

Children's Understanding of Intention and its Expression in Language

By

Emma Jameson

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Emma Jameson

Abstract

Some English verbs carry a moral connotation and thus are relevant to moral reasoning. While research has examined children's understanding of *lying*, less is known about their understanding of other moral verbs. The current study examined 4- to 7-year-old children's ($n = 44$) usage and understanding of the 'language of intention' in morally relevant contexts that could be described by the verbs *lie*, *steal*, *copy*, and *hide*. Participants made intention attributions, moral judgements, and assigned punishment to characters who acted either intentionally or unintentionally. Results showed that younger children were not sensitive to intention across these contexts, but that older children's sensitivity was moving in the correct direction, based on a comparison of their performance to that of an adult sample ($n = 48$). Children's performance on the main task was generally not related to Theory of Mind and Morally Relevant Theory of Mind understanding.

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Introduction

Theory of mind (ToM) refers to the ability to understand mental states, including beliefs, desires, and intentions, and helps us make inferences about human behaviour (Miller, 2006). The focus of the current thesis is on children's understanding of one of the mental states that falls within ToM, namely *intentions*, which include mental representations of goals (Feinfield et al., 1999). To interact successfully with others, children need the ability to infer others' mental states, such as their intentions, in order to appropriately interpret their behaviour. For example, one should be less upset with a friend who accidentally (i.e., *unintentionally*) breaks a toy than with one who does so purposefully. Therefore, understanding intention is critical to mature ToM development and is an integral concept in understanding human behaviour. Further, a consideration of others' intentions is critical for children's development of moral cognition, as such judgements require a consideration of the intention that motivated a particular outcome (e.g., breaking a toy).

There are many English words which directly reference mental states, such as *think*, *know*, *believe*, and *mean to* (there are many others). There is some evidence that basic mental verbs such as *think* and *know* appear in children's language as early as two-years of age (Shatz et al., 1983), but they are not used in the full adult sense of those terms. It is not until around age 4 that children are given credit for correctly using mental verbs like *think* based on their performance on ToM measures (see meta-analysis by Wellman et al., 2001). However, there are also many other English verbs that are not mental state verbs *per se*, but do require a consideration of mental states in order for them to be used in their full sense. For example, the verb *lie* requires a consideration the speaker's beliefs about the true state of the world, as well as their intention to deceive by saying something untrue (e.g., D'Esterre, et al., 2019; Vendetti et

al., 2019). An utterance, that may be untrue, would not be considered a lie by adults if the speaker was not trying to deceive; it would more likely be characterized as a mistake or as a joke (depending on the context). Thus, appropriate use of this verb requires the ability to distinguish intentional from unintentional behavior, in this case, whether the deception was intentional.

There is a fair bit of work on children's understanding of the verb *to lie* (e.g., Evans & Lee, 2013; Peterson et al., 1983; Talwar & Lee, 2013; Vendetti et al., 2019; Wimmer et al., 1985), and from this work we know that a basic understanding of lying emerges in the preschool years, with significant improvements occurring between the ages of four and five (Evans & Lee, 2013; Talwar & Lee, 2008; Vendetti et al., 2019). Although this research demonstrates children's emerging ability to distinguish between lies and mistakes within moral judgements, it is less clear when children can accurately use it, and its use in relation to other verbs that similarly require a consideration of intention.

There are terms that are regularly discussed in terms of this difference; for example, *murder* and *manslaughter* differ in terms of the intention of the actor, while both match in terms of the outcome (i.e., a death). Accordingly, these acts are treated very differently in our legal system and differ in the degree of punishment. Other more child-friendly examples of what can be called 'the language of intention' include verbs such as *lie*, *steal*, *copy*, and *hide*. For example, a child who unknowingly, and therefore unintentionally, takes another's toy cannot be said to have *stolen* it. Thus, while *steal* is not a mental verb *per se*, its mature usage requires a consideration of intention.

The formal definitions of the four verbs being examined in the current study do make reference (either directly or indirectly) to intention. More specifically, they are (1) *lie*: "to make an untrue statement with intent to deceive" (Merriam-Webster, n.d.); (2) *steal*: "to take another

person's property without permission ... and without intending to return it" (Oxford, n.d.); (3) copy: "to deliberately make something that looks exactly like something else" (Macmillan Dictionary, n.d.); and (4) hide: "to conceal from sight; prevent from being seen or discovered" (Dictionary, n.d.). These verbs are all similar in that intention is implicitly encoded within them. This means that for an action to be accurately described using each verb, the action would have to have been done with intention (and therefore, knowingly). Further, these verbs carry a moral connotation as *stealing* is far worse than accidentally taking someone else's belongings. Thus, such situations are relevant to moral reasoning.

It is important to note that in addition to being encoded implicitly, intention can also be encoded into language explicitly using terms such as *on purpose* or *by accident*. For example, when describing a scenario where someone took something that did not belong to them, using explicit language such that they did so *on purpose* would imply that their intention was to *steal*. The current study examined children's ability to understand intention when it was implicitly encoded into language (with their application of the verbs *steal*, *lie*, *copy*, *hide*), as well as when it was encoded explicitly using the terms *on purpose* or *by accident*.

With the exception of the verb *to lie*, it is not currently known whether children's appreciation of mental states, such as belief and intention, are directly related to the appropriate usage of morally-relevant verbs more generally, or whether there is consistency in children's consideration of intention across and between such verbs, either in terms of the verbs' meanings or in terms of the moral judgements related to the actions described by them. Thus, the current study focused on the ways in which certain aspects of ToM, specifically, belief and intention understanding, are related to using and understanding the language of intention in morally relevant contexts. More specifically, children's understanding of the morally relevant verbs

lying, stealing, copying, and hiding were explored across a series of story-based scenarios with performance on those scenarios examined in relation to ToM, with the anticipation that the results would yield meaningful contributions regarding the relation between ToM development and moral cognition.

Children's Understanding of Intention

Intention is a complex concept that develops gradually, and when fully developed, “intention allows one to appreciate the somewhat elusive distinctions between intention related concepts of desire, goal and action” (Baird & Astington, 2005, p. 258). Children begin to demonstrate the most rudimentary understanding of intention (primarily as goal-directed behaviour) within their first year of life, such as having the ability to distinguish between intentional agents and inanimate objects (Baird & Astington, 2005). Using methodology such as visual habituation/dishabituation paradigms and looking time, researchers have observed that infants are also sensitive to intention-relevant features of actions (Woodward, 1998), and to behaviours that interrupt intentions (Baldwin et al., 2001). Although children's understanding of intention is initially limited to being expressed implicitly (as our only way to draw inferences is through methods such as looking time), by the age of three, it begins to develop to be expressed explicitly (Baird & Astington, 2005). However, children's ability to understand, or talk about, more complex notions of intention at this age remains rudimentary and is expressed by using phrases such as *mean to*, *on purpose*, and *try* while discussing actions. Research has observed that until about five-years-old, children are not able to successfully distinguish between different intentions underlying characters who perform the same action, suggesting that their early understanding of intention is closely intertwined with action (Baird & Moses, 2001).

An understanding of intention is imperative when making judgements about the morality of an action. Early research by Piaget (1932), and other work that was inspired by him, suggested that until about 8 or 9 years of age children make moral judgements solely based on the outcome of a person's action (*moral realism*) rather than by the person's intentions. More recently, researchers have identified methodological flaws in such studies, and have demonstrated that children develop an understanding of intention at a much earlier age than the pioneer work originally suggested. For example, Wimmer et al. (1984) challenged Piaget's idea of moral realism in the context of lying by observing that children as young as four-years-old demonstrated sensitivity to intention when making moral judgements, despite inaccurately attributing the verb *lie* to describe a mistakenly (unintendedly) false statement. That is, young children were able to demonstrate that they were sensitive to the speaker's innocent intentions in relation to sharing misinformation, but that their attribution of the verb *lie* was biased by the objective nature of the information being untrue. These findings support the trajectory that children's understanding of intention is initially expressed implicitly (i.e., by judging the behaviour as benign), and later develops to be expressed explicitly (i.e., by being able to accurately express it with language; Baird & Astington, 2005). Thus, it may be that a lack of consideration for vocabulary constraints may be one of the methodological flaws that led to earlier research suggesting that children do not develop moral subjectivism until later than currently believed. It is important, then, to recognize that children's understanding of intention (and aspects of ToM more broadly) likely precedes their ability to appropriately use certain terms, such as *lie*.

Children's ToM abilities, specifically their understanding of intention, have implications for moral reasoning, as they are required to accurately evaluate the morality and responsibility

surrounding moral transgressions (Feinfield et al., 1999). Moral transgressions are broadly defined as “acts that have intrinsic consequences for others’ rights or welfare” (Smetana & Braeges, 1990, p. 329). Further, an appreciation of the intentions of others’ actions, and not just a focus on the outcome of said actions, facilitates competent social interactions because mental state knowledge can be used as a tool to understand the potentially antisocial goals of peers (Hughes & Devine, 2015).

People typically judge negative transgressions, and behaviours generally, more harshly when the action is intentional, and in turn are more tolerant when the action is accidental. For example, we are much more forgiving of someone who unintentionally causes a drink to spill in contrast with someone who spills a drink on purpose. In addition, different language is used to describe each scenario. For example, if someone was said to have *thrown* a glass of milk on someone’s laptop, we recognize that to mean that they purposefully caused a glass of milk to land on someone’s computer. Conversely, if it was accidental, one may say that the milk *slipped* from the person’s hand. While in both examples there is the same outcome, they differ considerably in terms of the acceptability of their behavior (i.e., whether it is seen as a transgression or an unfortunate accident), with the actor’s intention influencing how people evaluate and respond to it. An adult who did not witness the actions just described, but heard the two descriptions, would draw inferences about which person performed the act deliberately and which one had done so accidentally because the verbs *throw* and *slip* differ in terms of whether intention is a necessary part of their meaning; in other words, they differ in terms of whether intention is encoded into their meaning. These terms therefore convey information about how one should consider the behaviors. For example, the verb *throw* indicates intention and therefore marks that behavior as a transgression (one with moral implications). Thus, the term *throw*, but

not *slip*, marks an action as having been done with intention. In this case, using *throw* in relation to the outcome (spilling milk on a computer) indicates that a moral transgression has occurred.

To explore the influence of intention on young children's moral judgements, Zelazo and colleagues (1996) conducted a study to assess three- to five-year-old children's ability to incorporate intention, act, and outcome information while making moral judgements. Children were required to make moral judgements and assign punishments regarding two scenarios in which a fictional animal was either hit or pet by an actor that varied based on intention. The researchers included a noncanonical condition where the act and the outcome contrasted to examine whether young children would make their moral judgements based on actual harm or canonical harm. In this study, participants were told about a novel animal with atypical skin that responded differently to touch compared to other animals. In this case, getting hit led to that animal having positive reaction and getting pet led to it having a negative reaction. Interestingly, both qualitative and quantitative assessment methodology were incorporated, and the two differing methods yielded varying results. For the qualitative assessments, children of all ages categorized the acceptability of the actor's behaviour based exclusively on outcome (Zelazo et al., 1996). However, when act acceptability was rated quantitatively, it became evident that children were incorporating intention into their judgements by five-years of age, demonstrating the influence of different assessment methodology in children's moral judgements.

When assigning punishment, older children were able to consider the moral severity of both intention and outcome, whereas the younger children seemed to only focus on one or the other, and not both (Zelazo et al., 1996). Although the youngest children focused mainly on outcome, the lack of differences in the noncanonical condition suggested that children as young as three years of age consider the concept of harm in their moral judgements. While this study by

Zelazo and colleagues (1996) positively contributed to the literature regarding children's consideration of intention and outcome in their moral judgements, it was not absent of methodological flaws. Limiting the scenarios to be about fictional animals and physical harm impedes the generalizability of the results. That is, the study may have yielded different results if the victims were humans rather than animals, and if the severity of harm varied (of course, this would require different scenarios as stories in which children were hit are not appropriate). The present study addressed this limitation by requiring children to assign punishment to human story characters who were either intentionally or unintentionally involved in transgressions that varied in moral acceptability (no physical harm). This study is largely consistent with other research in the area which has found evidence of children being able to begin considering intention by 5 years of age (Andrews et al., 2019; Zelazo et al., 1996).

