Trolley Dilemmas and Utilitarian Moral Judgments in Children

Kunio Hessel

Carleton University

2017

A THESIS PRESENTED TO THE INSTITUTE OF COGNITIVE SCIENCE IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE B.COG.SCI WITH HONOURS DEGREE

Acknowledgments

First, I must thank the daycares who volunteered their time to help me with my project and allowed me to disrupt their days. I also have to thank the parents who allowed their children to participate, and of course the wonderful children themselves, who—out of the goodness of their little hearts (or perhaps for stickers)—put up with my stories, games, and even the PPVT.

I would like to thank former lab mate Katherine Andrews for her training, which allowed me to gain valuable experience in the field. I would also like to thank my current lab mates, Sarah Gardiner and Audrey Brown, for answering the dozens of questions I had during this process.

I would like to thank my family and friends who supported me throughout this process, whether it was helping me come up with stories, listening as I bounced around ideas, or simply putting up with me when I was stressed out. I couldn't have done this without you.

Finally, I would like to extend my sincerest thanks to my supervisor, Dr. Deepthi Kamawar, for her unwavering support, kindness, and dedication throughout this year-long process. Your guidance and belief in me have allowed me to (almost) complete this ambitious project. Whether it was making me rewrite my stories 7 times, never quite being satisfied with my often-goofy pictures, or editing and re-editing my thesis drafts, you always pushed me to do the best that I could, and I am better for it (as is this thesis). The knowledge you have imparted to me and the skills you have taught me will stick with me for the rest of my academic career.

Thank you.

Abstract

Utilitarian decisions are defined as those whose outcomes provide the greatest good (or least harm) for the greatest number of people (Kahane, 2015). Utilitarian decisions have been studied extensively in moral philosophy (e.g. Foot, 1967), and more recently, moral psychology (e.g. Lanteri et al., 2008; Pellizzoni et al., 2010). The trolley dilemma is the most well-known of the so-called *sacrificial dilemmas* that are used to judge people's utilitarian tendencies (Kahane, 2015). In variations of this dilemma, participants are forced to make a choice between one person or five people dying. Positive utilitarian options in which characters receive a benefit (such as five children receiving a snack), which have not been studied in the literature, are introduced in this study. The hypotheses were that children aged 5 and 6 would demonstrate utilitarian moral judgments for both positive and negative outcome trolley-style dilemmas. Although not enough data was collected to run quantitative statistical analyses (12 participants), qualitative results suggest that children do not follow utilitarian principles when making moral judgments in either positive or negative scenarios.

Table of Contents

Introduction

Why is it that people's opinions on the "right thing to do" vary so greatly? Under which conditions do people make certain types of moral judgments? What factors influence whether people view an action as right or wrong? These questions have been the focus of many thought experiments in moral philosophy and, more recently, experimental moral psychology (e.g. Lanteri, Chelini, & Rizzello, 2008; Thompson, 1976). The trolley dilemma is the most famous sacrificial dilemma – a thought experiment in which the reader must choose for whether one group of people or a single person must die. Many sacrificial dilemmas, including the trolley dilemma, have two options: a utilitarian option (e.g., 1 dies and 5 live) and a non-utilitarian option (e.g., 5 die and 1 lives). Utilitarianism is the view that the correct action is the one that provides the greatest good to the greatest number of people (or the least harm). The question in sacrificial dilemmas generally revolves around whether or not participants will choose the utilitarian option, and which factors impact those choices.

Child-appropriate variations of the trolley dilemma have been given to children in order to understand the development of moral judgments and utilitarian judgments (e.g. Leslie, Knobe, & Cohen, 2006; Pellizzoni, Siegal, & Suiran, 2010). Studies have shown that children give different judgments from adults on moral judgment tasks, and specifically trolley dilemmas (e.g. Leslie, Knobe, & Cohen, 2006; Pellizzoni, Siegal, & Suiran, 2010). At least one (Powell et al., 2012), has concluded that this is because children are unable to make cost/benefit analyses (which are required in order to make utilitarian judgments). Instead, it appears, that they may focus on any negative outcome as being 'bad', without a consideration of the trade-off between the options. Further, the work done with young children in this area thus far only includes negative trade-offs (e.g., 1 person gets muddy or 5 people do). One area that has not been

addressed in the literature, to the best of my knowledge, is young children's utilitarian judgments with *positive* outcomes (e.g., 1 person getting ice cream vs. 5 people getting ice cream). This is a focus of the current study.

Young children are interesting participants because they are at an early stage of development, and as a result vary greatly from adults on many cognitive factors, including Theory of Mind (the ability to consider another's mental states, such as beliefs or intentions) and moral cognition. Children show great increases in Theory of Mind during preschool years (4-5 years old), which allows them to engage in mental perspective-taking (Frye, Zelazo & Palfai, 1995). In terms of moral judgments, more advanced Theory of Mind (ToM) allows children to take into account more relevant factors; rather than simply looking at the events that occurred, ToM enables children to think about the mental states, feelings, and intentions of the characters in the stories (Ball, Smetana & Sturge-Apple, 2016). Furthermore, research has shown that ToM is significantly correlated with moral measures such as permissibility and justification of actions (Dunn, Cutting & Demetriou, 1990).

The present study examines young children's responses to age-appropriate trolley dilemmas, and their use of utilitarian principles in both positive- and negative-outcome scenarios, as well as two ToM tasks to examine its relation to moral judgments. This paper will overview the original trolley dilemma and relevant research in adult moral psychology; discuss utilitarianism and other relevant moral principles; provide a review of the existing research in child moral psychology; present the methodology and procedures involved in my experiment; and finally conclude with preliminary results and a discussion of the contributions to the literature and possible future directions.

The Trolley Dilemma and Moral Psychology

The trolley dilemma is the most famous sacrificial dilemma in the modern philosophy and psychology literature. This thought experiment was designed to test readers' application of utilitarian principles under varying conditions. The variations have different factors that affect judgments, such as emotional salience or physical contact. The trolley dilemma was first introduced in Foot (1967) as follows:

> A conductor is aboard his runaway train heading down the track towards five construction workers. The train cannot be stopped, only diverted to an adjacent track. However, there is one construction worker on the second track. There is no way for any of the workers to get off the tracks before the train would hit and kill them. The train conductor has access to the switch that would make the train change tracks; should he flip the switch and divert the train to the second track, saving the five workers but killing the sixth? (p. 3)

This dilemma will be referred to as the *switch dilemma* in the present paper, in order to distinguish between it and other variations of the trolley dilemma (e.g. the footbridge dilemma). The *trolley dilemma* will refer to the set of dilemmas involving a runaway train. Foot (1967) contrasts the trolley dilemma with another, seemingly similar one:

> A group of rioters are outraged over a crime, and are threatening to take revenge—violently—on a certain section of the community if justice is not served. The real culprit is unknown, so immediate justice is impossible. However, a judge realizes that if he frames an innocent man for the crime and has him executed, he can prevent further bloodshed. Should the judge convict the innocent man and have him killed to appease the rioters? (p. 3)

The eventual outcomes of these dilemmas are the same: one innocent person is killed in order to save more lives. Under utilitarianism, there is no difference here; the same number of people are killed in both scenarios. A utilitarian, then, would have no problem flipping the switch and

framing the man (in fact, their morals would *require* them to do both). However, as Foot describes, they are not identical problems. In the switch dilemma, if you make the train change tracks, the innocent man on the second track is merely an unfortunate victim of saving the five lives. If he were to disappear without a trace before he was killed, the five would still be saved. However, in the riot dilemma, the judge needs the innocent man to be killed in order to save the other potential victims. If the framed man were to disappear, the rioters would not be appeased, and no one would be saved. This is the distinction made by the *doctrine of double effect* (Foot, 1967): harm foreseen as a consequence of an action is not the same as intended harm. In other words, harm as a side effect (the man on the track being in the wrong place at the wrong time) is fundamentally different than harm as a main effect (the man being framed and executed as a means to appease the rioters). Foot suggests that people are generally okay with the man flipping the switch, but not with the judge framing the innocent man.

After the introduction of the switch dilemma in Foot (1967), variations of the trolley dilemma were created in order to offer a more direct comparison. The most widely used of these variations is known as the *footbridge dilemma*. From Thompson (1976):

> Like the switch dilemma, a runaway train is heading towards five construction workers. However, this time there is no second track; rather, there is a footbridge directly over the track. Our protagonist is standing on the footbridge and foresees the terrible death of the workers. The only way to save the workers is to drop a very heavy weight onto the track to stop the train. Our protagonist is not heavy enough, but standing next to him is a very large man who is heavy enough to stop the train if he is pushed onto the tracks. Of course, he will surely die if pushed, but the five workers will be saved. Should the protagonist push the large man onto the tracks to stop the train? (p. 207-208)

This dilemma is nearly identical to the switch dilemma, but with one key difference: like in the riot dilemma, the death of the large man would be the *main* effect; the protagonist would be using the large man as an instrument to save the others. Thompson (1976) describes the difference as deflecting a harm from a larger group to a smaller group (switch dilemma) vs. bringing about a different harm to a smaller group in order to save the larger group (footbridge dilemma). As will be investigated later in this paper, people overwhelmingly tend to say it is acceptable to flip the switch, but not to push the man off the footbridge (Lanteri, Chelini & Rizzello, 2008).

Thompson (1985) takes a closer, philosophical look at the trolley dilemma. She suggests that in the switch dilemma, it is permissible to flip the switch; more generally, it is always morally okay to cause harm through a side effect to avoid a greater harm. Thompson also posits that some people might consider it morally *obligatory* to flip the switch. However, in the footbridge dilemma, Thompson claims that it is not permissible to push the fat man because you are violating his rights. By pushing him off the bridge, you are physically contacting him—violating his "personal space"—and also displacing him without his consent. This is in contrast with the switch dilemma, in which you are simply displacing the train. The man on the second track cannot feel violated by your actions, whereas the fat man likely would feel violated even if he was miraculously unharmed after his fall (Thompson, 1985). Thompson is appealing to the actions themselves, rather than the outcomes or even intentions of the actions, to explain people's moral judgments. She suggests that the action itself is worse in the footbridge dilemma, and that this contrast is what leads to inconsistent answers to these dilemmas.

After the trolley dilemma became popular in philosophy, other fields of research began to use empirical methods to study adults' responses to sacrificial dilemmas in order to better

understand their reasoning. In their paper examining possible neurological bases of moral judgments, Greene, Sommerville, Nystrom, Darley, & Cohen, (2001) discuss a third variation of the trolley dilemma: the *loop dilemma*. It is as follows:

> Like in the switch dilemma, there is a track with five people and a track with one person. However, in this case, the track with one person loops around and connects to the track with five people. It is set up so that if there is no obstacle on the loop track, the train would loop back onto the original track and the five people would still be hit and. However, there is a large man on the loop track who will stop the train from killing the five people. (p. 2106)

This fascinating dilemma combines elements from the switch and footbridge dilemmas to create one that is a compromise of sorts; it blurs the lines between harm as a main effect and harm as a side effect. This is similar to the footbridge dilemma in that the large man's death is required to save the five people, but in this particular case the harm is indirect (i.e. no physical contact). While people might say that they do not intend to kill the man on the loop track, and that they are simply diverting the train away from the five people, it is not the same as the switch dilemma, because the man *must be killed* in order to save the five. The loop dilemma bypasses the theory that using people as a means to save others is the problem with the footbridge dilemma.

Greene et al. (2009) had participants rate the acceptability of the loop dilemma and the footbridge dilemma on a nine-point scale (with a 9 indicating the most acceptable, 1 indicating the most unacceptable). Participants rated the loop dilemma (5.89) as significantly more acceptable than the footbridge dilemma (3.89). Clearly something is at work besides simply side effect and main effect; Greene et al. (2001) argue that emotional salience (often correlated with physical contact) plays a larger role in moral judgments.

Greene et al. (2001) categorize the switch dilemma as "moral: impersonal", and the footbridge dilemma as "moral: personal". The distinction is that the decision to push the man off

the bridge is much more emotionally charged than flipping the switch because of proximity, physical contact, and the salient and horrifying nature of pushing someone to their certain death. Their claim is supported by their fMRI study, in which they showed that the emotion centres of the brain were more active during the footbridge dilemma than during the switch dilemma (Greene et al, 2001). The authors argue that the higher emotional response in the footbridge dilemma is the key difference between the two, and is also why people give different answers to the thought experiments.

