can I have four hotdogs, because I won't be getting a snack when I get home!"

Is it true, what Brian says?

YES / NO / DON'T KNOW

Why does he say that?

The Art Competition



Jane and Sarah are best-friends. They both entered the same painting competition. Now Jane wanted to win this competition very much, but when the results were announced it was her best-friend Sarah who won, not her. Jane was very sad she had not won, but she was happy for her friend, who got the prize. Jane said to Sarah, "Good job, I'm so happy you won!" Jane said to her mother "I am sad I did not win that competition!" Is it true what Jane said to Sarah?

YES / NO / DON'T KNOW.

Is it true what Jane said to her mother?

YES / NO / DON'T KNOW.

Why does Jane say she is happy and sad at the same time?

Christmas Eve



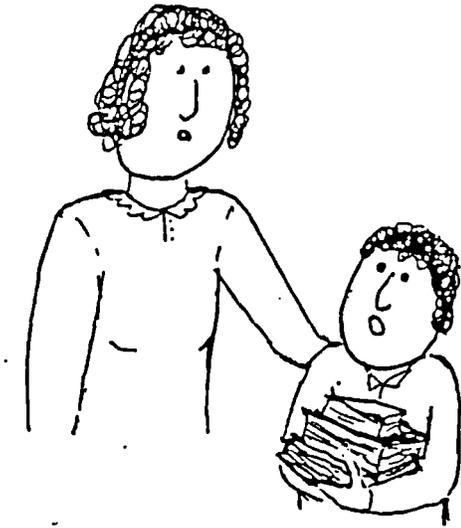
On Christmas Eve Alice's mother takes her to the big Department Store in town. They go to look in the toy department. In the toy department Mr. Brown, Alice's next-door neighbor is dressed up as Santa Claus, giving out candy to all the children. Alice thinks she recognizes Mr. Brown, so she runs up to him and asks, "Who are you?" Mr. Brown answers, "I'm Santa Claus!"

Is it true what Mr. Brown says?

YES / NO / DON'T

Why does he say this?

Absent



At school today John was absent. He was at home sick. All the rest of Ben's class was at school though. When Ben got home after school his mother asked him, "Was everyone in your class at school today?" Ben answers, "Yes Mom".

Is it true what Ben said?

YES / NO / DON'T KNOW.

Why did Ben say that?

The Rocky Mountains

In stormy weather, rocks often fall from the top of mountains. One day on a mountain in the Rockies, a very large boulder becomes loose and starts rolling down the mountain. It rolls and rolls and rolls, gathering speed and spinning and bouncing off the mountainside. Suddenly, there is a very noisy splash.

Q: Why is there a loud splash?

The Orchard

The summer has been long and very warm, just the right conditions for producing lots of apples. All summer long the orchard has been quiet and peaceful. Now, at the end of summer, the apples hang from the trees, glistening in the bright sun, all ripe and rosy. And every now and then in the orchard, little thumps can be heard.

Q: Why are there little thumps?

Winter

It is a very cold winter and has been snowing for days and days. The snow has covered everything; the trees, the houses, the hilltops, even the fences are covered in a thick layer of snow. Everything looks completely white apart from the dull gray sky. One morning, the skies are blue and the sun comes out. The sun beats down on the houses, the trees, the hilltops, and the fences.

Puddles start to form at the edges of the fields.

Q: Why are there lots of puddles?

Appendix E

Groupings for Strange Stories

(Appendix E document)

Groupings Strange Stories

Group A:

- 1) (1) Pretend- "The Telephone": 45%,
- 2) (5) Fig of Speech "The Cough": 30%
- 3) (14) Physical "Apple Orchard": N/A

Group B:

- 1) (4) White Lie "The Hat": 50%
- 2) (2) Joke "The Dog": 28%
- 3) (11) Appearance vs Reality "Christmas Eve": 30%

Group C:

- 1) (7) Double Bluff "The Prisoner": 47%
- 2) (8) Irony "The Picnic": 55%
- 3) (6) Misunderstanding "Mrs. Peabody": 35%

Group D:

- 1) (13) Physical "Rocky Mountains": N/A
- 2) (9) Persuasion "The Lunch": 40%
- 4) (10) Contrary Emotions: "The Art Competition" 8%

Group E:

- 1) (11) The Vase 30%
- 2) (12) Forgetting "Absent": 30%
- 3) (15) Physical "Winter": N/A