Expanding upon the influence of harm itself, more recent research has considered the role of other factors, such as transgressor and victim negligence (Mulvey et al., 2020). While considering the role of transgressor and victim negligence in children's moral judgements about scenarios that resulted in physical harm, children as young as three-years-old were observed to assign more punishment to negligent actors in comparison to careful actors (Mulvey et al., 2020). Such findings suggest that the salience of harm in a given scenario influences children's punishment judgements, as young children are able to emphasize intention-based information such as negligence when the harm is more severe (Mulvey et al., 2020).

Although moral transgressions are commonly caused by a physical action, transgressions can also be a result of *inaction*. Legal systems differentiate between these types of transgressions by referring to them as *commission* and *omission*, respectively, with acts of commission (physical action) typically being treated more harshly (Hayashi, 2010). Conceptually, making

fair moral judgements requires a certain level of mental state understanding; specifically, an understanding of the transgressor's knowledge (or *ignorance*) is required above and beyond an understanding of intentions. A study by Hayashi (2010) explored whether developmental differences exist in four- to six-year-old Japanese children's moral judgements of commission and omission, and whether this is related to mental state understanding. Participants were presented with two action tasks and two inaction tasks, and each task followed two similar stories with the same structure but differed based on the protagonist's mental state. For example, one of the action tasks was as follows:

A girl had a clean piece of paper. She put the paper on the floor and left. A boy came here and found the paper. The boy scribbled on the paper. After scribbling, he went out. The girl came back and found that the paper was dirty. So she felt sad (p. 200).

The corresponding story was identical, except before the girl leaves, the boy asks who the paper belongs to and the girl explicitly states that it is hers. The following is an example of one of the inaction tasks:

A girl had a pretty hat. She put the hat on a bench and left. A boy came here and found the hat. A gust of wind suddenly blew it off the bench. The boy went home leaving the blown hat behind (p. 201).

Like the action task, the corresponding story was identical, with the girl explicitly telling the boy that the hat belongs to her before she leaves. Participants' understanding of mental states were assessed by asking questions related to each task such as "which boy *knows* (or *does not know*) that the hat belongs to the girl?" (Hayashi, 2010, p. 192). The results revealed that although children's performance on the mental state questions and moral judgements increased

with age, there was no difference observed in children's ability to make moral judgements about transgressions of action and inaction related to mental state knowledge (Hayashi, 2010).

However, some limitations were present within the study. First, participants' moral judgements were dichotomously scored as either correct or incorrect (based on comparisons to data from an adult sample).

Previous research has demonstrated the influence of using qualitative ('good' or 'bad') versus quantitative methodology (how good or bad; Zelazo et al., 1996); perhaps if a scale were used to measure how good or how bad the boy was within the various tasks, the variability would make a difference on the observed relation between children's moral judgements and mental state knowledge within these contexts. Additionally, an assessment of whether participants felt that the boy deserved to be punished may have provided a more rounded evaluation of children's moral judgements. Finally, the action and inaction tasks were conceptually simple considering the age of the participants; perhaps if these tasks were more complex, differences in participant's difficulty related to mental state knowledge would be observed.

In the present study, ignorance was the distinguishing characteristic between the intentional and unintentional transgressor across the story-based scenarios on which the children were evaluated. That is, consideration of character knowledge in addition to intentions was necessary to distinguish between the intentional and unintentional transgressor. The current study addressed the aforementioned limitations of Hayashi's (2010) study by using a moral judgement scale that asked participants to indicate 'how good' or 'how bad' each character's behaviour was, as well as whether the characters should get in trouble, and if so, how much (another common way researchers measure participants' moral judgements). Considering that the overt behaviours as well as the outcome of harm matches for the two characters in each story-based scenario

employed in this thesis, it may be more complex for children to consider the role of ignorance and intention in their moral judgements compared to the tasks in Hayashi's (2010) study. The goal of this methodology was to further explore the possible relation, if any, between children's mental state understanding and their sensitivity to intention while making moral judgements.

The Language of Intention

In addition to being able to consider intention while making moral judgements, children need to learn how to use the language that describes it. While there are many aspects of language relevant to conveying intention, of particular interest for the current thesis were the verbs *lying*, *stealing*, *hiding*, and *copying*. I will begin with a review of children's understanding of *lying*, as there is considerably more research investigating children's development of understanding this verb relative to the others.

Lying has been described as "an interesting case in which an understanding of intentions intersects with moral knowledge" (D'Esterre et al., 2019, p. 54). That is, appropriately attributing something as a lie requires knowledge both about mental states and intention to deceive. However, the term lie is not the only verb that requires this intersection of cognitive abilities. For example, it would be odd for an adult to say that someone stole something "on purpose" because the intentionality of the action is embedded within the verb. This means that to appropriately attribute a behaviour as stealing, there must be an appreciation of the underlying mental states related to the transgressor's intention. Although the role of mental state knowledge in relation to children's ability to identify lies has recently been examined (D'Esterre et al., 2019), the verbs steal, copy, and hide are among similar cases that research has yet to explore.

Research has found that children as young as four-years of age demonstrate sensitivity to intention when making moral judgements about lying scenarios (e.g., Wimmer et al., 1984,

1985), and that their ability to appropriately attribute the verb significantly improves between five and eight-years of age (Peterson et al., 1983). For example, a study by Wimmer and colleagues (1984) presented children between four- to seven-years of age with a variety of scenarios that led a speaker to mistakenly (unintentionally) share a false statement. Children were first asked a moral judgement question, and then a lexical question (whether the protagonist *lied* or not). Interestingly, although children of all ages demonstrated an understanding of the speaker's innocent intentions while making their moral judgements, the younger children nonetheless labelled the speaker's accidental false statement as a lie. To investigate whether question order influenced these results, Wimmer et al. (1985) conducted a follow-up study that counterbalanced the order of the moral question and lexical question, which further supported children's difficulty to consider intention while making verb attributions compared to moral judgements. Such results suggest that children's verb meaning initially relies exclusively on observable details (such as making a false utterance), and then sometime before eight-years of age, it develops to incorporate their understanding of intention (Peterson et al., 1983; Wimmer et al., 1984, 1985). In other words, research should not consider the appropriate use of verbs to be the best indicator of children's sensitivity to intention because it may underestimate their abilities. Other, more recent work has demonstrated that by around the age of five, children consider intentions, rather than outcomes, when making moral judgements, at least in contexts related to lying (Maas, 2008; Vendetti et al., 2019).

The degree to which a character's transgression was motivated by either positive or negative intention is an additional factor that has been demonstrated to influence children's sensitivity to intention. Wandrey and colleagues (2012) observed this influence by exploring children's ability to differentiate between lies and truths in scenarios that varied based on moral

valence. Broadly, moral valence refers to the degree of positive or negative affect that underlies intentional behaviour (Shuman et al., 2013). In Wandrey et al.'s (2012) study, children between the ages of three- to five-years were asked to identify whether a character lied or told the truth in a series of scenarios that varied based on the valence of an act (negative vs. positive) and the honesty of the character who committed the act (truthful vs. lied). It was observed that children were more accurate in their identification of lies and truths in scenarios with a positive valence, and had more difficulty correctly differentiating between lies and truths in scenarios with a negative valence (Wandrey et al., 2012). Such results suggest that young children's understanding of lies are initially biased on the valence of the moral transgression, and that the ability to prioritize intention information develops later.

While there has been some research examining children's understanding of the verb *lie* (e.g. Peterson et al., 1983; Vendetti et al., 2019; Wimmer et al., 1984, 1985), the literature lacks information about children's understanding of other intentionally-laden verbs, such as *steal*. Similar to *lie*, the verb *steal* has intention encoded within it and when attributed correctly, is used to describe a moral transgression as opposed to an accidental taking of another's property. Not much is currently known about children's understanding of this verb, however, a study by McDermott and Noles (2018) explored the relation between age, ToM, and linguistic ability in the context of four- and five-year-old children's understanding of ownership. Participants' ToM was measured using a Theory of Mind Task Battery, a 15-item story-book format test that varies in complexity and is accessible to both verbal and nonverbal children (Hutchins & Prelock, 2010). Further, the Verbal Knowledge and Riddles sections of the Kaufman Brief Intelligence Test (Kaufman & Kaufman, 2014) was used to measure participants' general linguistic and cognitive abilities. For the main task, participants were presented with vignettes describing

different types of property transfer scenarios, including one that described stealing. After being presented with each scenario, participants were required to identify the owner of the transferred property. Although both age groups demonstrated an understanding of stealing by accurately identifying the property owner, little evidence was found for both the contribution of ToM competence as well as linguistic ability to the understanding of ownership concepts, and instead developmental changes were attributed to age (McDermott & Noles, 2018).

It is possible that the lack of evidence about the relation between ToM, linguistic ability, and children's understanding of ownership in this study was due to how these skills were measured. Perhaps if a moral judgement component were included, there would be information about whether young children's understanding of ownership transfers was related to their understanding of positive or negative intentions associated with the scenario, similar to what has been observed in lying research (Wandrey et al., 2012). The current study addressed this possibility by presenting children with a story where two characters both gain possession of a third character's property but differ in terms of their knowledge (i.e., one was ignorant of the fact someone else's property was in their bag) and their intentions (i.e., only one took the item home intentionally). This was established by having one character who knew that the third character's property had accidentally fallen into their bag, and one who did not. Thus, both characters matched in their overt behavior (neither was the cause of the items falling into their bags) but differed in terms of whether they could have been said to have *stolen* the item, in the full sense of the meaning of the term.

Following the stories, participants were asked to attribute intention, make moral judgements, and ascribe punishment for the two characters. The inclusion of both moral judgement and intention attribution questions were expected to provide an indication of whether

children's responses were related to their understanding of the verb *steal*. That is, if a child indicated in their intention attribution that the ignorant character *stole*, but then contradicted this by saying that they performed the behaviour *by accident* and indicated in their moral judgement that the character's behaviour was either neutral or positive, this may be interpreted to mean that they are sensitive to intention but are overextending the term *steal* across different property transfer contexts. Considering that similar results have been observed in contexts related to lying (Wimmer et al., 1984, 1985), it seems reasonable to expect that children's understanding of other verbs requiring an intersection of knowledge between intentions and morality, such as stealing, would be directly related to ToM and language ability. However, the research to date does not address this issue. Thus, the goal of the current study was to extend our knowledge about children's developing understanding of intention, employing a greater range of intentionally-laden verbs.

In addition to research regarding children's understanding of stealing *physical* property (McDermott and Noles, 2018), research has examined children's understanding of stealing *ideas*, otherwise known as *copying*. Understanding the concept of copying relies on being able to understand mental states, namely, the ability to track and consider their own and other's ideas. To examine children's response to copying, Olson and Shaw (2011) asked six- to eleven-year-old children to indicate how much they liked story characters in an art class who either drew their own work or drew an identical copy to another's work, either intentionally or coincidentally. The researchers observed that for children of all ages, the character who intentionally copied another's work was less preferred than those who either drew unique work or drew something identical by coincidence. When asked to justify their evaluations, children as

young as five-years-old made references to copying in their explanations by using statements such as “[they] drew the same thing” (Olson & Shaw, 2011, p. 437).

The study by Olson and Shaw (2011) provides evidence that for the act of copying, children’s ability to describe intention with explicit language begins to develop around the age of five. However, a limitation of this study was that children’s ability to describe intention with implicit language, on the other hand, was not measured. That is, while some children did correctly attribute intention using the verb *copy* in their justifications, researchers did not directly measure their ability to accurately use the intentionally-laden verb. Instead, all responses that either directly or indirectly referenced copying were grouped together for the analyses. Additionally, although the researchers posit that understanding copying requires children to appreciate the thoughts and ideas of others, and therefore indirectly examines children’s mental state understanding, participants’ ToM ability and its relation to their sensitivity to intention was not directly measured in the study.