Lanteri et al. (2008) take an experimental psychology route to study the trolley dilemma. Their experiment presents participants with the switch and footbridge dilemmas, and asks four questions for each story:

1) It is morally *obligatory* to flip the switch/push the man?
2) Is it morally *acceptable* to flip the switch/push the man?
3) If you *do* flip the switch/push the man, are you intentionally killing one person?
4) If you *do not* flip the switch/push the man, are you intentionally killing five people?

Lanteri et al. (2008) found that 24% of people said that it was obligatory to flip the switch, but only 5% said it was obligatory to push the man. Similarly, 87% said it was acceptable to flip the switch, but only 47% for the footbridge dilemma. Only 42% of participants believed flipping the switch was intentionally killing one person, but 90% believed pushing the man was intentional murder. The difference in perceived intention explains the stark contrast in the responses for the two dilemmas: most people naturally believe that 'unintentional' killing is not as bad as 'intentional' killing, and are therefore less likely to support pushing the man off the bridge compared to flipping the switch (Lanteri et al., 2008). It seems likely that Thompson's (1985) suggestion—that the actions themselves are important—is related to the intention findings.

Intention is not related to outcome; rather, the action itself is the most salient detail. Therefore, the information available for intention judgments is simply: one man flipped a switch, and one man pushed another man off a bridge. The results of the final question support this: there was no significant difference between the intention judgments of *not* acting on the switch and footbridge dilemmas, and very few people overall believed it was intentionally killing five people. Because the actions in both cases were the same (i.e. not doing anything), intention judgments were the same.

Competing Moral Principles

There are several principles by which people can make moral judgments. Utilitarian judgments are those which maximize the utility for the greatest number of people. "Maximize the utility" refers to maximizing the good and minimizing the harm that comes from a decision (Cote et al., 2013). For example, saving a school bus full of children is more utilitarian than saving a car with only one person inside, because an equal benefit (being saved) is distributed to many people rather than a single person. Note that the fact that children are being saved (rather than the adult that was alone in the car) is said to have no bearing on the decision under utilitarianism[1]. Judgments of this kind can be seen as cost-benefit analyses in which, roughly, utilitarianism = (number of people **x** benefit) – (number of people **x** harm). Under a utilitarian view, it is always correct to flip the switch or push the man in the trolley dilemmas, because one death is preferable over five deaths.

Utilitarianism stands in stark contrast with another theory of morality: deontology. Deontology is the view that decisions should be made based on rules (social, legal, moral, etc.)

[1] This is distinct from the fact that it may for some individuals.

or what it considered "right" in and of itself (Cote et al., 2013). The mantra "do not kill" is an example of such a rule. As such, a proponent of deontology would make their decisions on the switch and footbridge dilemmas based on their personal rules. They would almost certainly not push the man (because pushing a man to his death violates a great many social, legal, and moral rules), but their decision on the switch dilemma would likely be determined by whether or not they felt killing the one by flipping the switch was a worse type of killing than allowing the five to die. If they did not believe that either course of action was worse, they would likely default to a secondary principle (i.e. utilitarianism). Although people using the two different principles can arrive at the same conclusion about the correct course of action, they would not have the same rationale for their conclusions. Similar to what Thompson (1985) suggested, deontology argues that the type of action is more important than the number of people affected.

Of course, the vast majority of the population does not strictly follow either of these approaches to moral decision-making. Rather, people make decisions based on a number of factors that change based on the situation. Furthermore, humans are emotional beings; it is therefore difficult to separate emotions from rational thought when deciding to push a man to his certain death. Sacrificial dilemmas are problems designed to cause internal moral conflicts in the people who read and think about them. They are interesting because people value certain factors differently, leading to inconsistent results both in a given population and in individuals across different dilemmas. The underlying question asked by sacrificial dilemmas—under what circumstances do people make utilitarian moral judgments?—is the focus of trolley dilemmas. The present paper examines this question, as well as its application to children; do children apply utilitarian moral judgments to trolley-like dilemmas, and if so, under what circumstances?

Moral Psychology in Children

The scientific study of utilitarian principles in children is relatively recent; it has only been popular in the psychology literature for a few decades. Research in child morality in this context tends to centre around a few key factors: omission vs. commission, intention, and physical contact. These factors, which I will describe in detail later, are often considered the main principles upon which moral judgments are based in the trolley problem (Powell et al., 2012). Briefly, the omission bias states that harm caused by inaction (omission) is not as bad as the same harm caused by action (commission) (Baron & Ritov, 2004). The intention principle, similar to the doctrine of double effect, states that an action that causes a second event which *indirectly* produces harm is not as bad as an action that directly produces the same harm (Royzman & Baron, 2002). Finally, the contact principle argues that harm through physical contact is worse than the same harm produced in the absence of contact (Powell et al., 2012).

Children's moral judgments are very interesting because at a young age, children have not yet developed many of the cognitive abilities that adults take for granted. For example, research has shown that Theory of Mind—and specifically false believe reasoning, or the understanding that others can have false beliefs if they do not have all the relevant information (Zaitchik, 1991)—shows significant growth from three to five years of age (Wellman et al., 2001). This ability is very important when judging the actions of another person. The intentions that motivated another's actions often change how people judge an actor; for example, someone who spilled coffee on his friend by accident will not be judged as harshly as someone who deliberately poured the coffee on his friend, even if the outcome (the friend being covered in coffee) is the same in both situations. In children who have not yet developed belief reasoning (an important aspect of Theory of Mind), there is often little difference in their judgments of

accidental and deliberate harm because they are unable to properly look at the story from the perspective of the different characters (Cushman et al., 2013). Without this ability, young children cannot take into account the mental state of the person who caused the harm and use that information in their moral reasoning. Between four and eight years of age, however, as children age they increasingly make moral judgments of characters based on intention, rather than outcome (Cushman et al., 2013).

Saunders (2010) focused on the principle of double effect in preschooler's judgments of moral scenarios. Her experiment involved modified trolley dilemmas in which a squirrel was going to take cookies from five children. The main character could: use a barrier to divert the squirrel away, where it would then take a cookie from one child (side effect); physically take the cookie from the one child and give it to the squirrel, distracting the squirrel and saving the five cookies (main effect); or do nothing. She found that children as young as 3 years of age distinguished between harm as a main effect and harm as a side effect (although results for 3-year-olds showed an order effect). Four- and 5-year-olds demonstrated the well-established principle of double effect, consistently condemning harm as a side effect, but not as harshly as harm as a main effect (Saunders, 2010). This supports the claim that children do not simply use outcome to judge situations, but take into account other factors as well.

Pellizzoni et al. (2010) aimed to determine whether or not children were as sensitive to cost/benefit ratios as adults using child-appropriate versions of the sacrificial dilemmas. They also investigated the mediating effects of physical contact on children and adults. In order to convey the trolley dilemma to children more easily, Pellizzoni et al. (2010) presented participants with images of Lego setups that simulated modified versions of the switch and footbridge dilemmas. In the switch dilemma version, a large ball was rolling down a hill towards

five Lego people; the character could pull a string that would divert the ball towards one Lego person instead. In the footbridge dilemma version, the same ball was rolling towards the five Lego people, but this time the character was on a bridge over the hill; he could push a much larger Lego man off the bridge to stop the ball and save the five Lego people. The participants (aged 3-5 years old) had to decide what the character should do, and they generally advocated for action in the switch (87%) but not the footbridge (27%) dilemmas. The authors found that their results were consistent with both adult results and the contact principle (Pellizzoni et al., 2010) Although these results suggest that young children show similar judgment patterns as adults, there is no way of knowing if children made the decisions for the same reasons as the adults. It is assumed that adults make a utilitarian judgment when choosing to flip the switch, and that the contact principle causes many adults not to push the man. However, there is nothing to suggest that children made their judgments based on the same principles as the adults.

Their second experiment aimed to capture the participants' conception of "right and wrong". Using the same design as experiment 1, the experimenters asked the children questions such as "what is the right thing to do?" rather than asking them to advocate for action or no action (Pellizzoni et al., 2010). The results were very similar to experiment 1 and consistent across participants, which suggests that the children generally advocated for the action that they believed was "right". The third experiment used an "inverted" trolley dilemma, in which the harm was initially going to affect the one person, but could be deflected to the five people instead. Three-year-olds were unable to consistently understand the story and were excluded from the results; however, 4- and 5-year-olds showed a significant difference between the original and inverted trolley dilemmas (Pellizzoni et al., 2010). This suggests that children are able to apply utilitarian principles to moral situations, because they advocated for action to save

five people, but not when five people would be harmed. This implies that children do not simply advocate for action based on the situation or type of action, but rather that they take into account the number of people affected by the outcome. Thus, it seems that even very young children (4-5) undergo a type of utilitarian calculus when making moral judgments. However, the findings of this study stand in contrast with more recent ones.

In contrast with the previous studies, which suggest that young children adhere to the principle of double effect and the contact principle, Stey (2014) found that 3-, 4-, and 5-year-olds do not. The study replicated the methods used in Pellizzoni et al. (2010), though they presented the stimuli on a tablet computer rather than with Lego toys and pictures. Stey (2014) also added the loop dilemma described in Greene et al. (2001) to the study, contrasting it with both the switch and footbridge dilemmas. Stey (2014) reasoned that the loop case would allow for a better comparison for the contact principle; whereas the switch dilemma differs from the footbridge dilemma in terms of contact as well as intention (i.e. doctrine of double effect), the loop dilemma differs only in terms of physical contact. A Bayesian analysis showed that in his participant group, the probability of giving answers consistent with the contact principle was no different than what would be expected by chance. Furthermore, results showed that the probability of giving answers consistent with the doctrine of double effect was actually *less* than what would be expected by chance (Stey, 2014).

That these results are not consistent with Pellizzoni et al. (2010) is curious, and suggests that further work is needed before drawing conclusions about how young children make moral judgments. One possibility is that the method of presentation in Stey (2014)—a tablet rather than toys—may have been less engaging, causing the children to think less deeply about the stories. It is also possible that the participants in both studies were simply too young. Regardless, future

studies should aim to clarify these inconsistent results; one of the goals of the present study is to replicate past findings with children in order to add to the existing literature and paint a clearer picture regarding the trolley dilemma and utilitarian judgments in children.

Powell et al. (2012) conducted an experiment using age-appropriate trolley-style dilemmas with 5- to 8-year-old participants (divided into two age groups: 5/6 and 7/8). Their goal was to examine the differences in judgments of stories in which harm came about through commission or omission. The omission bias suggests that harm through omission (i.e. doing nothing and allowing harm to occur) is less morally wrong than harm through commission (i.e. doing something and causing harm to occur). In Experiment 1, omission and commission were crossed with harm-only and harm/benefit (2 x 2 design). In all stories, a train was driving down some tracks and was going to splash one child with mud unless the train was diverted. On the other track, where the train could be diverted, were either five or no children, depending on condition. Harm-only stories, thus named because harm was involved, but there was no benefit, involved one child being splashed with mud when the alternative was no child being splashed. Harm/benefit stories involved one child splashed with mud when the alternative was five children being splashed (5 children being spared is the "benefit"). In omission stories, the switch operator could have made the train switch tracks (from the one child to either no children or five children) but did not; in commission stories, the operator makes the train switch tracks (from either no children or five children to one child) (Powell et al., 2012). Note that in all cases, unlike in previous studies, the end result is always exactly one child being harmed. Participants were asked to rate the actions (or inaction) of the switch operator on a scale of 1 (very good) to 5 (very bad). Following the second harm-only story, participants were reminded of the events of the first story, and asked which of the switch operators acted worse (or if there was no difference). This

process was counterbalanced for story and question order, and repeated for the harm/benefit stories as well.

Results showed that in the harm/benefit stories, the 5- and 6-year-olds rated the operator's behaviour as more negative, in both omission (3.6) and commission (4.0) conditions, than did the 7- or 8-year-olds (2.4; 1.8) and adults (2.9; 2.7) (Powell et al., 2012). It seems that the younger children were not able to properly take into account the benefit involved in splashing the one child rather than the five children. A strange result is that for the commission harm/benefit story, in which the switch operator diverts the train away from five and towards one, the 7- and 8-year-olds rated the action as positive (1.8), but the adults rated it as neutral (2.7). For the omission condition, the difference was much smaller (2.4 for 7/8; 2.9 for adults) (Powell et al., 2012). The authors do not discuss these specific contrasts, so it is possible that they are not statistically significant. The participants in this study were older than in Pellizzoni et al. (2010) and Stey (2014), which both used 3- to 5-year-olds. The results of this study—that 5- and 6-year-olds cannot properly consider the benefit involved in one child rather than five children being splashed—suggest that perhaps even younger participants would not account for it either. This supports the findings in Stey (2014), and further suggests that the findings in Pellizzoni et al. (2010) may not be replicable. In any case, it is an interesting finding about the types of moral judgments children make in harm/benefit conditions that may warrant further study in the future.