In contrast, the current study measured children’s ability to describe intention with both explicit and implicit language in story scenarios where characters engaged in actions that could be described as *lying*, *stealing*, *copying*, and *hiding*. Although no known research to date has examined children’s understanding of the verb *hide* in a moral context, it is theoretically similar to verbs such as *lie*, in that correctly labelling a behaviour as *hiding* requires an understanding of deceit and mental knowledge. Thus, comparing children’s use of these terms, moral judgements, and punishment ascriptions across a variety of misdeeds was expected to give more insight into children’s ability to adjust the weight given to intention versus outcome at varying points during this developmental period, and how this ability is related to ToM.

It was anticipated that the moral transgressions described by these verbs would be interpreted to vary based their severity. This was proven valuable by previous findings that the degree of harm associated with a moral transgression interferes with children's ability to judge a character's actions (Zelazo et al., 1996). To test this, the current study included a sample of adult participants. Their responses to the stories provided an adult-based judgement of the severity of moral violations described in each story scenario, which were considered in the analyses. Further, the design of the current study made it possible to explore whether children's ability to understand intention develops simultaneously across the contexts related to the morally relevant verbs *lie*, *steal*, *copy* and *hide*, or whether children begin to understand the language of intention in relation to moral transgressions more gradually across these contexts.

The Role of ToM

Children's understanding of lying is one of many moral reasoning contexts that are relevant to the present study because it involves *intentional* deception, meaning that mental state knowledge is required to correctly classify some action as deception (and to deceive effectively, but that was not the focus of the current thesis). Lying is considered a unique construct because it requires the consideration of intentions as well as moral knowledge (D'Esterre et al., 2019), and therefore a precursor to understanding the concept of lying is understanding that different people can have different mental representations of the same reality (Lee & Imuta, 2021). Although children's understanding of lies is a relatively well-studied concept in the area of moral development (e.g., Evans & Lee, 2013; Maas, 2008; Talwar & Lee, 2013; Vendetti et al., 2019; Wandrey, et al., 2012), less is known about the relation between this understanding with ToM development.

Children's belief reasoning has been a central focus in research regarding ToM development and mental-state understanding. The reason for this focus is that when children can appreciate that another person, or they themselves, may have a belief that contradicts reality (referred to as a *false* belief), it demonstrates an understanding that mental states and reality can differ (Wellman et al., 2001). However, a common obstacle in cognitive development research is establishing tests that maintain face validity while simultaneously being comprehensive and age-appropriate for young children. The general consensus based on a meta-analysis of early ToM research is that basic belief reasoning is below chance among three-year-olds, and that successful performance increases with age, with neuro-typical children demonstrating success by age five (Wellman et al., 2001). This research demonstrates that children's ToM understanding undergoes significant conceptual changes between these years; specifically, that their understanding of mental states and behaviour shifts from being situation-based to representation-based. Further, belief-reasoning tasks are a valuable tool to measure ToM because children's success, or lack thereof, provides insight regarding where the individual stands in the developmental shift between understanding the world based on objective facts versus mental representations.

Maas (2008) designed a study examining the ability of children between the ages of four- to six-years-old to consider intention when judging sincere and insincere false statements, and how this success was related to false-belief reasoning abilities. The results revealed that older children were more successful than the younger children at correctly labelling lies based on the character's sincerity (Maas, 2008). This finding implies that younger children were fixated on the outcome of the untrue statement, and had more difficulty considering the intention behind it. Further, success on the lie judgement task was related to false-belief success, which supports the

idea that understanding mental state reasoning is developmentally related, at least in the context of judging lies.

Further investigating the role of mental state knowledge in children's sensitivity to intention in the context of lying, Vendetti et al. (2019) examined four- and five-year-old children's understanding of lies and truths across different contexts, as well as how this ability is related to false-belief understanding. Specifically, the study examined children's ability to identify and morally judge lies and truths in scenarios related to a misdeed (a minor transgression) or politeness situation (i.e., prosocial lying). In the misdeed lie story, the character lies about something they were supposed to have done, but did not. In the misdeed truth story, the character tells the truth about something they were supposed to have done but did not. In the polite lie story, the character lies to protect the feelings of another character. Finally, in the impolite truth story, the character is honest about a gift that they do not like. After hearing each story, children were given three options to identify lies and truths: (1) "a lie or not a lie"; (2) "a lie or the truth"; and (3) "a lie or the truth or something else" (Vendetti et al., 2019, p. 826). Further, children were asked to morally judge the story characters, as well as complete false-belief tasks. In line with previous research (e.g., Maas, 2008), Vendetti et al. (2019) observed that children between four and five years of age were able to accurately identify lies and truths but were more accurate in contexts related to misdeeds. Further, it was observed that there are significant developmental differences in this ability between the ages of four and five, and that these changes are related to the development of mental state understanding.

Children's understanding of *hiding* is an additional concept that requires mental state knowledge, that is, it requires intentional deception. Nelson et al. (2012) conducted a longitudinal study examining preschooler's developing understanding of mental state knowledge

in relation to deception. To achieve this, 42-, 54-, and 66-months-old children completed various ToM tasks as well as participated in a hiding game. In the hiding game, children were presented with three toys, and selected one to play with. Following this, the experimenter put the remaining two toys away in sealed locations (i.e., a box and a cabinet) and left the child alone in the room with their mother. Once the experimenter was gone, the mother encouraged the child to take the toys out of their respective locations and hide them from the experimenter before they came back. Children were then asked questions about where the experimenter would expect the toys to be when they returned.

Overall, it was observed that children's understanding that not seeing means not knowing (knowledge access) was a prerequisite to understanding deception, and that their understanding of false beliefs emerged last (Nelson et al., 2012). Children as young as 42-months-old demonstrated an understanding of knowledge access, as demonstrated by behaviours such as whispering to their mother to maintain deceit. However, when asked about where the experimenter would expect the toys to be, children at this age demonstrated a lack of false belief knowledge by consistently answering based on reality. Children did not demonstrate a sophisticated understanding of false belief knowledge until they were closer to 66-months-old. Although this research by Nelson et al. (2012) demonstrates the relation between children's general understanding of hiding and ToM, less is known about this understanding in morally relevant contexts, which was addressed in the current study.

The claim that most neuro-typical children reason about beliefs from a representation-based perspective by five-years-old is largely interpreted from their success on standard false belief tasks at this age (Wellman et al., 2001). However, it is important to consider that standard false belief tasks are relatively simple and lack both social and moral context. For example,

consider Wellman and Liu's (2004) explicit false belief procedure: a child is presented with a story about a boy (Scott) who is looking for his mittens, which could either be inside his backpack or the closet. The child is explicitly told that Scott's mittens are inside his backpack, but that he thinks his mittens are in the closet. The child is then asked the target false belief question: "Where will Scott look for his mittens? In his backpack or in the closet?" (Wellman & Liu, 2004, p. 539). It has been argued that due to a lack of social and moral relevance, such tasks are not representative of children's ability to consider mental state knowledge in the social interactions of daily life and in morally relevant situations (Killen et al., 2011), such as the types of situations that are examined in the current thesis. This suggests that a more sophisticated understanding of ToM, specifically one related to social and moral considerations, is required to better understand the role of mental states in human behaviour. Specifically, children must be sensitive to the mental state of *intention* in order to appropriately interpret behaviour in morally relevant contexts.

To address this concern, Killen et al. (2011) developed a false belief task about an accidental transgression to examine the relation between children's performance on their morally relevant ToM measure (MoToM) and children's moral reasoning, in contrast to the relation to the standard ToM measures. In this task, a character leaves a valuable item (a cupcake) in a paper bag on the table in a classroom while he plays outside. A second character then throws this paper bag into the garbage (the moral transgression) while helping the teacher clean the classroom, presumably because he had a false belief that the paper bag contained garbage (this is not explicitly specified in the task). When the first character returns to the classroom, he has a false belief that his cupcake is going to be on the table, when in reality it is in the garbage (Killen et al., 2011). Specifically, this task differs from standard ToM tasks because it has the moral

implications of victim and transgressor involvement. After hearing this story, participants answered questions about the characters' beliefs and emotions, and made moral judgments about the transgressor. Participants completed standard ToM tasks such as the previously described change of location task (Wellman & Liu, 2004).

While previous research has claimed that children have shifted to reasoning about beliefs from a representation-based perspective by the age of five based on their success with standard false belief tasks at this age (Wellman et al., 2001), the results of Killen et al.'s (2011) study did not support this developmental hypothesis. Specifically, it was observed that younger children evaluated the accidental transgression as 'more wrong' than did the older children, and that the positive intentions of the accidental transgressor in the MoToM task were not fully appreciated until seven and a half years of age. Such observations suggest that at the age of five, children's belief-reasoning is still somewhat limited, and a more sophisticated understanding of mental states, specifically intentions, continues to develop until a later age.

Although children had more difficulty with the MoToM task in comparison to the standard ToM task, consistent with the researchers' expectations, MoToM was observed to be a better predictor of moral reasoning than standard ToM. More generally, it was observed that even after controlling for age, children who were more successful at the false belief tasks attributed more positive intentions to the accidental transgressor compared to those who did not pass (Killen et al., 2011). Such findings are interpreted to mean that in general, children's ToM competency is related to their ability to attribute intentions in moral judgements, but that their understanding of intention in morally relevant contexts continues to develop between five and seven-years-old.

Such findings suggest a significant developmental difference between the acquisition of standard belief reasoning in contrast with morally relevant belief reasoning, however, the study by Killen et al. (2011) had noteworthy limitations. First, the moral judgement measure was embedded within the MoToM measure so that children's moral judgements were directly related to their understanding of the false beliefs in that scenario. However, having independent measures of MoToM and moral judgements, as included in the current study, were expected to be more informative as doing so eliminates the possibility of confounding factors such as comprehension and attraction/aversion to a particular story. Additionally, the stories within the MoToM task lacked context explaining how the false belief that led to the accidental transgression emerged, which made it seem as though the transgression was a result of negligence. This is problematic because negligence has been identified as a factor influencing children's moral judgements (Mulvey et al., 2020). Despite the limitations of Killen et al.'s (2011) MoToM measure, the study nonetheless provided novel evidence that MoToM is a better predictor of children's ability to reason about mental states in morally relevant contexts compared to prototypical ToM. That is, the addition of social and moral complexity in MoToM tasks make them more representative of how people have to consider intention in morally relevant situations. This level of mental state understanding is relevant not only to succeed in MoToM false belief tasks, but also to make appropriate moral judgements in the social interactions of everyday life.

Extending the work of Killen et al. (2011), the current study included measures of both prototypical ToM (Wellman & Liu, 2004) and a modified version of the MoToM task (Andrews et al., 2017). To address the aforementioned limitations, the revised version did not include a moral judgement related to the false beliefs in the MoToM task (moral judgements were only

made in response to the main task), and provided context about the emergence of the transgressor's false belief to eliminate the influence of transgressor negligence. The inclusion of both prototypical ToM and MoToM tasks made it possible to examine how both of these cognitive abilities are related to children's sensitivity to intention in a variety of contexts including lying, stealing, copying, and hiding. More recent research has expanded upon this relation by investigating the role of both ToM and MoToM on children's ability to distinguish between unintentional and intentional false statements within a morally relevant context (D'Esterre et al., 2019).

In D'Esterre et al.'s (2019) study, it was expected that those with underdeveloped ToM competencies would demonstrate bias toward interpreting all false statements as lies and treating them as such (i.e., that they are wrong and deserving of punishment) because they lack the ability to consider mental state knowledge related to intention. Children between the ages of four- to ten-years-old were presented with a story about two characters who both made false statements but differed based on whether their false statement was intentional or unintentional. For example, in the unintentional transgressor story, a character forgets to pack drinks in their backpack before a field trip, and unbeknownst to the character, their brother places drinks inside of the backpack on their behalf. In the intentional transgressor story, the character remembers to pack drinks into their backpack before the field trip. The premise of each story was that the character was responsible for packing a drink for a second character who did not have drinks available at home. In both stories, the characters falsely claim that they do not have any drinks, but in the unintentional story the character does not know that their brother packed the drinks for them, and in the intentional story, the character had consciously packed drinks in her backpack. After hearing each story, children made moral judgements, judged whether the actions were intentional

or not, assigned punishment, and indicated what they expected the teacher to do, in relation to punishment regarding the behaviour of the characters in the story. Further, participants completed two types of theory of mind tasks: prototypic ToM and MoToM assessments.

The results revealed that most children were sensitive to intention by morally judging the unintentional false statement more positively than the intentional false statement across all the measures, demonstrating that they could distinguish between the two types of falsehoods (D'Esterre et al., 2019). In line with previous research (e.g., Killen et al., 2011), children who succeeded on the MoToM task were sensitive to the distinction between the unintentional and intentional transgressions, and those who failed the MoToM task were not able to make this distinction. Additionally, MoToM was observed to be a stronger predictor of children's moral evaluations than prototypic ToM. Overall, D'Esterre and colleagues (2019) demonstrated novel findings about the importance of children's mental state understanding in their ability to understand lies. However, similar to Killen et al.'s (2011) study, a noteworthy limitation of this study is that the MoToM measure was embedded within the relevant stories, whereas the prototypic ToM task was independent of the other measures. That is, the relation between MoToM and children's ability to distinguish between unintentional and intentional false statements may have been caused in part by the moral judgement questions being embedded in the same context as the MoToM task (D'Esterre et al., 2019). The current study addressed this limitation by measuring ToM and MoToM separately from the story-based scenarios in the main task. Additionally, it aimed to extend the research on the relation between children's understanding of intention, ToM, and MoToM by exploring it in novel contexts beyond lying including stealing, copying, and hiding.

To summarize, we know from previous research that children's developing ToM competency is related to their understanding of lying (e.g. Maas, 2008; Vendetti et al., 2019), and that although most neurotypical children master standard ToM tasks between the ages of four and five (Vendetti et al., 2019; Wellman et al., 2001; Wellman & Liu, 2004), children's mental state understanding continues to develop until around the age of seven to incorporate an understanding of intention in morally complex contexts (D'Esterre et al., 2019; Killen et al., 2011). Research has also demonstrated that appropriate verb attribution by itself may underestimate children's understanding of intention in this age range (four to seven-years-old), as children's sensitivity to intention in moral judgements is apparent at a younger age than their ability to describe it using implicit verbs (Peterson et al., 1983; Wimmer et al., 1984, 1985). Further, there is a need for more research on children's developing understanding of intention, when it is encoded in language both implicitly and explicitly, and how it is related to both ToM and MoToM development.

In order to investigate children's ability to understand intention, including when it is encoded in language, and how this understanding is related to ToM and MoToM development, children in the current study heard four different story-based scenarios. In each scenario there were three characters: two characters who had *identical* overt behaviours, but differed in terms of their intention and beliefs (with details explicitly described in each story), and one character who was affected by these behaviours. Children's ability to understand intention was gauged by their: (1) application of verbs that had intention implicitly embedded in their meaning (steal, lie, copy, hide); (2) judgements of characters' intentions when explicit terms such as *on purpose* or *by accident* were employed; (3) moral judgement of story characters' behaviours; and (4) assigning of punishment to the story characters. Performance on these various assessments of children's

intention understanding were examined in relation to their ToM performance, employing both standard ToM and MoToM measures.

Present Study

The main goal of the present study was to examine children's sensitivity to intention (or lack thereof), such as when it is encoded in language, and how this skill is related to mental state reasoning (i.e., ToM and MoToM). The ability to consider intention when evaluating characters' behaviour was compared across a series of stories that involved actions that could be described by the intentionally-laden verbs: *lie*, *steal*, *copy*, and *hide*. The verb *lie* was included despite being well-studied in this area because its acquisition was yet to be compared to the acquisition of other intentionally-laden verbs within a single group of children. The remaining verbs, *steal*, *copy*, and *hide*, have been proven relevant by previous research in relation to children's mental state knowledge (e.g. McDermott & Noles, 2018; Nelson et al., 2012; Olson & Shaw, 2011), but have not been examined in the area of moral cognition. Their inclusion was expected to provide information about the uniformity of the acquisition of a consideration of intention and the use of verbs that require its consideration. Additionally, previous research demonstrating the influence of moral context in children's understanding of intention (Killen et al., 2011; Wandrey et al., 2012) justified the inclusion of verbs related to a variety of moral transgressions. *Steal*, *copy*, and *hide* were specifically chosen because the moral transgressions that these verbs apply to were expected to differ in severity. In general, although the severity of moral transgressions associated with these verbs may vary depending on the specific context, it was anticipated that based on how they were embedded in the story-based scenarios in the present study, *lie* and *steal* would be interpreted as more severe moral transgressions than *copy* and *hide*. Adult data was collected for the Intention-Verb task and the severity ratings from this sample were considered in the analyses.

For the current study, children between 4- to 7-years of age were recruited, as previous research has demonstrated that the ability to understand intention emerges during this age range (e.g., Maas et al., 2008; Wandrey et al., 2012; Wimmer et al., 1984). Children were presented with four stories (Intention-Verb task), each containing two characters who perform the same overt behaviour but vary based on their intentions and knowledge, and a third character who was affected by the behaviour. Following each story, children were asked: (1) comprehension questions to verify that they understood the story; (2) target questions about which description fit each character, one question using implicit language such as ‘*steal*’ someone’s belonging, and one question using explicit language such as ‘take someone else’s belonging on *purpose/by accident*’; (3) moral judgement questions about both story characters; and (4) whether or not each character deserved punishment, and if they did, how much. To address the possibility of order effects, the target questions were counterbalanced as well as the moral judgement questions (more details below).

Contrasting implicit and explicit language within the target questions was expected to capture potential differences, if any, between children’s understanding of intention when it is implicitly and explicitly encoded in language. This has been shown to be valuable by previous research observing that children’s understanding of intention is initially expressed implicitly, and later develops to be expressed explicitly (Baird & Astington, 2005; Wimmer et al., 1984). However, such research focused on children’s moral judgements as an indication of their implicit understanding of intention, whereas the current study focused on children’s correct verb usage as an indication of their implicit intention understanding, with moral judgements and assignments of punishment being measured separately. Comparing participants’ accuracy at attributing

intention both implicitly and explicitly to their moral judgements and assignments of judgement offered a novel way to explore children's developing understanding of intention.

Additional goals of the current study included analyzing the uniformity of the consideration of intention for different behaviours across contexts, as well as the correct use of the verbs that require its consideration, by comparing children's performance at doing so across scenarios describing *lying*, *stealing*, *copying*, and *hiding*. In addition to the main sample of children, a small group of adults were tested to examine whether adults considered the moral transgressions described in the context of these scenarios to vary in severity, as this was expected to be helpful to explain variations in children's performance. Additionally, the current study investigated the relation between performance on the described measures and both prototypical ToM (Wellman & Liu, 2004) and MoToM tasks (Andrews et al., 2017; revised from Killen et al., 2011). Though not the focus of the current study, the inclusion of both ToM measures were expected to add to our understanding of developmental differences across the two. Put another way, the current study examined whether previous findings about the relation between MoToM and children's understanding of intention (D'Esterre et al., 2019), as well as developmental differences in success on prototypical ToM and MoToM tasks (Killen et al., 2011) would be replicated when a revised version of MoToM is used.

Participants' language abilities were also assessed, using the Receptive Vocabulary subtest of the Wechsler Preschool and Primary Scale of Intelligence – Fourth Edition: Canadian (WPPSI – IV CDN; Wechsler, 2012). Tests of receptive vocabulary have been suggested to be one of the most straightforward measures of language ability because the assessments are often relatively independent of other language abilities (Milligan et al., 2007). Therefore, the inclusion of this type of measure made possible to control for general language ability while examining the

relation between children's understanding of intention and its relation to ToM. Given the verbal nature of the measures, controlling for general language was important in order to reduce the likelihood that relations across tasks were simply due to language ability.

Hypotheses

The first set of hypotheses focused on the relation between children's age and their performance on various components of the Intention-Verb task. It was anticipated that in general, children's sensitivity to intention across the Intention-Verb task would follow an age-related trend, in line with extensive previous research demonstrating improvements in children's intention understanding as they get older (e.g., Killen et al., 2011; Maas, 2008; Wandrey et al., 2012). Specifically, I hypothesized that:

- a. Children's accuracy with verbal descriptions that involve intention, both implicitly and explicitly, would be correlated with age (after for controlling for general language). More specifically, they would be more accurate at attributing the correct language to the intentional and unintentional characters, as well as correctly indicate which character acted purposefully versus by accident; and
- b. Older children would demonstrate a greater sensitivity to intention, as demonstrated by their moral difference scores and punishment difference scores (these scores are explained in the methodology). In other words, it was expected that children's age would be positively correlated with their moral difference and punishment difference scores, after controlling for general language ability.

The second hypothesis related to children's success across the four verb scenarios. I hypothesized that children would demonstrate greater overall accuracy at attributing intention when it was encoded explicitly with terms such as *on purpose* or *by accident* in comparison to

their overall accuracy at attributing intention when it was implicitly encoded in language across the verbs *lie*, *steal*, *copy*, and *hide*. This was expected based on previous research that has observed children being sensitive to intention before they are able to accurately use the language that describes it (Peterson et al., 1983; Wimmer et al., 1984, 1985).

The third set of hypotheses were related to the perceived severity of the transgressions described across the Intention-Verb stories. A sample of 44 adult participants completed the main task, and the differences in their moral judgements and assignments of punishment were taken to indicate their beliefs about the varying severity of the transgressions (comparing intentional to unintentional actions) across the four verb scenarios. It was anticipated that in the context of the current study, adults would evaluate the intentional character in the lying and stealing scenarios more negatively than the unintentional character, as well as assign them to be more deserving of punishment, compared to the copying and hiding scenarios. This was operationalized by creating difference scores from the moral judgements of the characters who acted unintentionally with the moral judgement scores of the characters who acted intentionally, and the same was done for punishment scores. It was expected that regardless of the pattern revealed, the differences in children's moral judgements and assignments of punishment would be reflective of the adult data; that is, children's sensitivity to intention would follow the same pattern to that of the adults'. Specifically, I hypothesized that:

- a. Adults' ratings of the intentional characters across the scenarios would vary based on the perceived severity of harm, validating that the degree of harm in these scenarios vary. Specifically, it was expected that adults would have higher moral difference and punishment difference scores in the lying and stealing scenarios in comparison to the copying and hiding scenarios; and

- b. The variations in adults' moral difference and punishment difference scores would be predictive of children's performance on the Intention-Verb task. More specifically, I predicted that children's moral difference scores, punishment difference scores, and accuracy for both implicit and explicit verbs, would be similar to adults' moral difference and punishment difference scores. In the context of the current study, it was expected that the scenarios in which adults demonstrated the most sensitivity would be the ones where children would demonstrate greater sensitivity.

The fourth set of hypotheses related to performance on the ToM and the MoToM tasks. More specifically, I predicted that:

- a. Supporting extensive previous research demonstrating that mental state understanding improves with age (e.g., Baird & Astington, 2005; Lee & Imuta, 2021; Wellman et al., 2001), age would be related to performance on both Theory of Mind measures, even after controlling for general language ability; and
- b. Children would have more difficulty with the MoToM task in comparison to the ToM task, even after controlling for age, because previous research has demonstrated significant differences between performance on these tasks due to the higher cognitive demands of considering a moral component (D'Esterre et al., 2019; Killen et al., 2011); and
- c. Performance on both the ToM and MoToM tasks would predict performance on the Intention-Verb task (implicit accuracy, explicit accuracy, moral accuracy, and punishment accuracy). Moral accuracy and punishment *accuracy* scores were operationalized by allocating a score of 1 for each difference score that was positive (i.e., that were in the right direction, as will be explained in the methods). MoToM was

expected to be a greater predictor based on previous findings (Killen et al., 2011). That is, accuracy in the MoToM measure was expected to be related to better implicit accuracy, explicit accuracy, moral accuracy, and punishment accuracy above and beyond both language ability and age, because children's ability to succeed at this comparatively complex task should be related to their ability to attribute the mental state of intention.