Present Study

Previous research has shown mixed results relating to children's utilitarian moral judgments. The present study aims to examine utilitarian judgments in 5- and 6-year-olds using

(age-appropriate) variations of the trolley dilemma. Furthermore, it adds positive-outcome trolley dilemmas to the literature. The positive outcome trolley dilemma stories are new to the experimental moral psychology and philosophy literature. Positive outcomes have been studied in other types of dilemma, such as those used when investigating the side-effect effect, but not in trolley-style dilemmas (to the best of my knowledge). This is surprising, because trolley dilemmas study utilitarian moral judgments, which can be applied to positive scenarios as readily as to negative ones. As far as I am aware, positive-outcome stories—ones in which the outcome is positive, such as receiving ice cream, rather than negative, such as losing a snack—have not been studied in the context of utilitarian judgments, in adults or children. Utilitarianism does not apply exclusively to negative outcomes; it simply requires the greatest good for the greatest number. Therefore, it seems reasonable that people who make utilitarian judgments on traditional negative-outcome trolley dilemmas should also make them on positive-outcome ones. However, I do not know whether young children treat both types of outcomes in a similar manner.

In the current study, children heard eight stories, half of which have a negative outcome, and half of which have a positive outcome. As well, in half of the stories the outcome affects five people in the end (when it was originally going to affect one person), and in the other half the outcome affects one person in the end (when it was originally going to affect five people). The two factors (positive/negative and 5 affected vs. 1 affected) are crossed, with two stories for each combination.

Two of the stories (negative outcome, one person affected) are like the traditional trolley dilemmas where the character flips the switch. These stories provide a baseline for utilitarian judgments, because their results will be comparable to previous work with children (e.g. Pellizzoni et al., 2010). The other two negative stories, in which five people are ultimately

affected, are the opposite; they offer non-utilitarian outcomes, so they are contrasted with the traditional ones. The two positive utilitarian stories (five people affected) introduce the "greatest good", contrasting with the non-utilitarian positive stories (one person affected).

Note that for the positive and negative outcome stories, the cases in which the actions are utilitarian are reversed. For the traditional negative stories, switching from five to one is utilitarian, and switching from one to five is not (because it maximizes harm). In the positive stories, however, switching from five to one is now *non-utilitarian* because it minimizes the benefit. Similarly, switching from one to five is now utilitarian. From here on out, stories in which the result is deflected from *one person* to *five people* will be referred to as a 1→5 story; likewise, when the result is diverted from *five people* to *one person*, it is a 5→1 story.

Other measures employed this study include a general measure of receptive language (the Peabody Picture Vocabulary Test; PPVT-III; Dunn & Dunn, 1997), a measure of working memory (the Backwards Digit Span), and two tests of belief understanding (Theory of Mind; the Unexpected Contents and the Change of Location). The PPVT is designed to measure receptive language (i.e. language comprehension, rather than language production), and was included to control for possible variability in language skills. The Backwards Digit Span was administered to control for variability in working memory—the ability to hold and manipulate information in one's mind. The tests of ToM are to examine the relation between ToM and moral cognition. All tasks will be described in further detail in the *Methods* section.

One aim of this study was to compare the positive outcome stories with the negative ones: do children show similar judgments for positive utilitarian outcomes and negative ones? Another goal of the study is to replicate the findings of previous traditional trolley dilemma research with children (e.g. Pellizzoni et al., 2010).

Hypotheses

1. First, I expect the child participants to make similar judgments on the negative utilitarian dilemmas as is found in the child literature (e.g. Pellizzoni et al., 2010). Thus, it is expected that children will rate negative 5→1 stories as utilitarian compared to negative 1→5 stories (i.e., say that the character did something relatively more good for the utilitarian option than the non-utilitarian option). The Pellizzoni study is the closest comparable one to mine in terms of methodology (both used multiple stories presented with pictures of Lego/Playmobil people). As Pellizzoni et al. (2010) found that children aged 3-5 years old followed utilitarian principles, I expect participants in my study (who are older and presumably more cognitively and morally developed) to show similar results.
2. I also expect that children will answer in a manner consistent with utilitarianism on positive outcome utilitarian stories (i.e., they will rate positive 1→5 as more good than positive 5→1); however, the degree may differ between positive and negative conditions with the same outcome valence. For example, it is plausible that giving one child a snack rather than five children will be judged as less negative than taking a snack away from five children rather than one child, despite them being equal in terms of utilitarian outcome (one child ends with a snack; five children end with no snack). I do not expect utilitarian judgments for stories with non-utilitarian outcomes (negative 1→5 and positive 5→1). That is, for stories in which 5 people are harmed (rather than 1) or 1 person is helped (rather than 5), I do not expect participants to rate the actor more positively. Overall, utilitarian stories will be rated higher than their non-utilitarian counterparts.

Methods

Participants

Participants (N = 12; 7 female) were recruited from daycares and after-school programs[2]. All participants were 5 or 6 years old at the time of testing (in Session 1; mean age = 5 years 10 months). Participants were not screened for any factors other than age (e.g. sex, parents' socioeconomic status, etc.). The experimenter tested the participants in a quiet corner of the daycare room, or in an adjacent room with the door open. Parents of the participants provided written, informed consent (see Appendix B for consent form), and the children provided verbal assent, prior to participating.

Materials and Procedure

Participants were tested in two sessions, approximately 15-20 minutes in length and approximately one week apart. Four test stories were administered in session 1, and four in session 2. Screener stories (details below) were administered at the beginning of session 1. Other cognitive measures were divided between session 1 and 2 ("unexpected contents" and the Backwards Digit Span in session 1; "change of location" and the PPVT in session 2).

Three brief screener stories were used to ensure that participants could distinguish between stereotypically "good" or "bad" actions (Andrews, 2015), and to familiarize them with the moral judgment scales employed in this study. One scene involved a child taking a ball from

[2]Prior to April 5, 2017, only 3 of 47 daycares (12 participants) had agreed to participate in my study. Since then, 3 more daycares have granted permission, but data collection for those participants will not be completed before the submission of this thesis. Data collection will continue into the summer to finish the study.

another child without asking permission (bad). Another involved a child who shared her Crayons with another child (good). The last one involved a child who just plays with a car at daycare (neutral). Scenes were depicted using two pictures (4'x 6') of Playmobil characters acting out the stories, which were shown as the experimenter read the story aloud (see Appendix D for screener stories). All stories were accompanied by two comprehension questions and two moral judgment questions. The comprehension questions were to ensure that participants could follow along with a simple story. If the answers were incorrect, participants were reminded about the events of the story and asked the questions again, up to three times. The moral judgment asked children if the characters were 'good' and 'bad', and if they were answered in the affirmative, were followed up with questions regarding 'how good' or 'how bad' they were ("good" and "bad" questions were counterbalanced).

Another function of the screener stories was to familiarize participants with the rating scale used for moral judgment questions. We used a variation of a 5-point Likert scale to measure moral judgments (-2 to +2). For the "good" question, 'no' was scored as 0, 'a little' was scored as +1, and 'a lot' was scored as +2. For the "bad" question, 'no' was scored as 0, 'a little' was scored as -1, and 'a lot' was scored as -2. Different combinations of answers add up to final scores ranging from -2 ('no' for "good"; 'a lot' for "bad") to +2 ('a lot' for "good"; 'no' for "bad"). The other screener stories can be found in Appendix D. Screener story 1 ("bad"), with questions:

"This is Jordan and this is Alex. Jordan is playing with a ball. Alex sees the ball and he wants it so, Alex comes along and takes the ball away from Jordan without even asking."

Comprehension 1: Were they flying a kite? Yes/No

Comprehension 2: Did Alex take the ball away from Jordan? Yes/No

Moral Judgment 1: Think about Alex. Was he being good? Yes/No

If yes: How good, a little or a lot?	Little/Lot
Moral Judgment 2: Think about Alex. Was he being bad?	Yes/No
If yes: How bad, a little or a lot?	Little/Lot

Regardless of how children responded on these stories, they continued on the main test stories.

There were eight test stories, which were administered to all participants. The stories varied on three factors: outcome valence (positive vs. negative); utility (outcome switched from 5 children to 1 child vs. outcome switched from 1 child to 5); and the animacy of the "trolley" (a human taking away snacks vs. a toy truck knocking over a block tower). The study had a 2x2 within-groups design, with outcome valence and utility being the crossed factors. I attempted to have solely inanimate "trolleys" (as in the original dilemma), but it was very difficult to even come up with four plausible and child-appropriate situations with inanimate causes. However, I wanted more than one story per condition; as a result, half of the stories have animate (i.e. human) "trolleys". This factor also varies within-participant (each child received an equal number of animate/inanimate stories, per valence/utility combination).

The original dilemmas and variations have trains, but I did not want to use trains in all of my stories, because the stories would be quite repetitive. I attempted to make all of the stories take place in a setting that would be familiar to the children (e.g. a daycare room or a park). Furthermore, I wanted the stories to differ in terms of content, to reduce possible confounds. Half of the children received all the positive outcome stories in session 1, and half received negative outcome stories first. Half of the participants received the 5→1 stories first in each valence category. Finally, half received the animate stories first in each utility (5→1/1→5) pair. This corresponds to eight possible orders of presentation, with four administered in session 1, and four administered in session 2. See Table 1.

2 x 2 Design		**Valence**	
		Positive	Negative
Utility	5 → 1	Animate Inanimate	Animate Inanimate
	1→5	Animate Inanimate	Animate Inanimate

Table 1: 2 x 2 experimental design; valence x number, and animacy pairs.

For example, what follows is a negative outcome story, with an animate "trolley", in which one person is affected, with comprehension questions. Corresponding text appears below each picture. Questions always have two possible answers (e.g. "1" or "5"); possible answers displayed like "1/5". A reminder of the salient story details is presented immediately before the moral judgment questions:

"It's time to play at daycare. Look, this room has 2 sets of Lego, and the kids are playing with them. Five friends are playing with Lego at the activity table, and 1 friend is playing with Lego in the toy area."

"Another teacher comes from next door to take one set of Lego away from this room because they are only supposed to have 1 set. She hasn't looked around the room, so she doesn't know who is playing with Lego. She decides that she is going to take the Lego from the activity table."

“Suzie just saw the kids playing and she knows that 5 friends are playing with Lego at the activity table, but only 1 friend is playing with Lego in the toy area.”

“The next door teacher says, ‘I am going to take the Lego from the activity table’. Suzie tells the teacher that she should take the Lego from the toy area instead. One friend is playing with the Lego there.”

"The teacher was going to take the Lego from the activity table, but instead she takes the Lego from the toy area. One friend loses their Lego."

Comprehension 1: Think about the next-door teacher before Suzie talked to her [point to her in the relevant photo]. Was she going to take the Lego from 1 friend or 5 friends? Yes/No

Comprehension 2: Did Suzie know that? Yes/No

Comprehension 3: Think about the next-door teacher after Suzie talked to her. Was she going to take the Lego from 1 friend or 5 friends? 1/5

Comprehension 4: Did Suzie know that? Yes/No

Comprehension 5: So, how many friends lost their Lego? 1/5

"Remember, the next-door teacher was going to take the Lego from 5 friends at the activity table, but Suzie told her to take the Lego from 1 friend at the toy area. Let's think about what Suzie did."

Moral Judgment 1: Was it good? Yes/No

If yes: How good, a little or a lot? Little/Lot

Moral Judgment 2: Was it bad? Yes/No

If yes: How bad, a little or a lot? Little/Lot

This story is directly analogous to the switch dilemma in the original trolley dilemmas (the child character (Suzie) is the "train operator", with the next door teacher as the "train", and telling the teacher to change course is the "switch"). Five children are about to be negatively affected (they will have their Lego taken away), but the agent diverts the harm to one child instead (telling the teacher to take the Lego from that toy area instead). There are two stories with this format, and two reverse dilemmas, in which the harm is diverted from one child to five children (opposite utility). The same conditions are applied to the positive outcome story. All stories can be found in Appendix E.