Method

Participants

Due to the SARS-CoV-2 pandemic, all participant recruitment and data collection took place online. While data collection is ongoing, this thesis is based on the data collected by end of December 2022. Child participants ($N = 44$, $M_{\text{age}} = 74.16$, $SD = 13.17$) were divided into two groups, based on age in years. There were 18 four- to five-year-olds (10 girls; $M_{\text{age}} = 60.67$ months, $SD = 6.60$), and 26 six- to seven-year-olds (10 girls; $M_{\text{age}} = 83.50$ months, $SD = 6.85$). Ten additional participants were tested but not included in the analyses; three were excluded due to parental influence, two were excluded due to experimenter error that resulted in missing data, and five did not complete the study due to fatigue or persistent environmental distractions. Participants were recruited through popular social media platforms (i.e., Facebook and Instagram), word-of-mouth, and follow-ups with parents who had previously given consent to be contacted for future studies in the lab. Using Facebook and other global social media platforms as recruitment tools resulted in the inclusion of participants from various parts of Canada and the United States, however, demographic information was not collected. Although a lot of hard work was put into participant recruitment, the current pandemic has made this process particularly challenging, which justifies my decision to proceed with my analyses despite not meeting the originally proposed sample size. I will be continuing to recruit and test participants through the

end of April, and the current study will be continued in the Children's Representational Development Lab until it is completed.

All parents who expressed interest in participating were sent an email with additional information about the study (Appendix B) and an informed consent letter (Appendix D). Additionally, parents were sent a Zoom protocol form explaining how the platform is used and the steps we take to create a secure and confidential connection (Appendix E). At the beginning of each session, verbal consent was obtained from the parents. The researcher presented the parents with a consent statement and requested permission to audio record the parent providing this consent. The researcher also requested verbal consent to video and audio record the session with their child, however, children were still permitted to participate if their parent did not wish to grant this additional consent. After verbal consent was obtained from the parents, the recording was terminated, and a separate recording began if this level of consent had been granted. Verbal consent and recordings of children's sessions were recorded and stored separately for confidentiality purposes. All recordings were stored exclusively on protected hard drives accessible only to the researchers associated with the study.

Before starting the tasks, verbal assent was obtained from the children, and all children were informed that they could end the testing session at any point if they did not wish to continue. Due to the study being completed online, sessions took place at various times of the day, including late evenings. Because of this, researchers were attentive for children who seemed to be too fatigued to complete the tasks and ended the testing session if necessary (even if the child did not request it). This was also the planned procedure in the case that children seemed to be upset or in distress, however, there were no participants who demonstrated these feelings.

Regardless of the number of tasks completed, a \$10 Amazon gift card¹ was provided to each participant as a way to show appreciation for their willingness to participate in the study.

A comparison group of 50 adult participants were recruited through SONA to complete the Intention-Verb task (main task). Two participants were removed due to receiving extremely low scores on the comprehension questions, suggesting that they were not reading the stories carefully, resulting in a final sample of 48 adult participants being included in the main analyses. The purpose of including this sample was to get an assessment of adults' evaluation of the transgressions across the various story-based scenarios to determine whether they saw them as differing in severity. More specifically, I was interested in whether they would evaluate lying and stealing more negatively than copying and hiding. Additionally, the inclusion of an adult sample was helpful to determine whether or not the main task elicits the expected responses. It was expected that adults would be sensitive to the intentions of both story characters in each of the stories. That is, adults were expected to be able to accurately attribute the corresponding intention verbs, and that this understanding of intention would be reflected within their moral judgements. Additionally, it was expected that they would be able to make appropriate assignments of punishment based on this information (i.e., assign punishment to the intentional transgressor). The adult data was collected prior to running the study with child participants.

Procedure

The current study was conducted entirely online. Each child had a one-on-one testing session with a researcher via the video conferencing platform Zoom. The testing session included: four stories for the Intention-Verb task (main task), ToM tasks (diverse desires, diverse beliefs, knowledge access, contents false belief, and explicit false belief; drawn from Wellman &

¹ Gift card was provided in CAD or USD depending on the location of the participant.

Liu, 2004), MoToM tasks (two trials), and a receptive vocabulary test (WPPSI). Each session took approximately 35-40 minutes to complete.

Intention-Verb Task

Children were presented with four stories (counterbalanced in terms of order of presentation), each containing two characters who performed the same overt behaviours but varied in their intentions and relevant knowledge, as well as one character who was affected by these behaviours. More specifically, each story featured a character who intentionally *lied*, *stole*, *copied*, or *hid* (the ‘intentional character’), and a second character who performed the identical physical behaviours but differed from the first character by lacking the relevant belief/knowledge and intention (the ‘unintentional character’). The intentional characters’ intentions and knowledge were explicitly stated within the various stories, and the unintentional characters’ ignorance was made clear. Each story was accompanied by simple animations for clarity (one image accompanied each story point, as indicated by the bullets). An example of one of the stories is as follows (see Appendix I for full stories and images):

- This is Angela, and this is Sam. They are sister and brother. This is their Dad.
- Angela and Sam are reading books in the living room. There are two big chairs in the living room. If Angela and Sam sat in them, no one would be able to see them from behind.
- Angela can hear Dad coming down the stairs to tell them it’s time for bed.
Angela doesn’t want to go to bed.
- She doesn’t want her dad to see her, so she jumps into one of the chairs and sits there reading her book.
- Sam does not hear his dad coming but he also jumps into a chair with his book.

- Dad does not see them and goes back upstairs.

Following the presentation of each story, children were first asked a series of comprehension questions. The comprehension questions included: “Did Dad see Angela?”, “Did Dad see Sam?”, “Who heard that Dad was coming to say it was time for bed?”, “Who didn’t hear that Dad was coming to say it was time for bed?”. If they did not answer these questions correctly, the relevant story details were repeated and were asked once more. If they were not able to correctly answer the comprehension questions after the second repetition of the story, this was noted and they continued on to the rest of the questions.

Participants were then asked about the characters’ intention when it was implicitly encoded in language with the questions “Did Angela hide from Dad?” and “Did Sam hide from Dad?”. They were also asked about intention explicitly marked with questions such as, “Did Angela sit where Dad couldn’t see her by accident or on purpose?”, and “Did Sam sit where Dad couldn’t see him by accident or on purpose?”, with the forced choice options counterbalanced across participants. The implicit and explicit intention attribution questions were counterbalanced across participants. The question order for the intentional and unintentional characters were counterbalanced, within question type, across participants as well.

Correct answers on both implicit intention attribution questions were credited with a single point, and correct answers on both explicit intention attribution questions were credited with a single point and were summed up across the four stories to provide scores (out of four) for each type of question (implicit and explicit). These scores were used in the analyses.

Children were asked to make moral judgements about the characters using the questions drawn from Vendetti, Kamawar, and Andrews (2019). For example, following the hiding story outlined above, children were asked: “Was what Angela did good? [If yes] How good was it? A

little bit good, or a lot?”, “Was what Angela did bad? [if yes] How bad was it? A little bit bad, or a lot?” (p. 827). Answers to these questions were scored from -2 (indicating “yes” to initial moral judgement about whether behaviour is bad, then indicating “a lot” when asked how bad) to +2 (indicating “yes” to initial moral judgement about behaviour being good, and then indicating “a lot” when asked how good) for each story. If children initially respond “no” to whether the behaviour was good or whether it was bad, they received a score of 0. For the purpose of the analyses, the scale was converted to a scale ranging from +1 (“a lot” good) to +4 (“a lot” bad), with scores of +2 converted to a +1, and scores of -2 converted to a +4 (and the rest being converted in a similar fashion).

On a child-by-child basis, a difference score was created by subtracting the moral judgement score assigned to the character who acted unintentionally from the moral judgement score assigned of the character who acted intentionally. If this score was positive, it meant that the participant judged the unintentional character more positively than the intentional character, which can be interpreted to indicate that they were sensitive to the characters’ intentions. Further, positive difference scores were categorized as ‘correct’, and the participant received a score of 1. Both of the scores (difference scores and categorized scores) were used in the analyses.

In addition to making moral judgements of the characters, children were asked to indicate whether or not they thought each character should get in trouble for their behaviour, for example: “Think about what Angela did. Should Angela get in trouble for what she did? [If yes] How much trouble? A little bit or a lot?” (p. 827). Scores on these questions were entered as 0 (indicating “no” to the initial question), 1 (indicating “yes” to initial question about whether the character deserves to get in trouble, and then indicating “a little” when asked how much), or as 2 (indicating “yes” to initial question about whether the character deserves to get in trouble, and

then indicating “a lot”). Similar to the moral judgement questions, a difference score was created for each participant (per story) by subtracting the punishment ascription of the character who acted unintentionally from the punishment ascription of the character who acted intentionally. If this score was positive, it suggested that the participant considered intention when ascribing punishment. Positive difference scores were considered correct, and the participants received a score of 1 for that punishment ascription. Again, both scores were used in the analyses.

The inclusion of children’s moral judgements provided insight about children’s understanding of the key verbs. For example, a possible response regarding the accidental transgressor in the *stealing* story may be that the character “stole”, but took the item accidentally, that what the character did was not “bad”, and that they should not be punished. This sort of response would provide support for the idea that the child does understand the character’s intentions within that context, but has not yet developed an understanding of the intention-embedded language that is used to describe it (Wimmer et al., 1984). Thus, including measures for implicit accuracy, explicit accuracy, moral judgements, and assignments of punishment made it possible to compare the different ways their understanding of intention in these scenarios, if any, may be expressed.

Theory of Mind

In addition to the main task, children completed prototypical ToM tasks, which were modified to be completed virtually with the use of photos (tasks drawn from Wellman & Liu, 2004, photos created in the lab). More specifically, participants completed a five-item scale, in which the items assessed children’s understanding of knowledge access, contents false belief, explicit false belief, belief-emotion, and real-apparent emotion (see Appendix J). The tasks increased in complexity with progression of the measure. Children received a score of 1 for each

task that they succeeded on, which were summed together at the end for a total score out of 5, which was the score used in the analyses when appropriate (i.e., for correlational and regression analyses). For analyses comparing means (i.e., ANCOVA), this score was converted to be out of 4 (by multiplying the ToM total by 4/5) so that mean performance could be compared to MoToM, which is scored out of 4 (described after this task). Neuro-typical children are usually able to succeed at all of these ToM items by the age of five (Wellman & Liu, 2004).

Knowledge Access. Children were shown the contents of a cupboard, and then were asked to reason about whether another person who had not seen inside the cupboard knew what the contents were. More specifically, the child was presented with a photo of a featureless cupboard and were asked what they thought was inside of it. After the child made a guess or indicated that they did not know, they were shown that the cupboard contained a clipart image of a dog. To control for memory, after the image of the dog was concealed again by returning to the photo of the closed cupboard, the child was asked again what was inside of the cupboard. Next, the child was introduced to a hypothetical character and was asked to reason about the character's knowledge about the cupboard: "Polly has never seen inside this [cupboard]. Now here comes Polly. So, does Polly know what is inside this [cupboard]?" (p. 538). As an additional memory control, the child was asked again whether the character saw inside of the cupboard. Children's answers were scored as correct only if they responded "no" to whether the character knew what was inside the cupboard and whether they saw inside of it.