As with the screener stories, test stories were read aloud by the experimenter, and presented with pictures of Playmobil models. Test stories had five pictures each, rather than two like in the screeners, due to the increased length and complexity of the stories. Similarly, more comprehension questions were included to account for the greater complexity. Understanding of the main character's knowledge was crucial to the moral judgments, so comprehension questions focused on the actor's train of thought. Five comprehension questions were administered, and asked up to 3 times each (with reminders of relevant story content before each repeated question). The number of errors was tracked to assess comprehension. A reminder of the main character's actions then preceded two moral judgment questions, which assessed the participants' judgments of the character's actions as good or bad, and how good or bad (a little/a lot). Just as in the screener stories, the moral judgments produced a moral score ranging from -2 (very bad; not good) to +2 (very good; not bad).

False belief (Theory of Mind) tasks were administered to participants in order to test the relation between mental state reasoning and moral judgments. Also, the participant needed to understand the knowledge states of the main character in order to properly judge his or her actions. The two false beliefs tasks used were the Change of Location task (Onishi & Baillargeon, 2005) and the Unexpected Contents task (Gopnik & Astington, 1988). The Change of Location task (Appendix F) begins with a Playmobil girl (Jill) playing with a soccer ball next to two boxes, one white and one polka-dotted. Jill places her ball in the white box and leaves to do something else. While Jill is gone, Peter comes along and moves the ball to the polka-dot box. The participant was then asked where Jill initially put the ball (correct answer: white box), where the ball is now (polka-dot box), and the false belief test question, "Where Jill will look for the ball?" (white box). Participants who were able to correctly answer the last question demonstrated belief reasoning (understanding that Jill was unaware of the location change) and could correctly predict her behaviour based on her beliefs. Participants received a point if they had answered all questions correctly.

In the Unexpected Contents task (Appendix G), the participant was shown a Crayon box and was asked what is inside. When the child predictably answered "Crayons" (or "colours", or the like), the experimenter opened it up and removed a toy pig. The experimenter then put the pig back inside and asked the child what was in the box (a pig), what the kid *thought* was in the box *before* it was opened (Crayons), and the test question, "What will [another child] will think is in the box *before* we open it?" (Crayons). In order to understand that the next child will not know about the pig, the participant must think about the state of knowledge of another person. Again, this is demonstrating Theory of Mind: participants must think beyond their own knowledge and realize that others do not necessarily possess the information that they do.

Participants receive a point for correctly answering that they originally thought there would be crayons (or whatever they had said) and a point for saying that another child would give that original answer (or crayons), for a total of 0-2 points. The scores on the two False Belief tasks were summed for total score out of 3.

The test stories we administered were fairly complex; therefore, a measure of working memory was administered to account for potential variability in experiment results. We administered the Backwards Digit Span task (Appendix H) to measure working memory in the participants. It is possible that variation in moral judgments is explained by differences in working memory (i.e. some children were not able to hold all the story information in mind, and thus had different results on story questions). The experimenter read aloud strings of digits, one digit per second. The participants were instructed to listen to the strings of digits, and then to repeat them in *backwards* order. The strings started at two digits in length, and increased up to six digits if the participants were successful. There were two 2-digit strings, two 3-digit strings, and so on. If the participant was successful on at least one string of a given length, then they proceeded to the next length, until they made an error on both strings of a given length. Participants receive a score of 1 for each correct string, and scores are summed for a total score from 0 - 12.

Language ability is another variable that was controlled for in this study. Because the stories were complex, a certain level of receptive language ability (language understanding) was required in order to understand the story contents. Young children often vary on their English language ability, especially those who grow up in a bilingual household, or who do not have English as their first language. As with working memory, differences on moral judgment results may be explained by differences in language comprehension. I used the Peabody Picture

Vocabulary Test (PPVT-3; Dunn & Dunn, 1997; Appendix I) to measure the language abilities of participants. The PPVT measures *receptive language*, or the ability to understand (rather than produce) language. The experimenter had a flip-board-style booklet oriented so that one side was facing the participant. On each page of the booklet facing the participant, there were four pictures of objects or simple scenes (e.g. a cat, a ball, a spoon, and a bird). The experimenter read a word aloud (e.g. "cat"), and the participant had to point to the picture that corresponded best to that word. Each segment had 12 pages (and thus 12 words); participants continued until they made eight errors on one segment. Each segment had an age associated with it, which approximated the difficulty of the vocabulary words in that segment. Participants began at the segment corresponding to their age and progressed until they make eight errors on one segment of 12. As well, the participant must make one or fewer errors on at least one segment (termed "basal"). Segments lower than the child's age might be administered if this criteria is not met. The final score was determined by subtracting the total number of errors from the basal segment to the final segment from the number of the last word in the final segment (e.g. if the child makes 8 errors on segment 9, their final word will be number 108 (9 x 12); if the basal was segment 3, all errors from segments 3 to 9 will be subtracted from 108). Testing continued until the participant made 8 errors on a segment (although the segment is still completed regardless of number of errors). Children's raw scores (total number of correct items before the task was terminated) were used in the analyses.

Results and Discussion

Due to a lack of participants, I am not yet able to run a statistical analysis on the data I have collected. Rather, this section will be devoted to the qualitative analyses of the results I do

have (including some interpretation and discussion), as well as an indication of the analyses that would have been run had there had been a sufficiently large sample.

Before turning to children's responses to the key questions (the moral judgment evaluations), I first examined the difficulty level of the stories. Based on the 12 participants who have completed the study, it does not seem that the stories were too difficult for participants to comprehend. Each story had five comprehension questions, and if a participant made an error, they were reminded of the salient story details and then asked the question again, up to a maximum of three times. Overall, participants on average made fewer than one comprehension error per story, and no story had an average of more than one error per participant. Similarly, no participant required more than two attempts before correctly answering any comprehension questions. This suggests that results of moral judgment questions were not affected by misinterpretation of story details.

Although only 12 participants had participated at the time of writing, some trends emerged in the results that are worth discussing, despite the lack of statistical validity. My hypotheses were that participants would demonstrate utilitarian moral judgments on both negative and positive stories. More specifically, I had predicted that: (1) characters in the negative 5→1 stories (utilitarian) would be judged as better (morally) than would characters in the negative 1→5 stories (non-utilitarian); and (2) characters in the positive 1→5 stories (utilitarian) would be judged more favourably than those in the positive 5→1 stories (non-utilitarian). However, participants did not show utilitarian judgments. The mean score for moral judgments (possible range: -2 to +2) for negative utilitarian stories was -0.55, and the mean score for negative non-utilitarian stories was -0.45. The mean score for positive utilitarian stories was +0.27, and the mean score for positive non-utilitarian stories was +1.36. The combined utilitarian

story mean score was -0.09, and the combined non-utilitarian story mean score was +0.41. Although these differences are not statically significant given the small sample size, the results suggest that children aged 5-6 years old do not reliably use utilitarian reasoning when making moral judgments (only 1 participant out of 12 was consistently utilitarian). In fact, participants often seemed to exhibit the opposite reasoning: non-utilitarian stories were scored higher overall, and especially for positive outcome stories. However, these differences were not tested for significant differences. Early results suggest that neither of my hypotheses were supported.

The qualitative examination of the responses is consistent with participants making their moral judgments based on the valence (positive or negative) of the outcome. The average score for negative outcome stories was -0.50, and the average score for positive stories was +0.82. This suggests that children at this age may not be able to make cost-benefit analyses (as previously suggested in Powell et al., 2012). In other words, children may not fully comprehend that one child receiving ice cream came at the expense of the other five children. They may instead focus on the outcome for the child or children who are ultimately affected, without taking into consideration the children who are not affected. Thus, they judge more harshly those characters who bring about a negative outcome. It is important to note that no predictions were made about the relative mean scores of positive utilitarian vs. negative utilitarian stories, while it was expected that differences in outcome and story content would have an impact on children's responses.

If I had met my participant sample size target (of 60 participants), before turning to the main analyses, preliminary examination of the data would have been checked to make sure that the assumptions were met for the planned analyses (e.g., roughly equal sample sizes per age group; Tabachnick & Fidell, 2007). Further, preliminary examination of the data would check

for order effects, for factors such as story order (a between-subject variable) and question order (the moral judgment questions, with 'good' or 'bad' either first or second). After this, I would go on to my main analyses (ANOVA).

In order to investigate the main hypotheses, an Analysis of Variance (ANOVA) would have been conducted. The between-subject factor would be age (5- vs. 6-year-olds) and the within-subject factors would be outcome valence (positive vs. negative) and utility (utilitarian vs. non-utilitarian scenarios). This would allow me to test for differences between positive utilitarian and positive non-utilitarian stories, as well as negative utilitarian and negative non-utilitarian stories. I would also be able to test for significance for all utilitarian stories vs. all non-utilitarian stories, and all positive stories vs. all negative stories. This would allow me to determine whether the utility or the valence of the outcome had a more significant impact on participants' moral judgments. Further, it would also test for any interactions between the two factors.

This study—when completed—will introduce new ideas into the child moral psychology literature, namely positive outcome trolley dilemmas. I examined phenomena that had not been studied before, with the hopes of broadening the scope of research with trolley-style dilemmas and moral judgments. This study can serve as a jumping-off point for studying utilitarian judgments using thought experiments with a positive outcome. It will also serve as the first comparison between positive and negative outcome stories from a utilitarian moral judgment perspective; as far as I am aware, no study has examined differences in behaviour for outcomes of different valence, in the adult or child literature. This study introduces a new direction of research regarding utilitarian judgments with children, which can be readily applied to adults as well.

There were several potential limitations associated with the design of my experiment. However, given the small sample size, it is difficult to know whether the findings (such as they are now) are indicative of the final findings (once the full sample has been collected and analyzed). However, I will discuss potential limitations based on the data collected thus far. First and foremost, it is unclear whether the stories I used were the best way to capture the phenomena I was looking for. Because a study involving positive outcomes had not been reported in the literature, there was no reference to follow. Most previous studies had two total stories, with some having three or four at most, depending on the manipulations. Even then, the only difference between them was number of people affected (e.g. Powell et al., 2012) or the outcome. No study in the literature reports even four stories with significantly different content, whereas my study had eight. While this is not a limitation itself, having a greater number of stories increases the likelihood that there will be differences between them. Stories with different content are less likely to be similar to one another. It was very challenging to create eight plausible and similar stories, because "switch" scenarios are not common in everyday situations. Other than the one story with an actual train and switch, the stories were all approximations of the trolley dilemma with metaphorical trolleys and switches. In fact, half of the stories have people as the trolleys, because it was so challenging to come up with stories with inanimate objects being diverted. However, once the study is complete, I will be able to determine if the story content had an impact on the moral judgment results either individually or based on a certain factor such as animacy or setting (classroom vs. outside).

One possible confound due to story content is that animate "trolleys" may not be perceived the same as inanimate ones. Because such trolleys are people, participants may assign knowledge or agency to them. For example, in the story outlined in the *Methods* section,

participants may think that the teacher is able to make her own choices, and assign less praise or blame for the outcome to the main character. I tried to preclude for this by making the animate agents ignorant of the potential outcomes (e.g., the teacher did not know which play area had 5 vs. 1 child, see *Methods* or Appendix E for full story details). As well, it is difficult to know whether the positive outcomes were equivalent to the negative outcomes; in other words, it is not clear whether, if the positive stories are +1.0 on average, the negative ones are matched for absolute value, or perhaps differ (e.g., -0.5 or -1.5). Differences in the absolute value of the story outcomes could lead to varying results. Again, once the study is complete, I can examine children's responses within story valence/utility combinations (e.g., positive utilitarian outcome) and by animation type (animate vs. inanimate). This will add to our understanding of the different factors that go into children's moral judgments. Factors such as physical contact and intention have been studied extensively in the literature (as was discussed in previous sections), but animacy and outcome valence have not. It is not clear how these factors impact how children make (or do not make) utilitarian moral judgments.

Given that my very preliminary findings are inconsistent with Pellizzoni et al. (2010), more research needs to be conducted with traditional trolley dilemmas with this age group. Findings from the literature (e.g. Pellizzoni et al.,2010; Powell et al., 2012; Stey, 2014) are not consistent, and our results would support Stey (2014) and Powell et al. (2012) but not confirm anything. Utilitarian moral judgments in children have not been studied extensively, and results have been inconsistent thus far. However, my study, once completed, has the potential to answer some of the lingering questions in this area.