Contents False Belief. Children were shown the contents of a box, and then were asked to reason about another person's false beliefs about the contents of the box. Specifically, the child was shown a photo of a Band-Aid box and was asked what they thought was inside of it. After the child indicated what they thought was inside of the box, the researcher showed a photo

that revealed a toy frog inside of the box, and then returned to the photo of the closed Band-Aid box and asked the child again what was actually inside of the box. The child was then introduced to a hypothetical character who had not seen the inside of the Band-Aid box and was asked to reason about their beliefs about the contents: “Peter has never seen inside this Band-Aid box. Now here comes Peter. So, what does Peter think is inside the box? Band-Aids or a frog?” (p. 538). To control for memory, the child was asked if the character had seen inside the box. Children’s answers were be scored as correct if they indicated that the character thought that there are Band-Aids in the box *and* that they had not seen inside of the box.

Explicit False Belief. Children were informed about another person’s false belief about the location of an object, and were then asked to reason about where that person would search for the object based on that false belief. Accompanied with illustrations, children were presented with the following scenario: “Here’s Scott. Scott wants to find his mittens. His mittens might be in his backpack or they might be in the closet. Really, Scott’s mittens are in his backpack. But Scott thinks his mittens are in the closet” (p. 539). The child was then asked to indicate where the character would look for their mittens, and where the mittens were in reality. Children’s answers were scored as correct if they indicated that the character would look in the closet for his mittens (false belief) *and* also indicated that the mittens were actually in his backpack.

Belief-Emotion. Children were be presented with an image of a boy (Teddy) and an identifiable raisin box with rocks inside of the closed box. The child was asked to reason about what they believed was inside of the raisin box. The experimenter made Teddy speak to express that raisins (or whatever child suggested was inside the box) are his favourite snack. Teddy then went away to play (his photo was removed from the screen), and the real contents of the raisin box (rocks) were shown to the child. Then, Teddy returned and the child was told: “Teddy has

never seen inside this box. Now here comes Teddy. Teddy's back and it's snack time. Let's give Teddy this box. Before Teddy opens the box, how does Teddy feel when he gets this box? Happy or sad?" (p. 539) and then after revealing the contents of the box to Teddy: "How does Teddy feel after he looks inside the box? Happy or sad?" (p. 539). Children's responses were scored as correct if they indicated that Teddy would feel happy when he received the raisin box (because he thought his favourite snack was inside of it) *and* that Teddy felt sad after looking inside the box (because he realized it was filled with rocks).

Real-Apparent Emotion. Children were presented with the following story, accompanied by an image of the back of a boy's head so that his facial expression was concealed:

This story is about a boy. I'm going to ask you about how the boy really feels inside and how he looks on his face. He might really feel one way inside but look a different way on his face. Or, he might really feel the same way inside as he looks on his face. I want you to tell me how he really feels inside and how he looks on his face. This story is about Matt. For his birthday, Matt had asked for a cool red shirt from his favourite store. On his birthday, Aunt Rosie gives Matt the last gift. When he opens it, he finds an ugly green shirt. All of Matt's family thought it was a great gift, but not Matt. Matt didn't like the gift. Matt didn't want his Aunt Rosie to see how he felt about the gift, because it would make her sad. So Matt tried to hide how he felt (p. 539).

After hearing the story, children were asked two questions about key details in the story as a memory check. Following the memory check children were asked a target-feel question: "So, how did Matt really feel, when he opened the gift? Did he feel happy, sad, or okay?" (p. 539) as well as a target-look question: "How did Matt try to look on his face, when he opened the

gift? Did he look happy, sad, or okay?" (p. 539). Children were presented with three faces (happy, okay, and sad) to refer to when they respond to the questions. Answers were scored as correct if their answer to the target-feel question was more negative than their answer to the target-look question.

Morally Relevant Theory of Mind (MoToM)

Participants received two trials measuring their morally relevant Theory of Mind abilities (Andrews et al., 2017, based on Killen et al., 2011). Such tasks are similar to standard first-order false belief but were modified to incorporate moral considerations. By situating a false belief scenario within a morally relevant context, the child was required to consider the potential role of a transgressor and the effect on a victim, rather than just passive characters. Specifically, participants were presented with a story in which a child mistakenly believed that an item was trash, which led them to unintentionally dispose of something that was valuable to another child (see Appendix K for full stories and images). An example of one of the stories is as follows (each bullet point is associated with a different image to help with comprehension of the story):

- Shalini and Jennifer are having lunch together at school.
- Shalini finished her lunch and put her water bottle in her lunch bag. When Jennifer finished her lunch, she put her banana peel inside her empty chip bag.
- Then, the teacher gave everyone a cookie. Shalini finishes her cookie and tidies her desk. She puts her garbage away and goes wash her hands.
- While Shalini is gone, Jennifer decides to save her cookie, so she takes the banana peel out of her chip bag and puts the cookie inside to save it.
- Jennifer throws the banana peel away and goes outside to play. While she's gone, Shalini comes back.

- Shalini sees Jennifer's chip bag on the table, and wants to help tidy up.
- Shalini throws the bag in the garbage.

Children were first asked a comprehension question to verify that they understood the story: "Did Shalini see Jennifer put her cookie in the chip bag?". If they were incorrect, the main story portion was re-read (bullet #4) and the question was asked again. This was repeated up to one time more before proceeding to the remaining questions (accuracy was noted). Then, they were asked a series of four questions relating to the accidental transgression. Specifically, they were asked to identify the false belief of the accidental transgressor regarding the item (content false belief): "What did Shalini think was in the chip bag?" as well as the location of the item in reality: "What was really in the chip bag?" (this also served to check for story comprehension). They were then asked about the victim's false belief about their item (location-change false belief): "Where will Jennifer first look for her cookie when she comes back inside?" as well as where the victim's item was in reality: "Where is her cookie?" (again, this served to check for story comprehension). Each correctly answered pair of questions (one pair for the transgressor and one pair for the victim) were scored as +1, for a score of 0 to 2, per story. The scores for the two stories were summed to create a total score out of 4, which was the score used in the analyses.

General Language Ability

General language ability was tested using the Receptive Vocabulary subtest of the Wechsler Preschool and Primary Scale of Intelligence – Fourth Edition: Canadian (WPPSI – IV CDN; Wechsler, 2012). Children were presented with a series of four photos and were asked to point out a specific picture (e.g., "Show me the Toaster", and then the child had to correctly indicate which picture among 4 appliances was a toaster). Depending on the child's age, there

were different word/photo series varying in complexity. If children indicated the correct photo, they received a score of 1, and conversely if they could not correctly indicate the correct photo, they received a score of 0. The test is discontinued after five consecutive scores of 0. For the purpose of the analyses, correct answers will be summed together to create a total score, which was the score used in the analyses.

Results

Preliminary Analyses

Preliminary analyses were conducted prior to examining performance on the Intention-Verb task to determine whether participants were matched across the different counterbalancing conditions. More specifically, a repeated-measures analysis of variance (ANOVA) was conducted to test for any significant differences across the five counterbalancing conditions (Story Order, Intentional/Unintentional Character First, Implicit/Explicit Questions First, On Purpose/By Accident First, and Good/Bad Questions First). Additionally, an independent-samples t-test was conducted to test for any significant gender differences across all study variables. Results revealed no significant differences at the $p = .05$ level between counterbalancing orders or participant gender. Therefore, counterbalancing order and gender were not controlled for in the following analyses. Additional preliminary analyses for the statistical tests used in the main analyses are described below with each set of hypotheses.

Descriptive statistics for all measures considered in the analyses are displayed in Tables 1 and 2. Descriptive statistics for adult participants on the Intention-Verb task are included in Table 1 for comparative purposes. All child participants completed all of the measures, with the exception of five children who were excluded from the general language (WPPSI) measure

because of experimenter error ($n = 1$), or participant fatigue that led to ending the study session prior to completing this task ($n = 4$). Therefore, these participants were excluded from the statistical analyses that controlled for performance on this measure. Adult participants only completed the Intention-Verb task, and their scores on this task were used in some of the main analyses to compare their performance on this task to that of the children.

Table 1

Means and Standard Deviations for Child and Adult Participants on Intention-Verb Task

Dependent Variable	Younger Children	Older Children	Overall Children	Adults
	Mean (SD)			
Implicit Accuracy: Total (0-4)	1.00 (0.97)	2.42 (1.21)	1.84 (1.31)	3.31 (0.93)
Implicit Accuracy: Lie	0.22 (0.43)	0.69 (0.47)	0.50 (0.51)	0.88 (0.33)
Implicit Accuracy: Steal	0.28 (0.46)	0.58 (0.50)	0.45 (0.50)	0.75 (0.44)
Implicit Accuracy: Copy	0.44 (0.51)	0.62 (0.50)	0.55 (0.50)	0.94 (0.24)
Implicit Accuracy: Hide	0.06 (0.24)	0.54 (0.51)	0.34 (0.48)	0.75 (0.44)
Explicit Accuracy: Total (0-4)	0.56 (0.86)	2.46 (1.27)	1.68 (1.46)	3.71 (0.54)
Explicit Accuracy: Lie	0.17 (0.38)	0.65 (0.49)	0.45 (0.50)	0.83 (0.38)
Explicit Accuracy: Steal	0.17 (0.38)	0.81 (0.40)	0.55 (0.50)	1.00 (0.00)
Explicit Accuracy: Copy	0.17 (0.38)	0.46 (0.51)	0.34 (0.48)	0.98 (0.14)
Explicit Accuracy: Hide	0.06 (0.24)	0.54 (0.51)	0.34 (0.48)	0.90 (0.31)
Moral Difference: Lie ^a	0.33 (1.33)	2.00 (1.67)	1.32 (1.74)	1.69 (1.06)
Moral Difference: Steal	0.00 (1.88)	1.73 (1.67)	1.02 (2.06)	2.58 (1.20)
Moral Difference: Copy	-0.06 (0.99)	0.81 (1.36)	0.45 (1.54)	0.52 (1.57)
Moral Difference: Hide	0.22 (2.40)	1.23 (1.56)	0.82 (1.98)	1.65 (1.56)
Moral Accuracy (0-4) ^b	1.39 (1.38)	2.54 (1.21)	2.07 (1.39)	3.29 (0.82)
Punishment Difference: Lie ^a	0.17 (0.99)	1.23 (1.07)	0.80 (1.15)	1.04 (0.58)
Punishment Difference: Steal	0.44 (0.78)	1.15 (0.92)	0.86 (0.93)	1.60 (0.57)
Punishment Difference: Copy	0.28 (0.67)	0.42 (0.86)	0.36 (0.78)	0.44 (0.74)
Punishment Difference: Hide	0.11 (0.83)	1.04 (0.82)	0.66 (0.94)	0.98 (0.70)
Punishment Accuracy (0-4) ^b	1.00 (2.25)	2.46 (1.42)	1.80 (1.56)	2.90 (0.90)

Note. $n = 18$ younger children; $n = 26$ older children; $n = 44$ adults.

^a Difference scores created by subtracting the score of the unintentional character from the score of the intentional character (Moral ± 4 ; Punishment ± 2). ^b These accuracy scores were created by allocating a score of 1 for each difference score that was positive (i.e., that were in the right direction).

Table 2

Means and Standard Deviations for Child Participants on Additional Study Variables

Dependent Variable	Younger Children	Older Children	Overall Children
	Mean (SD)	Mean (SD)	Mean (SD)
Theory of Mind (0-5)	2.72 (1.53)	4.19 (0.85)	3.60 (1.37)
Theory of Mind Scaled (0-4)	2.18 (1.22)	3.35 (0.68)	2.87 (1.10)
Morally Relevant Theory of Mind (0-4)	1.94 (1.35)	2.92 (1.09)	2.52 (1.28)
WPPSI ^a (raw)	16.61 (8.90)	15.15 (1.15)	17.51 (3.84)

Note. $n = 44$

^a $n = 39$ due to missing data from five children on this measure.

Main Analyses

The first set of hypotheses focused on whether children’s age was related to their sensitivity to intention on various components of the Intention-Verb task when general language ability was controlled for. To address these hypotheses, a Pearson’s partial correlation was run. Note that $n = 39$ for this analysis due to missing data from five participants on the general language task. Prior to running the correlations, the data was checked to ensure that the main assumptions for a Pearson’s partial correlation (e.g., linear relationships between all variables, normal distributions, and the absence of outliers). These assumptions were met, and therefore the test was run normally.