Several lines of inquiry are needed to address the inconsistencies within the literature, as well as the questions raised by my study. More research is needed to reach a consensus regarding

traditional negative trolley dilemmas. Similarly, future research needs to build off my study regarding positive trolley dilemmas, and positive outcome utilitarian moral judgments in general. This is a new area of research in the moral development literature, but may shed light on how children judge others. Positive utilitarian judgments could also explain the discrepancies in the literature regarding traditional trolley dilemmas in children. Perhaps differences found in positive outcome studies will be relevant to traditional negative utilitarian judgments.

My study set out to examine positive and negative trolley-style dilemmas in 5- and 6-year-old children. My hypotheses were that children in this age range would show utilitarian tendencies for both positive and negative outcome stories. The sample size is too small for quantitative statistical analysis, so while preliminary qualitative results show that my hypotheses were not supported, it is too early to draw any firm conclusions. Children show a greater difference based on the valence (positive or negative) of the outcome than they do based on the number of people affected by the outcome. However, once complete, this study has the potential to add to the literature regarding child moral judgments, and specifically utilitarian moral judgments. It may help to support the findings of Pellizzoni et al. (2010), or Powell et al. (2012) and Stey (2014), which currently show conflicting results. This study could answer several current questions in the literature, or at least support one side of the debate about whether children follow utilitarian principles. It will also introduce new ideas (positive utilitarian judgments) and pave the way for new directions of study in child moral psychology.

References

Andrews, K. (2015). Preschoolers' development of intent-based moral judgment and the role of theory of mind. *Thesis: Carleton University. Ottawa, Ontario.*

Ball, C., Smetana, J. & Sturge-Apple, M. (2016). Following my head and my heart: Integrating preschoolers' empathy, theory of mind, and moral judgments. *Child Development, 88(2),* 597-611.

Baron, J. & Ritov, I. (2004). Omission bias, individual differences, and normality. *Organizational Behaviour and Human Decision Processes, 94,* 74-85.

Cote, S., Piff, P. & Willer, R. (2013). For whom do the ends justify the means? Social class and utilitarian moral judgment. *Journal of Personality and Social Psychology, 104(3),* 490-503.

Cushman, F., Sheketoff, R., Wharton, S. & Carey, S. (2013). The development of intent-based moral judgment. *Cognition, 127,* 6-21.

Dunn, L. & Dunn, L. (1997). The PPVT-III: Peabody Picture Vocabulary Test. Third Edition. American Guidance Service, Circle Pines, MN.

Dunn, J., Cutting, A. & Demetriou, H. (2000). Moral sensibility, understanding others, and children's friendship interactions in the preschool period. *British Journal of Developmental Psychology, 18,* 159-177.

Foot, P. (1967). The problem of abortion and the doctrine of double effect. *Oxford Review, 5,* 5-15.

Frye, D., Zelazo, P. & Palfai, T. (1995). Theory of mind and rule-based reasoning. *Cognitive Development, 10,* 483-527.

Gopnik, A. & Astington, J. (1988). Children's understanding of representational change and its relation to the understanding of false belief and the appearance-reality distinction. *Child Development, 59,* 26–37.

Greene, J., Cushman, F., Stewart, L., Lowenberg, K., Nystrom, L. & Cohen, J. (2009). Pushing moral buttons: The interaction between personal force and intention in moral judgment. *Cognition, 111,* 364-371.

Greene, J., Sommerville, R., Nystrom, L., Darley, J. & Cohen, J. (2001). An fMRI investigation of emotional engagement in moral judgment. *Science, 293,* 2105-2108.

Kahane, G. (2015). Sidetracked by trolleys: Why sacrificial moral dilemmas tell us little (or nothing) about utilitarian judgment. *Social Neuroscience, 10(5),* 551-560.

Knobe, J. (2003). Intentional action and side effects in ordinary language. *Analysis, 63*(3), 190-193.

Lanteri, A., Chelini, C. & Rizzello, S. (2008). An experimental investigation of emotions and reasoning in the trolley problem. *Journal of Business Ethics, 83,* 789-804.

Leslie, A., Knobe, J. & Cohen, A. (2006). Acting intentionally and the side-effect effect. *Psychological Science, 17*(5), 420-427.

Nobes, G., Panagiotaki, G & Pawson, C. (2009). The influence of negligence, intention, and outcome on children's moral judgments. *Journal of Experimental Child Psychology, 104,* 382-397.

Onishi, K. & Baillargeon, R. (2005). Do 15-month-old infants understand false beliefs? *Science, 308,* 255-258.

Pellizzoni, S., Siegal, M. & Suiran, L. (2010). The contact principle and utilitarian judgments in young children. *Developmental Science, 13(2),* 265-270.

Powell, N., Derbyshire, S. & Guttentag, R. (2012). Biases in children's and adults' moral judgments. *Journal of Experimental Child Psychology, 133,* 186-193.

Royzman, E. & Baron, J. (2002). The preference for indirect harm. *Social Justice Research, 15(2),* 165-184.

Saunders, K. (2010). The principle of double effect and preschoolers' moral intuitions. *Thesis: Rutgers, The State University of New Jersey. New Brunswick, New Jersey.*

Stey, P. (2014). Bayesian analysis of children's moral judgements on the trolley cases. *Thesis: The University of Notre Dame. Notre Dame, Indiana.*

Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics*. Boston: Pearson/Allyn & Bacon.

Thompson, J. (1976). Killing, letting die, and the trolley problem. *The Monist: Philosophical Problems of Death, 59(2),* 204-217.

Thompson, J. (1985). The trolley problem. *The Yale Law Journal, 94(6),* 1395-1415.

Wellman, H., Cross, D. & Watson, J. (2001). Meta-analysis of theory-of-mind development: The truth about false belief. *Child Development, 72(3),* 655-684.

Zaitchik, D. (1991). Is only seeing really believing? Sources of the true belief in the false belief task. *Cognitive Development, 6,* 91-103.

Appendices

Appendix A: Informed Consent form for Program Director

Carleton UNIVERSITY
Canada's Capital University

Children's Representational Development Lab
www.carleton.ca/crdl

Fall 2016/Winter 2017

Dear Program Coordinator,

As part of a current project on children's cognitive development, we are talking to children to learn about their developing moral reasoning. The study has been approved by the Carleton University Research Ethics Board-B (approval number #106087; valid until 08/31/2017). In this letter, we will describe the project and request your permission for your centre's participation.

Should you wish to participate in the current project, we will provide you with individual informed consent letters to distribute to the parent(s) or guardian(s) of the four- and five-year-old children in your centre. Once consent letters have been returned to you from parents, we will arrange a convenient time for you to have our researchers at your center to conduct the study. The researchers are university students with current police record checks and copies of these documents will be provided to the daycare director before we commence any interviews with your child. The researchers will also be sensitive to the children at all times.

Children will hear a number of stories involving one character that makes a decision that positively or negatively impacts a child or a group of children. The impacts are never physical or psychological harm to a story character, but instead take the form of getting a ball to play with, or having a Lego tower knocked down. Children will then be asked about the story character (e.g., whether they did something good or bad). We are interested in whether children think about the number of characters that are impacted by the decision, and if it influences their judgments of the principal story character. We will also play games that measure related skills such as working memory and vocabulary. Children usually enjoy these kinds of activities and will be given stickers as thanks (even if they stop playing part-way through). We will also provide enough stickers for all children in the participating classrooms to the daycare, so that all children get some, even if their parents have not consented to their participation.

We will meet with each child twice, for approximately 20 minutes each time. Participation in this experiment is completely *voluntary*. Children will be asked if they want to participate, and if they don't, they will not be pressured into participating. Children can stop playing at any time during the session and will still receive their stickers.

The information collected in this study is confidential and will be coded such that a child's name is not associated with their responses. The information provided will be used for research purposes only, and will only be accessible to the researchers directly involved in the project. The consent form will be kept separate from the data in a locked cabinet and will be destroyed after 2 years. The datafile and hard-copies of data, though they do not include identifying information, are stored on a password protected computer (the datafile) and in a locked room (the hard copies). As soon as we have finished talking with all of the children that will be participating in the study, we will remove the file linking the children's names to their identification numbers used in the datafile. In other words, it will no longer be possible to identify an individual child's responses (the data will be anonymized). As a result, participants will no longer be able to withdraw their data. We expect that this will occur in April 2017. Analyses presented in presentations or written publications will only contain group data, with no identification of individuals who participated in this study.

The research supervisor of this project is Dr. Deepthi Kamawar and she may be reached at 613-520-2600, ext. 7021 or deepthi.kamawar@carleton.ca. The primary researcher involved in this project is Kunio Hessel (Honours Student, Cognitive Science program), and he can be reached by email at kunio.hessel@carleton.ca. Two additional graduate students, Sarah Gardiner (sarah.gardiner@carleton.ca) and Audrey Brown (audrey.brown@carleton.ca) will also be assisting.

This study has been approved by Carleton University's Research Ethics Board-B (ethics protocol number: #106087) and has been deemed minimal risk. Some participants may find a particular task taxing, which could cause them to become upset. In those rare cases, children are dealt with in a very sensitive manner (told that we're all done, thanked for doing a great job) and taken back to their teachers. We have used similar tasks with children in the same age ranges over the past 13 years and found this reaction to be extremely rare. If you have any ethical concerns about this study, please contact: Dr. Andy Adler, Chair, Carleton University Research Ethics Board-B (ethics@carleton.ca or 613-520-2600 ext. 4085). You may also contact the Carleton University Research Compliance Office at ethics@carleton.ca.

Your consent is required for your centre's participation in this project. Kindly sign the attached consent form indicating whether we may provide you with individual consent forms for parents or guardians of children within this age range in your centre. If you would like a summary of the research results once the study is completed, please contact Kunio Hessel. However, please note that individual feedback regarding the children cannot be provided.

Thank you for your consideration.

Sincerely,

Deepthi Kamawar, PhD
Associate Professor
Psychology/Cognitive Science

Kunio Hessel
Honours Student
Cognitive Science

Carleton University Study – Children's Moral Reasoning

The information collected for this project is confidential and protected under the Provincial Freedom of Information and Protection of Privacy Act.

I have read the attached description of the study of *Children's Moral Reasoning* and I understand the conditions of my child care centre's participation.

I understand that the study will require two 20-minute testing sessions, with children of appropriate ages, whose parents/guardians have given written consent for their children's participation in the research project.

Name of Centre: _____

Address: _____

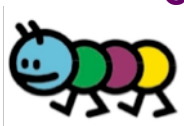
_____

Signature: _____ Date: _____

Name & Title: _____

Appendix B: Informed Consent form for Parents or Guardians

Carleton UNIVERSITY
Canada's Capital University



Children's Representational Development Lab
www.carleton.ca/crdl

Fall 2016/Winter 2017

Dear parent(s) or guardian(s),

As part of a current project on children's cognitive and moral development, we are talking to children to learn about their developing ability to use information about how many people were impacted by a decision when judging the decision-maker. The study has been approved by the Carleton University Research Ethics Board-B (approval number #106087; valid until 08/31/2017). In this letter, we will describe the project and request your permission for your child to participate. The purpose of an informed consent is to ensure that you understand the purpose of the study and the nature of your child's involvement.

Children will hear a number of stories involving one character that makes a decision that positively or negatively impacts a child or a group of children. The impacts are never physical or psychological harm to a story character, but instead take the form of getting a ball to play with, or having a Lego tower knocked down. Children will then be asked about the story character (e.g., whether they did something good or bad). We are interested in whether children think about the number of characters that are impacted by the decision, and if it influences their judgments of the principal story character. We will also play games that measure related skills such as working memory and vocabulary. Children usually enjoy these kinds of activities and will be given stickers as thanks (even if they stop playing part-way through). We will also provide enough stickers for all children in the participating classrooms to the daycare, so that all children get some, even if their parents have not consented to their participation.

We will meet with each child twice, for approximately 20 minutes each time. Participation in this experiment is completely *voluntary*. Children will be asked if they want to participate, and if they don't, they will not be pressured into participating. Children can stop playing at any time during the session and will still receive their stickers. The researchers all have current police record checks, and copies of these documents will be provided to the child care centre coordinator before we commence any interviews with your child. The researchers will also be sensitive to the children at all times. Children can stop playing at any time during the session and will still receive their stickers.