To test the first part of the hypothesis, which was that children’s implicit and explicit accuracy would increase with age (demonstrating a greater sensitivity to intention), a Pearson’s partial correlation involving age in months, implicit accuracy, and explicit accuracy, controlling for general language ability, was run. As seen in Table 3, there were significant, positive correlations between age and implicit accuracy, $r(36) = .45, p = .005$, and age and explicit

accuracy $r(36) = .59, p < .001$. These correlations support the hypothesis, and demonstrate that as age increased, children's implicit and explicit accuracy increased, suggesting that their sensitivity to intention improved with age.

The second part of the hypothesis, which was that older children would demonstrate a greater sensitivity to intention as demonstrated by their moral difference scores and punishment difference scores (recall that positive scores indicate that characters' intentions were being considered), a Pearson's partial correlation involving age in months, moral difference scores, and punishment difference scores, controlling for general language ability, was run. As seen in Table 3, there were significant, positive correlations between age and moral difference scores $r(36) = .50, p = .001$, as well as between age and punishment difference scores, $r(36) = .59, p < .001$. These correlations supported the hypothesis by demonstrating that as age increased, children's consideration of intention while making moral judgements and assigning punishment increased as well.

Table 3

Descriptive Statistics and Correlations for Study Variables (controlling for General Language)

Variables	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7
1. Age (months)	75.51	13.10	-						
2. Implicit Accuracy	1.87	1.28	.45**	-					
3. Explicit Accuracy	1.79	1.40	.59**	.54**	-				
4. Moral Difference	4.10	4.70	.50**	.63**	.49**	-			
5. Punishment Difference	2.82	3.00	.74**	.59**	.55**	.74**	-		
6. ToM	3.69	1.30	.57**	.39*	.40*	.48**	.34*	-	
7. MoToM	2.62	1.21	.28	.36*	.41*	.30	.23	.37**	-

Note. $n = 39$

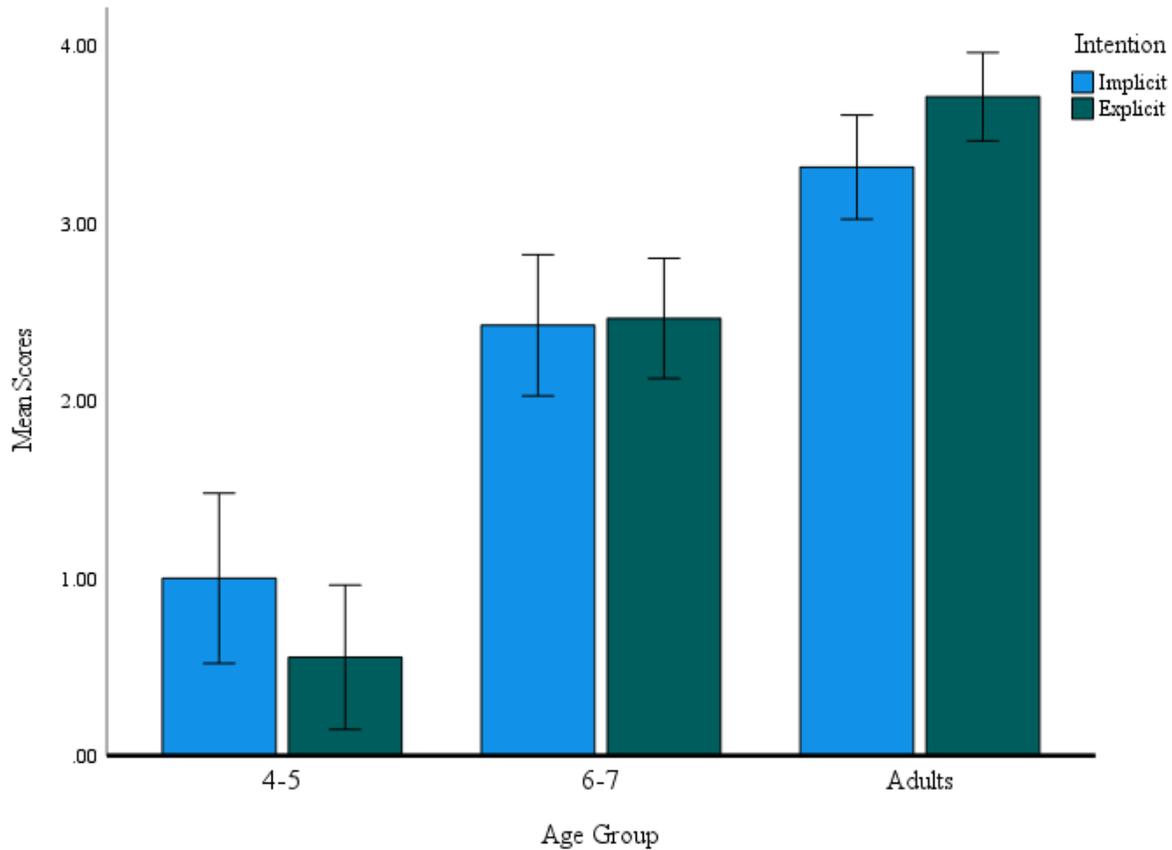
* $p < .05$. ** $p < .01$.

To test my second hypothesis, that children would demonstrate greater accuracy at attributing intention when it was stated explicitly in comparison to when it was implicitly encoded in language, a two-way 2 (intention: implicit accuracy vs. explicit accuracy) x 3 (age: younger children, older children, adults) mixed ANOVA was conducted. Although this hypothesis was not about adults' performance, their data was included for comparative purposes. First, preliminary analyses concluded that the data was normally distributed for both implicit and explicit accuracy, that there were no significant outliers, and that there was homogeneity of variance. Each of the main ANOVA assumptions were satisfied, validating that it was appropriate to proceed with the statistical test.

The analysis revealed that overall, the difference between implicit accuracy and explicit accuracy was not significant, $F(1, 89) = 0.001$, $MSE = 0.53$, $p = .977$, $\eta_p^2 = 0$. However, the analysis revealed an age effect, $F(2, 89) = 79.20$, $MSE = 1.26$, $p < .001$, $\eta_p^2 = .64$, as well as a significant interaction between accuracy and age group, $F(2, 89) = 4.48$, $MSE = 0.53$, $p = .014$, $\eta_p^2 = .09$. Post-hoc comparisons were conducted using a Bonferroni adjustment. As shown in Figure 1, for both younger and older children, there was no difference in accuracy between the implicit and explicit questions, $M_{DIFF} = 0.44$, $p = .071$, and $M_{DIFF} = -0.04$, $p = .850$, respectively. Thus, the hypothesis that children would be significantly more accurate when intentions were explicitly stated, in comparison to when they were encoded implicitly, was rejected. In contrast, adults were significantly more accurate at attributing intention when they were explicitly indicated than when they were implicitly encoded, $M_{DIFF} = 0.40$, $p = .009$.

Figure 1

Mean Scores for Intention Accuracy by all Age Groups



Note. Mean scores for implicit and explicit accuracy by all age groups. Error bars: 95% CI.

My third set of hypotheses were focused on whether participants’ sensitivity to intention varied for each of the four verb scenarios (*lie, steal, copy, and hide*) across the Intention-Verb task (moral difference scores, punishment difference scores, implicit accuracy, and explicit accuracy). In other words, adults’ sensitivity to intention was expected to vary based on the perceived severity of harm in each verb scenario, and differences in children’s sensitivity were expected where adults showed the most sensitivity. It was specifically expected that the intentional characters in the lying and stealing scenarios would be judged more negatively than

to their unintentional counterparts, in comparison to the copying and hiding scenarios, which would be demonstrated by higher difference and accuracy scores. To test this set of hypotheses, four mixed-design ANOVAs were conducted (one per each performance component of the Intention-Verb task). Age group was consistently used as the between-subject factor so that sensitivity to intention could be compared between younger children, older children, and adults. Preliminary analyses were run, which confirmed that each of the main ANOVA assumptions including normality, homogeneity of variance, and sphericity were satisfied.

It was hypothesized that adults would have higher moral difference scores in the lying and stealing scenarios in comparison to the copying and hiding scenarios, reflecting the expected variations based on the perceived severity of harm across the verb scenarios. Additionally, it was expected children's moral difference scores would follow the adults' pattern. The first ANOVA followed a two-way 4 (moral difference scores: lie, steal, copy, hide) x 3 (age group: younger children, older children, adults) mixed design. Through examination of boxplots, one significant outlier was identified in the moral difference scores for *steal*. However, sensitivity analyses including and excluding the outlier showed similar results, thus, the outlier was not removed from the analysis.

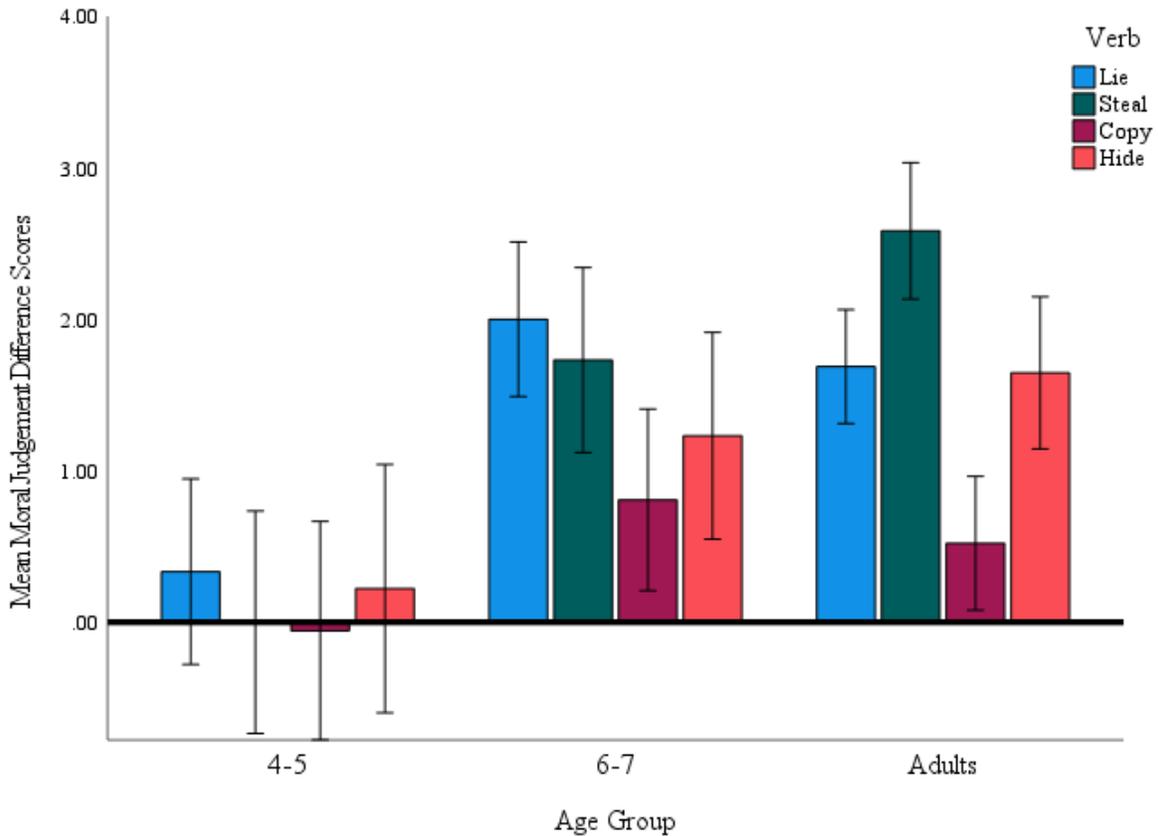
Significant differences were observed between the overall moral difference scores for the verbs, $F(2.95, 262.84) = 8.97$, $MSE = 1.85$, $p < .001$, $\eta_p^2 = .09$. There was also an age effect, $F(2, 89) = 14.47$, $MSE = 4.13$, $p < .001$, $\eta_p^2 = .25$. Further, the analysis revealed a significant interaction between moral difference scores and age group, $F(5.91, 262.84) = 3.24$, $MSE = 1.85$, $p = .005$, $\eta_p^2 = 0.07$.