The information collected in this study is confidential and will be coded such that a child's name is not associated with their responses. The information provided will be used for research purposes only, and will only be accessible to the researchers directly involved in the project. The consent form will be kept separate from the data in a locked cabinet and will be destroyed after 2 years. The datafile and hard-copies of data, though they do not include identifying information, are stored on a password protected computer (the datafile) and in a locked room (the hard copies). As soon as we have finished talking with all of the children that will be participating in the study, we will remove the file linking the children's

names to their identification numbers used in the datafile. In other words, it will no longer be possible to identify an individual child's responses (the data will be anonymized). As a result, participants will no longer be able to withdraw their data. We expect this to occur in April 2017. Analyses presented in presentations or written publications will only contain group data, with no identification of individuals who participated in this study.

The research supervisor of this project is Dr. Deepthi Kamawar and she may be reached at 613-520-2600, ext. 7021 or deepthi.kamawar@carleton.ca. The primary researcher involved in this project is Kunio Hessel (Honours Student, Cognitive Science program), and he can be reached by email at kunio.hessel@carleton.ca. Two additional graduate students, Sarah Gardiner (sarah.gardiner@carleton.ca) and Audrey Brown (audrey.brown@carleton.ca) will also be assisting.

This study has been approved by Carleton University's Research Ethics Board-B (ethics protocol number: #106087) and has been deemed minimal risk. Some participants may find a particular task taxing, which could cause them to become upset. In those rare cases, children are dealt with in a very sensitive manner (told that we're all done, thanked for doing a great job) and taken back to their teachers. We have used similar tasks with children in the same age ranges over the past 13 years and found this reaction to be extremely rare. If you have any ethical concerns about this study, please contact: Dr. Andy Adler, Chair, Carleton University Research Ethics Board-B (ethics@carleton.ca or 613-520-2600 ext. 4085). You may also contact the Carleton University Research Compliance Office at ethics@carleton.ca.

Your consent is required for your child's participation in this project. Kindly sign the attached consent form indicating whether your child may participate in this research and return it to your child's daycare. If you would like a summary of the research results once the study is completed, please contact Kunio Hessel. However, please note that individual feedback regarding the children cannot be provided.

Thank you for your consideration.

Sincerely,

Deepthi Kamawar, PhD
Associate Professor
Psychology/Cognitive Science

Kunio Hessel
Honours Student
Cognitive Science

Carleton University Study – Children's Moral Reasoning

The information collected for this project is confidential and protected under the Provincial Freedom of Information and Protection of Privacy Act.

I have read and understood the request for my child to participate in the study of *Children's Moral Reasoning*. I have discussed it with my child and ...

☐ I consent to my child's participation in the current study **[please fill out the next page]**

☐ I do not consent to my child's participation in the current study **[nothing more needs to be completed]**

Child's Name (please print): _____

Parent's/Guardian's Name (please print): _____

Signature: _____ Date: _____

Participant Information

If you have consented to your child participating on the previous page, please provide us with the following information about your child. If you have not provided consent, please do not fill out this page.

Please note: your child's name and birth date will be kept separate from their data and consent form, and only researchers directly involved in this project will have access to this information.

Child's Date of Birth: year _____ month _____ day _____

Please indicate the language(s) spoken at home and then please circle the ones that your child is

fluent in: _____ _____ _____

Appendix C: Ethics Certificates

Research Compliance Office
511 Tory | 1125 Colonel By Drive
Ottawa, Ontario K1S 5B6
613-520-2600 Ext: 4085
ethics@carleton.ca

CERTIFICATION OF INSTITUTIONAL ETHICS CLEARANCE

The Carleton University Research Ethics Board-B (CUREB-B) has granted ethics clearance for the research project described below and research may now proceed.

CUREB-B is constituted and operates in compliance with the *Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans* (TCPS2).

Ethics Protocol Clearance ID: Project # 106087

Faculty Supervisor: Mr. Kunio Hessel

Research Team:
Dr. Deepthi Kamawar (Research Supervisor)
Audrey Brown (Student Research Assistant)
Sarah Gardiner (Student Research Assistant)

Project Title: Children's Moral Reasoning [Kunio Hessel]

Funding Source:

Awards File No	Title	Status	
9264	Advanced theory of mind understanding	Active	CURO Awards

Effective: **December 16, 2016** Expires: **December 31, 2017**.

Restrictions:

This certification is subject to the following conditions:

1. Clearance is granted only for the research and purposes described in the application.
2. Any modification to the approved research must be submitted to CUREB-B via a Change to Protocol Form. All changes must be cleared prior to the continuance of the research.

Research Compliance Office
511 Tory | 1125 Colonel By Drive
| Ottawa, Ontario K1S 5B6
613-520-2600 Ext: 4085
ethics@carleton.ca

CERTIFICATION OF INSTITUTIONAL ETHICS CLEARANCE

The Carleton University Research Ethics Board-B (CUREB-B) has granted ethics clearance for the changes to protocol to research project described below and research may now proceed.

CUREB-B is constituted and operates in compliance with the *Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans* (TCPS2).

Ethics Clearance ID: Project # 106087

Principal Investigator: Mr. Kunio Hessel

Co-Investigator(s) (If applicable): **Mr. Kunio Hessel (Primary Investigator)**
Dr. Deepthi Kamawar (Research Supervisor)
Audrey Brown (Student Research Assistant)
Sarah Gardiner (Student Research Assistant)

Project Title: **Children's Moral Reasoning [Kunio Hessel]**

Funding Source:

Awards File No	Title	Status	
9264	Advanced theory of mind understanding	Active	CURO Awards

Effective: **March 09, 2017** Expires: **December 31, 2017**.

Please email the Research Compliance Coordinators at ethics@carleton.ca if you have any questions or if you require a clearance certificate with a signature.

CLEARED BY: **Date: March 09, 2017**

Andy Adler, PhD, Chair, CUREB-B

Appendix D: Screener Stories

Bolded answers indicate the correct answer for comprehension questions.

Screener 1:

This is Jordan and this is Alex. Jordan is playing with a ball. Alex sees the ball and he wants it so, Alex comes along and takes the ball away from Jordan without even asking.

Comprehension

1. Were they flying a kite? Yes/**No**

[If yes: "Remember, Jordan is playing with a ball"] up to 3X

2. Did Alex take the ball from Jordan? **Yes**/No

[If no: "Remember, Alex comes along and takes the ball away"] up to 3X

Moral Judgment

1. Think about Alex. Was he being good? Yes/No

(if yes) How good, a little or a lot? Little / a lot

2. Was he being bad? Yes/ No

(if yes) how bad, a little or a lot? Little/ a lot

Screener 2

This is Harper and this is Morgan. Harper is drawing a picture with her crayons. Then she sees that Morgan doesn't have anything to play with so Harper shares her crayons with Morgan. Now Morgan can draw a picture.

Comprehension

1. Were they eating a snack? Yes/**No**

[If yes: "Remember, Harper is drawing a picture with her crayons"] up to 3X

2. Did Harper share her crayons with Morgan? **Yes**/No

[If no: "Remember, Harper shares her crayons"] up to 3X

Moral Judgment

1. Think about Harper. Was she being good? Yes/No

(if yes) How good, a little or a lot? Little / a lot

2. Was Harper being bad? Yes/ No

(if yes) how bad, a little or a lot? Little/ a lot

Screener 3:

This is Payton and this is Quinn. It is play time at daycare so Payton plays with a toy car.

Comprehension

1. Were they taking a nap? Yes/**No**

[If yes: "Remember, it's play time so Payton decides to play with a toy"] up to 3X

2. Did Payton play with a toy? **Yes**/No

[If no: "Remember, it's play time so Payton plays with a toy car"] up to 3X

Moral Judgment

1. Think about Payton. Was she being good? Yes/No

(if yes) How good, a little or a lot? Little / a lot

2. Was Payton being bad? Yes/ No

(if yes) how bad, a little or a lot? Little/ a lot

Appendix E: Test Stories

Story 1: Positive outcome, 1→ 5, animate

"It's time to play outside at daycare. Look, both playgrounds are locked, and kids are waiting to play. One friend wants to play in the playground in front of the school, and 5 friends want to play in playground at the back of the school.

The teacher is going to open only one playground for the kids to play in. She hasn't seen outside, so she doesn't know where the kids are waiting. The teacher decides that she is going to open the playground in front of the school.

Johnny just came from outside and he knows that 5 friends are waiting to play in the back playground, but only 1 friend is waiting to play in the front playground.

The teacher says, "I am going to open the front playground". Johnny tells the teacher that she should open the back playground instead. Five friends are waiting to play there.

The teacher was going to the front playground, but instead she opened the back playground. Five friends get to play."

Comprehension

1) Think about the teacher before Johnny talked to her. Was she going to open the playground for 1 friend or 5 friends?

2) Did Johnny know that?

3) Think about the teacher after Johnny talked to her. Was she going to open the playground for 1 friend or 5 friends?

4) Did Johnny know that?

5) So, how many friends got to play in the playground?

"Remember, the teacher was going to open the front playground for 1 friend, but Johnny told her to open the back playground for 5 friends. Let's think about what Johnny did."

Moral Judgment

1) Was it good?

(if yes) How good, a little or a lot?

2) Was it bad?

(if yes) How bad, a little or a lot

Story 2: Negative Outcome, 5→1, animate

"It's time to play at daycare. Look, this room has 2 sets of Lego, and the kids are playing with them. Five friends are playing with Lego at the activity table, and 1 friend is playing with Lego in the toy area.

Another teacher comes from next door to take one set of Lego away from this room because they are only supposed to have 1 set. She hasn't looked around the room, so she doesn't know who is playing with Lego. She decides that she is going to take the Lego from the activity table.

Suzie just saw the kids playing and she knows that 5 friends are playing with Lego at the activity table, but only 1 friend is playing with Lego in the toy area.

The next door teacher says, "I am going to take the Lego from the activity table". Suzie tells the teacher that she should take the Lego from the toy area instead. One friend is playing with the Lego there.

The teacher was going to take the Lego from the activity table, but instead she takes the Lego from the toy area. 1 friend loses their Lego."

Comprehension

1) Think about the next door teacher before Suzie talked to her. Was she going take the Lego from 1 friend or 5 friends?

2) Did Suzie know that?

3) Think about the next door teacher after Suzie talked to her. Was she going to take the Lego from 1 friend or 5 friends?

4) Did Suzie know that?

5) So, how many friends lost their Lego?

"Remember, the next door teacher was going to take the Lego from 5 friends at the activity table, but Suzie told her to take the Lego from 1 friend at the toy area. Let's think about what Suzie did."

Moral Judgment

1) Was it good?

(if yes) How good, a little or a lot?

2) Was it bad?

(if yes) How bad, a little or a lot?

Story 3: Positive Outcome, 5→1, animate

"It's a hot day, and these kids are playing in 2 nearby parks. Look, the kids have money to buy ice cream, but there isn't an ice cream truck at the parks. Five kids are playing at the soccer park, and 1 kid is playing at the baseball park.

This ice cream truck is going to go to one more park before the end of the day. The driver doesn't know how many kids are at each park. He decides to go to the soccer park.

Rachel has just been to both parks, and she knows that 5 friends want ice cream at the soccer park, and 1 friend wants ice cream at the baseball park.

The ice cream truck driver says out loud, "I am going to go to the soccer park." Rachel tells the driver that he should go to the baseball park instead. One friend is waiting there.

The ice cream truck was going to go to the soccer park, but instead he went to the baseball park. One friend gets to have ice cream."

Comprehension

1) Think about the ice cream truck driver before Rachel talked to him. Was he going to the park with 1 friend or 5 friends?

2) Did Rachel know that?

3) Think about the ice cream truck driver after Rachel talked to him. Was he going to the park with 1 friend or 5 friends?

4) Did Rachel know that?

5) So, how many friends got to buy ice cream?

"Remember, the ice cream truck driver was going to the soccer park with 5 friends, but Rachel told him to go to the baseball park with 1 friend. Let's think about what Rachel did."

Moral Judgment

1) Was it good?

(if yes) How good, a little or a lot?

2) Was it bad?

(if yes) How bad, a little or a lot?

Story 4: Negative Outcome, 1→5, animate

"It's time to have some fruit at daycare. Look, this room has 2 trays of fruit, and the kids are waiting to eat them. One friend is about to have some fruit at the short table, and 5 friends are about to have some fruit at the long table.

Another teacher comes from next door to take one tray of fruit away from this room because they are only supposed to have 1 tray of fruit. She doesn't know how many kids are waiting for the fruit. She is going to take the tray of fruit from the short table.

David just saw the kids, and he knows that 1 friend is about to eat the fruit at the short table, but 5 friends are about to eat the fruit at the long table.

The next-door teacher says, "I am going to take the fruit tray from the short table". David tells the teacher that she should take the fruit tray from the long table instead. Five friends are about to eat fruit there.

The teacher was going to take the fruit tray from the short table, but instead she takes the fruit from the long table. Five friends lose their fruit."

Comprehension

1) Think about the next door teacher before David talked to her. Was she going to take the fruit tray away from 1 friend or 5 friends?

2) Did David know that?

3) Think about the next door teacher after David talked to her. Was she going to take the fruit tray away from 1 friend or 5 friends?

4) Did David know that?

5) So, how many friends got lost their fruit?

"Remember, the next door teacher was going to take the fruit tray from 1 friend at the short table, but David told her to take the fruit tray from 5 friends at the long table. Let's think about what David did."

Moral Judgment

1) Was it good?

(if yes) How good, a little or a lot?

2) Was it bad?

(if yes) How bad, a little or a lot?

Story 5: Positive Outcome, 5→1, inanimate

"It's time to play outside at daycare. These friends want to play with a ball, but they don't have one right now. Five friends want to play at the big field, and 1 friend wants to play at the small field.

There is only one ball, and the other kids are done with it. They send it rolling over to the fields where these friends are. It starts rolling toward the big field.

Emily was just looking at the two fields and she knows that 5 friends are waiting to play with the ball at the big field, but only 1 friend is waiting to play with it in the small field.

Emily sees that the ball is heading towards the large field. She decides that she should kick the ball to make it roll to the small field instead. One friend is waiting to play with it there.

The ball was rolling to the large field, but instead, Emily kicked it to the small field. One friend gets to play with the ball."

Comprehension

1) Think about the ball before Emily kicked it. Was it going to 1 friend or 5 friends?

2) Did Emily know that?

3) Think about the ball after Emily kicked it. Was it going to 1 friend or 5 friends?

4) Did Emily know that?

5) So, how many friends got to play with the ball?

"Remember, the ball was going to the big field with the 5 friends, but Emily kicked it so it went to the small field with the 1 friend instead. Let's think about what Emily did."

Moral Judgment

1) Was it good?

(if yes) How good, a little or a lot?

2) Was it bad?

(if yes) How bad, a little or a lot?

Story 6: Negative Outcome, 1→5, inanimate

"It's time to play at daycare. These kids have built block towers. One friend built his tower on the circle carpet, and 5 friends built their tower on the square carpet.

Another kid is playing with a wind-up truck. He lets go of it and sends it towards the carpet area where these friends are. It is rolling towards the circle carpet.

Mike was just looking at the 2 carpet areas, and he knows that the 1 friend at the circle carpet is working on a tower, and that the 5 friends at the square carpet are working on their tower.

Mike sees that the truck is heading towards the circle carpet. He decides that he should roll a ball to hit the truck and make it go to the square carpet instead. Five friends built a block tower there.

The truck was going to ruin tower on the circle carpet, but instead Mike hit the truck with a ball and it broke the tower on the square carpet. Five friends get their tower ruined."

Comprehension

1) Think about the truck before Mike hit it with his ball. Was it going to the tower that 1 friend built or 5 friends built?

2) Did Mike know that?

3) Think about the truck after Mike hit it with his ball. Was it going to the tower that 1 friend built or 5 friends built?

4) Did Mike know that?

5) So, how many friends had their tower ruined?

"Remember, the truck was going to ruin the tower that 1 friend built on the circle carpet, but Mike hit it with the ball so it ruined the tower that 5 friends built on the square carpet. Let's think about what Mike did."

Moral Judgment

1) Was it good?

(if yes) How good, a little or a lot?

2) Was it bad?

(if yes) How bad, a little or a lot?

Story 7: Positive Outcome, 1→5, inanimate

"It's time to have a snack at daycare. These friends want to have a snack, but they don't have any right now. One friend is waiting for a snack at the small table, and 5 friends are waiting for a snack at the big table.

There is a train set that is pulling some snacks. It is going to the tables where the kids are. It is going towards the small table.

Theo was just looking at the two tables and he knows that the 1 friend at the small table is waiting for a snack, and that the 5 friends at the big table are waiting for a snack.

Theo sees that the train is going to the small table. He decides that he should flip the train track switch to make it go to the big table instead. Five friends are waiting to eat snacks there.

The train was going to the small table, but instead, Theo flipped the train track switch and it went to the big table. Five friends get to eat their snacks."

Comprehension

1) Think about the train before Theo flipped the train track switch. Was it going to 1 friend or 5 friends?

2) Did Theo know that?

3) Think about the train after Theo flipped the train track switch. Was it going to 1 friend or 5 friends?

4) Did Theo know that?

5) So, how many friends got to eat their snacks?

"Remember, the train was going to the small table with 1 friend, but Theo flipped the train track switch so it went to the big table with 5 friends instead. Let's think about what Theo did."

Moral Judgment

1) Was it good?

(if yes) How good, a little or a lot?

2) Was it bad?

(if yes) How bad, a little or a lot?

Story 8: Negative Outcome, 5→1, inanimate

"It's time for a picnic at the park. These kids have set up their picnics. Five friends set up their picnic on the yellow picnic blanket, and 1 friend set up their picnic on the orange picnic blanket.

Another kid is playing with a wagon. She lets go of it and it rolls down the hill towards the picnic area where these friends are. It is rolling towards the yellow picnic blanket.

Chloe was just at the picnic area and she knows that the 5 friends at the yellow blanket set up a picnic, and that the 1 friend at the orange blanket set up a picnic.

Chloe sees that the wagon is heading towards the yellow picnic blanket. She decides that she should push the wagon with her racquet to make it go to the orange picnic blanket instead. One friend set up a picnic there.

The wagon was going to ruin the picnic on the yellow blanket, but instead, Chloe pushed the wagon with her racquet and it ruined the picnic on the orange blanket. One friend doesn't get to eat his picnic."

Comprehension

1) Think about the wagon before Chloe hit it with her racquet. Was it going to the picnic that 1 friend set up or 5 friends set up?

2) Did Chloe know that?

3) Think about the wagon after Chloe hit it with her racquet. Was it going to the picnic that 1 friend set up or 5 friends set up?

4) Did Chloe know that?

5) So, how many friends had their picnic ruined?

"Remember, the wagon was going to ruin the picnic that 5 friends set up on the yellow blanket, but Chloe pushed it with the racquet so it ruined the picnic that 1 friend set up on the orange blanket. Let's think about what Chloe did."

Comprehension

1) Was it good?

(if yes) How good, a little or a lot?

2) Was it bad?

(if yes) How bad, a little or a lot?

Appendix F: Change of Location (Theory of Mind)

Bolded answers indicate correct answers. Italicized text indicates a physical manipulation of the task materials.

“I'm going to tell you a story. Listen carefully and then I'll ask you some questions.

This little girl’s name is Jill. Jill was playing with a ball. When she was done playing with it, she put it in the white box and then went outside to play. *(Move Jill aside, hidden).*

While Jill was playing outside, her friend Peter came along. Peter found the ball and he played with it for a little while. When he was done he put it in the polka-dot box and then he went away to do something else. *(Move Peter to a different aside location, hidden)."*

1. Where did Jill put the ball? **[white box]** [polka dot box]

2. Where is the ball now? **[polka dot box]** [white box]

“A little while later, Jill came back from playing outside. She wanted to play with the ball again. *(Position Jill an equal distance from both boxes. Do not orient her towards either box).”*

3. Where will Jill first look for the ball? **[white box]** [polka dot box]

Appendix G: Unexpected Contents (Theory of Mind)

Bolded answers indicate correct answers. Italicized text indicates a physical manipulation of the task materials.

"Look at this *(show a closed, Crayola crayons box)."*

1. What's in here? **[crayons]**

"Let's open it and have a look *(Open box and show child)."*

2. What is it? **[toy pig]** [crayons]

"Yeah! A toy pig! That's interesting, isn't it? I just put it in this box to keep it safe. Well, let's put him back into the box now… *(Put pig back in the box). Once box is closed:"*

3. What's in the box? **[pig]** [crayons]

*False Belief for self:

4. What did you think was inside the box BEFORE we opened it? [pig] **[crayons]**

*False Belief for other:

"Tomorrow I am going to play this game with a brand new friend."

5. What will s/he think is inside it BEFORE s/he opens it? [pig] **[crayons]**

Appendix H: Backward Digit Span (Working Memory)

Italicized text indicates a physical manipulation of the task materials.

Instructions for Experimenter: Say one digit per second. Stop when child makes an error on both strings of the same length (e.g., when both items 5 and 6 are incorrect). Provide no feedback after 2 training trials.

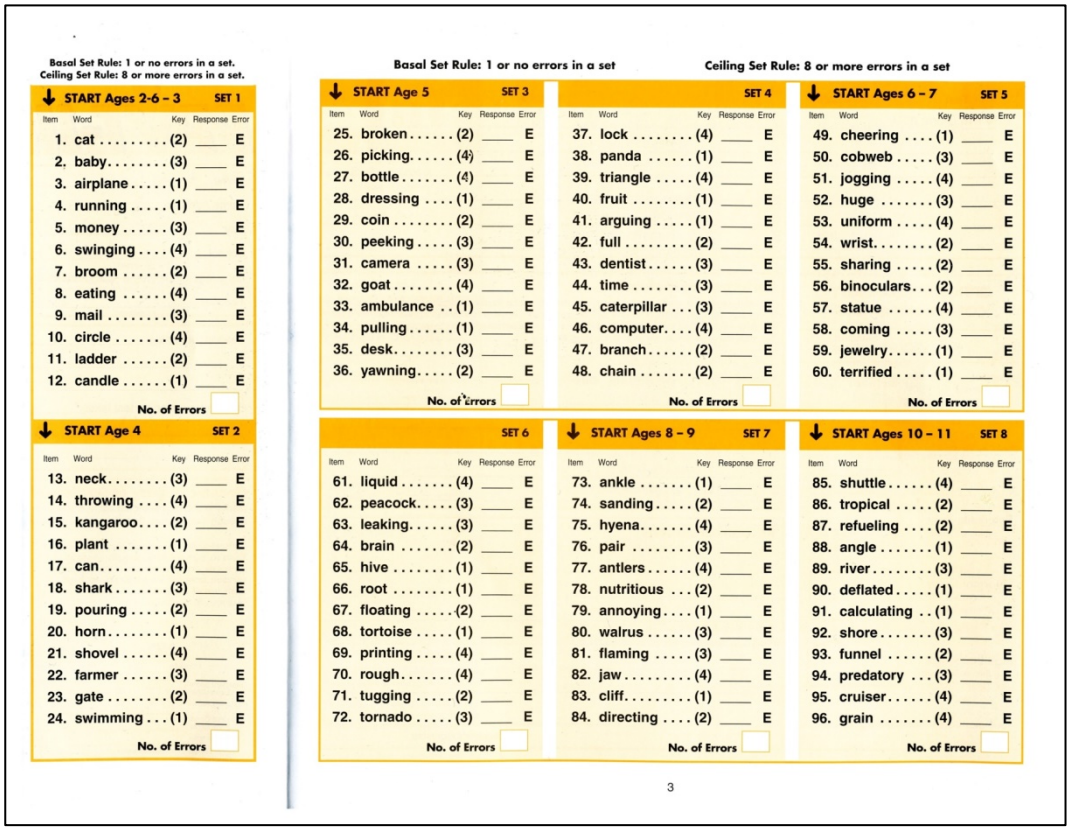
"This is my friend, Willy. Whenever I say numbers, Willy says them backwards. Listen: **5 – 8**. (*Willy says*:) **8 – 5**. Now I want you to do the same as Willy and say my numbers backwards. Do you understand? Let's try one. Ready? Listen carefully. Remember to say the numbers backwards. **2 – 4**." *(score below)*

"Let's try another one. Remember to say the numbers backwards. **7 – 1**."

	Digits Forward	Child's Response
i.	**2 – 4** ("That's right!" or correct the mistake)	____ – ____ ; ____ – ____
ii.	**7 – 1** ("That's right!" or correct the mistake)	____ – ____ ; ____ – ____
1.	**6 – 3**	_____ – _____
2.	**4 – 9**	_____ – _____
3.	**2 – 9 – 5**	_____ – _____ – _____
4.	**8 – 1 – 6**	_____ – _____ – _____
5.	8 – 5 – 2 – 6	_____ – _____ – _____ – _____
6.	4 – 9 – 3 – 7	_____ – _____ – _____ – _____
7.	**8 – 1 – 3 – 7 – 9**	_____–_____–_____–_____–____
8.	**4 – 2 – 5 – 8 –1**	_____–_____–_____–_____–____
9.	9 – 3 – 5 – 1 – 8 – 4	_____–_____–_____–_____–_____–_____
10.	6 – 5 – 8 – 4 – 2 – 7	_____–_____–_____–_____–_____–_____

Appendix I: PPVT III (Receptive Language)

" I'm going to show you some pictures and say a word, and I want you to point to the picture that matches the word. There will be 4 pictures on each page."



Basal Set Rule: 1 or no errors in a set. Ceiling Set Rule: 8 or more errors in a set.

START Ages 2-6 – 3 — SET 1

Item	Word	Key	Response	Error
1.	cat	(2)	____	E
2.	baby	(3)	____	E
3.	airplane	(1)	____	E
4.	running	(1)	____	E
5.	money	(3)	____	E
6.	swinging	(4)	____	E
7.	broom	(2)	____	E
8.	eating	(4)	____	E
9.	mail	(3)	____	E
10.	circle	(4)	____	E
11.	ladder	(2)	____	E
12.	candle	(1)	____	E

No. of Errors ____

START Age 4 — SET 2

Item	Word	Key	Response	Error
13.	neck	(3)	____	E
14.	throwing	(4)	____	E
15.	kangaroo	(2)	____	E
16.	plant	(1)	____	E
17.	can	(4)	____	E
18.	shark	(3)	____	E
19.	pouring	(2)	____	E
20.	horn	(1)	____	E
21.	shovel	(4)	____	E
22.	farmer	(3)	____	E
23.	gate	(2)	____	E
24.	swimming	(1)	____	E

No. of Errors ____

Basal Set Rule: 1 or no errors in a set — Ceiling Set Rule: 8 or more errors in a set

START Age 5 — SET 3

Item	Word	Key	Response	Error
25.	broken	(2)	____	E
26.	picking	(4)	____	E
27.	bottle	(4)	____	E
28.	dressing	(1)	____	E
29.	coin	(2)	____	E
30.	peeking	(3)	____	E
31.	camera	(3)	____	E
32.	goat	(4)	____	E
33.	ambulance	(1)	____	E
34.	pulling	(1)	____	E
35.	desk	(3)	____	E
36.	yawning	(2)	____	E

No. of Errors ____

SET 4

Item	Word	Key	Response	Error
37.	lock	(4)	____	E
38.	panda	(1)	____	E
39.	triangle	(4)	____	E
40.	fruit	(1)	____	E
41.	arguing	(1)	____	E
42.	full	(2)	____	E
43.	dentist	(3)	____	E
44.	time	(3)	____	E
45.	caterpillar	(3)	____	E
46.	computer	(4)	____	E
47.	branch	(2)	____	E
48.	chain	(2)	____	E

No. of Errors ____

START Ages 6 – 7 — SET 5

Item	Word	Key	Response	Error
49.	cheering	(1)	____	E
50.	cobweb	(3)	____	E
51.	jogging	(4)	____	E
52.	huge	(3)	____	E
53.	uniform	(4)	____	E
54.	wrist	(2)	____	E
55.	sharing	(2)	____	E
56.	binoculars	(2)	____	E
57.	statue	(4)	____	E
58.	coming	(3)	____	E
59.	jewelry	(1)	____	E
60.	terrified	(1)	____	E

No. of Errors ____

SET 6

Item	Word	Key	Response	Error
61.	liquid	(4)	____	E
62.	peacock	(3)	____	E
63.	leaking	(3)	____	E
64.	brain	(2)	____	E
65.	hive	(1)	____	E
66.	root	(1)	____	E
67.	floating	(2)	____	E
68.	tortoise	(1)	____	E
69.	printing	(4)	____	E
70.	rough	(4)	____	E
71.	tugging	(2)	____	E
72.	tornado	(3)	____	E

No. of Errors ____

START Ages 8 – 9 — SET 7

Item	Word	Key	Response	Error
73.	ankle	(1)	____	E
74.	sanding	(2)	____	E
75.	hyena	(4)	____	E
76.	pair	(3)	____	E
77.	antlers	(4)	____	E
78.	nutritious	(2)	____	E
79.	annoying	(1)	____	E
80.	walrus	(3)	____	E
81.	flaming	(3)	____	E
82.	jaw	(4)	____	E
83.	cliff	(1)	____	E
84.	directing	(2)	____	E

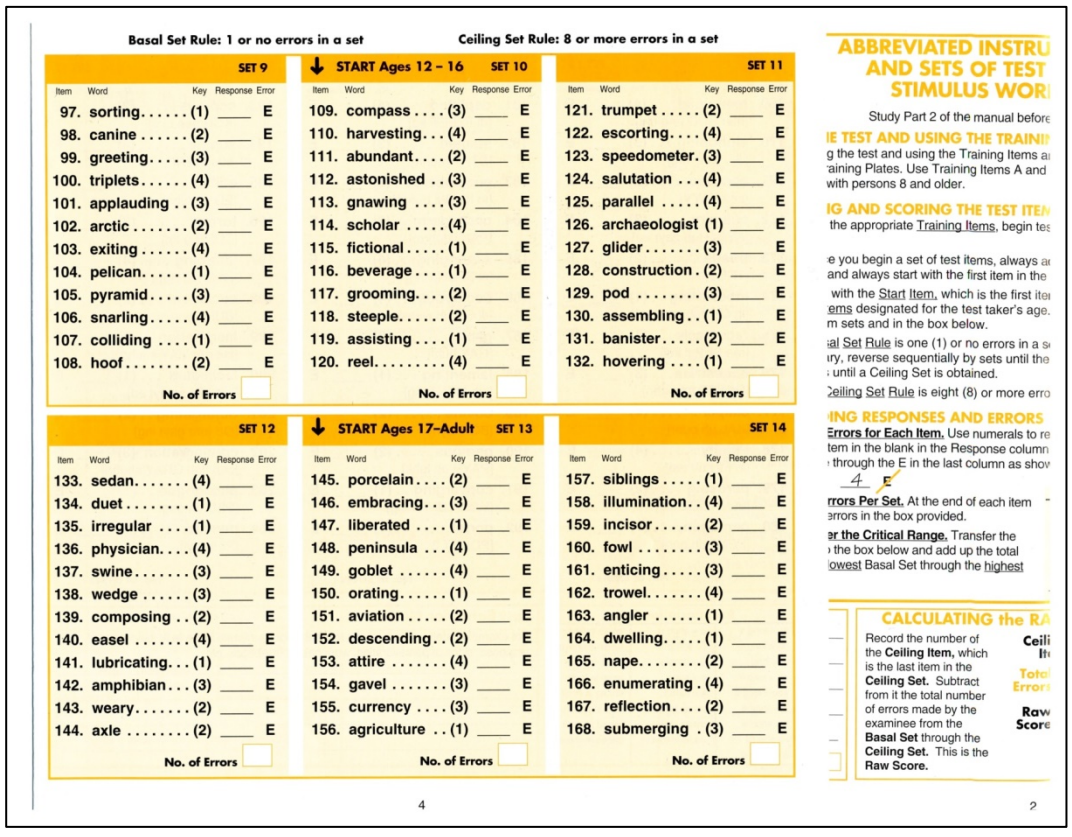
No. of Errors ____

START Ages 10 – 11 — SET 8

Item	Word	Key	Response	Error
85.	shuttle	(4)	____	E
86.	tropical	(2)	____	E
87.	refueling	(2)	____	E
88.	angle	(1)	____	E
89.	river	(3)	____	E
90.	deflated	(1)	____	E
91.	calculating	(1)	____	E
92.	shore	(3)	____	E
93.	funnel	(2)	____	E
94.	predatory	(3)	____	E
95.	cruiser	(4)	____	E
96.	grain	(4)	____	E

No. of Errors ____

3



Basal Set Rule: 1 or no errors in a set — Ceiling Set Rule: 8 or more errors in a set

SET 9

Item	Word	Key	Response	Error
97.	sorting	(1)	____	E
98.	canine	(2)	____	E
99.	greeting	(3)	____	E
100.	triplets	(4)	____	E
101.	applauding	(3)	____	E
102.	arctic	(2)	____	E
103.	exiting	(4)	____	E
104.	pelican	(1)	____	E
105.	pyramid	(3)	____	E
106.	snarling	(4)	____	E
107.	colliding	(1)	____	E
108.	hoof	(2)	____	E

No. of Errors ____

START Ages 12 – 16 — SET 10

Item	Word	Key	Response	Error
109.	compass	(3)	____	E
110.	harvesting	(4)	____	E
111.	abundant	(2)	____	E
112.	astonished	(3)	____	E
113.	gnawing	(3)	____	E
114.	scholar	(4)	____	E
115.	fictional	(1)	____	E
116.	beverage	(1)	____	E
117.	grooming	(2)	____	E
118.	steeple	(2)	____	E
119.	assisting	(1)	____	E
120.	reel	(4)	____	E

No. of Errors ____

SET 11

Item	Word	Key	Response	Error
121.	trumpet	(2)	____	E
122.	escorting	(4)	____	E
123.	speedometer	(3)	____	E
124.	salutation	(4)	____	E
125.	parallel	(4)	____	E
126.	archaeologist	(1)	____	E
127.	glider	(3)	____	E
128.	construction	(2)	____	E
129.	pod	(3)	____	E
130.	assembling	(1)	____	E
131.	banister	(2)	____	E
132.	hovering	(1)	____	E

No. of Errors ____

SET 12

Item	Word	Key	Response	Error
133.	sedan	(4)	____	E
134.	duet	(1)	____	E
135.	irregular	(1)	____	E
136.	physician	(4)	____	E
137.	swine	(3)	____	E
138.	wedge	(3)	____	E
139.	composing	(2)	____	E
140.	easel	(4)	____	E
141.	lubricating	(1)	____	E
142.	amphibian	(3)	____	E
143.	weary	(2)	____	E
144.	axle	(2)	____	E

No. of Errors ____

START Ages 17–Adult — SET 13

Item	Word	Key	Response	Error
145.	porcelain	(2)	____	E
146.	embracing	(3)	____	E
147.	liberated	(1)	____	E
148.	peninsula	(4)	____	E
149.	goblet	(4)	____	E
150.	orating	(1)	____	E
151.	aviation	(2)	____	E
152.	descending	(2)	____	E
153.	attire	(4)	____	E
154.	gavel	(3)	____	E
155.	currency	(3)	____	E
156.	agriculture	(1)	____	E

No. of Errors ____

SET 14

Item	Word	Key	Response	Error
157.	siblings	(1)	____	E
158.	illumination	(4)	____	E
159.	incisor	(2)	____	E
160.	fowl	(3)	____	E
161.	enticing	(3)	____	E
162.	trowel	(4)	____	E
163.	angler	(1)	____	E
164.	dwelling	(1)	____	E
165.	nape	(2)	____	E
166.	enumerating	(4)	____	E
167.	reflection	(2)	____	E
168.	submerging	(3)	____	E

No. of Errors ____

4

ABBREVIATED INSTRU AND SETS OF TEST STIMULUS WOR

Study Part 2 of the manual before

E TEST AND USING THE TRAINI

g the test and using the Training Items a aining Plates. Use Training Items A and with persons 8 and older.

IG AND SCORING THE TEST ITE

the appropriate Training Items, begin te

e you begin a set of test items, always a and always start with the first item in the with the Start Item, which is the first ite ems designated for the test taker's age. m sets and in the box below.

al Set Rule is one (1) or no errors in a s ry, reverse sequentially by sets until the until a Ceiling Set is obtained.

Ceiling Set Rule is eight (8) or more erro

ING RESPONSES AND ERRORS

Errors for Each Item. Use numerals to re tem in the blank in the Response column through the E in the last column as show

4 E

rrors Per Set. At the end of each item errors in the box provided.

er the Critical Range. Transfer the the box below and add up the total owest Basal Set through the highest

CALCULATING the RA

Record the number of the **Ceiling Item**, which is the last item in the **Ceiling Set**. Subtract from it the total number of errors made by the examinee from the **Basal Set** through the **Ceiling Set**. This is the **Raw Score**.

Ceili It

Total Error

Raw Score

2