Post-hoc comparisons with a Bonferroni adjustment were conducted to determine the nature of the interaction. As seen in Figure 2, the analyses revealed that adults had significantly

greater difference scores in the lying scenario in comparison to the copying scenario, $M_{\text{DIFF}} = 1.17, p < .001$. Further, adults had significantly greater moral difference scores for the stealing scenario in comparison to the copying scenario, $M_{\text{DIFF}} = 2.06, p < .001$, as well as the hiding scenario, $M_{\text{DIFF}} = 0.94, p = .004$. Thus, the hypothesis that adults would be more sensitive to intention in the lying and stealing scenarios was only partially supported, because not all of the expected differences were observed. More specifically, adults' moral difference scores demonstrated that they only rated the intentional character more negatively than the unintentional character for some of the scenarios. Additional significant differences existed between the stealing and the lying scenarios, $M_{\text{DIFF}} = 0.90, p = .005$, as well as between the hiding and copying scenarios, $M_{\text{DIFF}} = 1.13, p = .001$.

Figure 2

Mean Moral Difference Scores per Verb by Age Group



Note. Mean moral difference scores ($N = 92$) for lie, steal, copy, and hide by age group. Error bars: 95% CI.

In relation to children’s moral difference scores, for the older children, moral difference scores were higher in the lying scenario in contrast to the copying scenario, $M_{DIFF} = 1.19, p = .01$, however, this was the only significant difference that aligned with the pattern of moral difference scores among adults. For the younger children, there were no significant differences in moral difference scores between any of the verb scenarios. These contrasts are summarized in Table 4.

Table 4

Summary of Moral Difference Contrasts

Contrast	Difference Predicted	Younger Children	Older Children	Adults
Lie vs. Steal	X	X	X	✓
Lie vs. Copy	✓	X	✓	✓
Lie vs. Hide	✓	X	X	X
Steal vs. Copy	✓	X	X	✓
Steal vs. Hide	✓	X	X	✓
Copy vs. Hide	X	X	X	✓

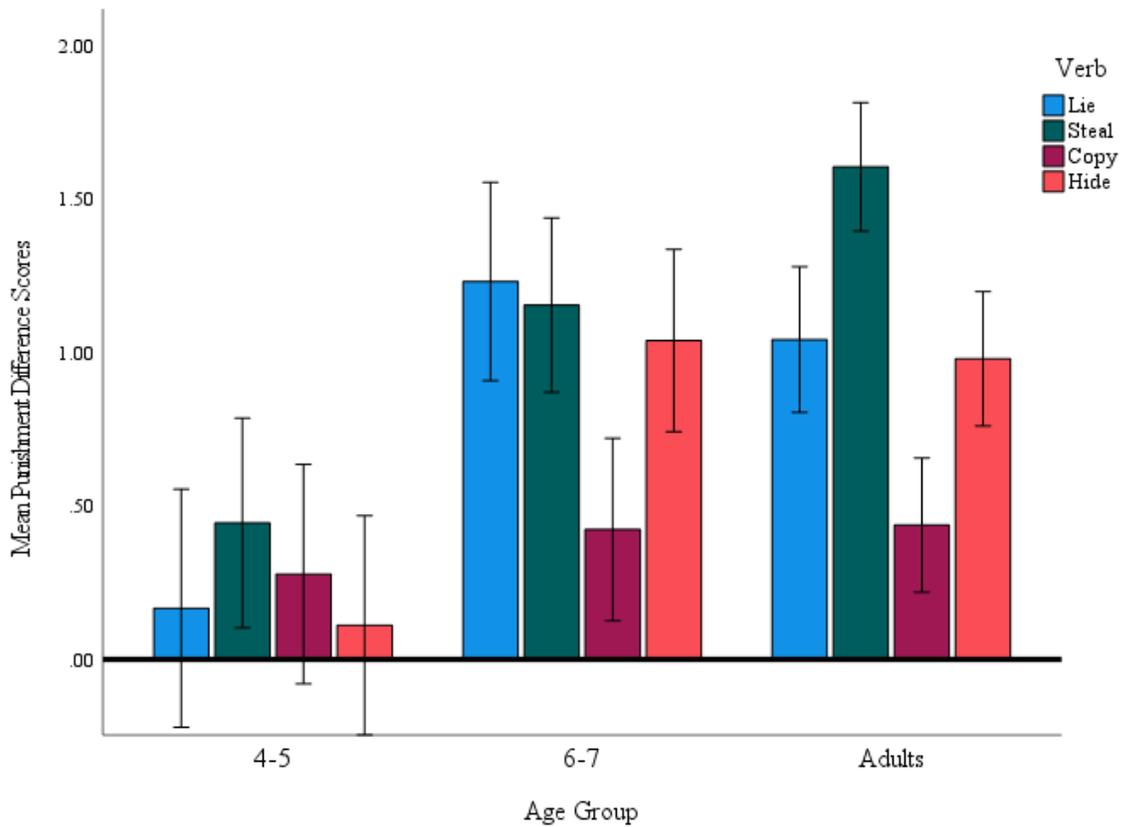
The second ANOVA was conducted to examine the variation in punishment difference scores. Similarly, it was expected that adults’ punishment difference scores would vary based on the perceived severity of harm, and that children’s sensitivity to intention would be the most apparent where adults showed the most sensitivity. This analysis followed a two-way 4 (punishment difference: lie, steal, copy, hide) x 3 (age group: younger children, older children, adults) mixed design.

Overall, there was a statistically significant difference between the punishment difference scores for the verbs, $F(2.77, 267) = 15.90, MSE = 0.40, p < .001, \eta_p^2 = .15$. There was also an age effect, $F(2, 89) = 13.76, MSE = 1.18, p < .001, \eta_p^2 = .24$. Further, there was a significant interaction between punishment difference scores and age group, $F(5.53, 267) = 4.48, MSE = 0.40, p < .001, \eta_p^2 = .09$. Post-hoc analyses with a Bonferroni correction were conducted to determine the nature of the interaction.

As shown in Figure 3, the analyses revealed that adults had larger punishment difference scores in the lying scenario in comparison to the copying scenario, $M_{\text{DIFF}} = 0.60, p < .001$. In relation to stealing, adults' punishment difference scores were larger in comparison to the copying scenario, $M_{\text{DIFF}} = 1.17, p < .001$, as well as the hiding scenario, $M_{\text{DIFF}} = 0.63, p < .001$. Additional significant differences existed between stealing and lying, $M_{\text{DIFF}} = 0.56, p < .001$, as well as between hiding and copying, $M_{\text{DIFF}} = 0.54, p < .001$. These findings do not fully support the hypothesis, because similar to the results that were observed for moral difference scores, not all of the expected differences between punishment difference scores were observed. However, it is worth noting that for adults, the significant differences found in punishment difference scores between verb scenarios followed the identical pattern to their moral difference scores.

Figure 3

Mean Punishment Difference Scores per Verb by Age Group



Note. Mean punishment difference scores ($N = 92$) for lie, steal, copy, and hide per age group. Error bars: 95% CI.

Contrary to the hypothesis, there were no significant differences between any of the verb scenarios for the younger children. However, similar to the adults, the older children demonstrated higher punishment difference scores for both the lying and stealing scenario in contrast to the copying scenario, $M_{DIFF} = 0.81, p < .001$, $M_{DIFF} = 0.73, p < .001$, respectively. Additionally, older children had higher punishment difference scores for the hiding scenario in comparison to the copying scenario, $M_{DIFF} = 0.62, p < .001$. These contrasts are summed in Table 5.

Table 5

Summary of Punishment Difference Contrasts

Contrast	Difference Predicted	Younger Children	Older Children	Adults
Lie vs. Steal	X	X	X	✓
Lie vs. Copy	✓	X	✓	✓
Lie vs. Hide	✓	X	X	X
Steal vs. Copy	✓	X	✓	✓
Steal vs. Hide	✓	X	X	✓
Copy vs. Hide	X	X	✓	✓

Overall, the hypothesis that adults’ moral difference scores and punishment difference scores would be predictive of children’s difference scores on these scales was partially met. Although there were not as many significant differences observed between the verb scenarios for children in comparison to adults, the significant differences that did exist, for older children, were for contrasts which were significantly different for adults. Specifically, adults and 6- to 7-year-old children both had higher moral and punishment difference scores in the lying scenario in comparison to the copying scenario. Additionally, both of these groups had higher punishment difference scores for stealing in comparison to copying, as well as for hiding in comparison to copying.

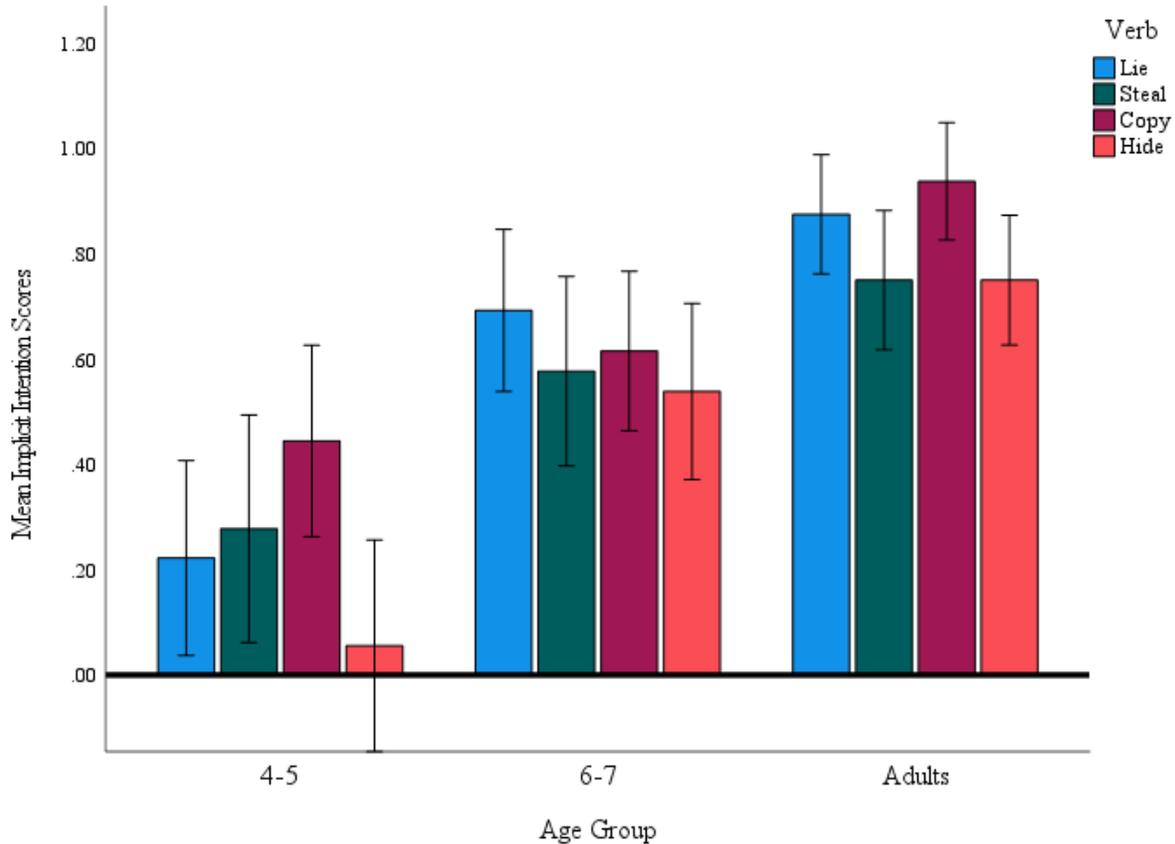
To address the hypothesis that the variation in children’s implicit accuracy scores would follow a similar pattern to adults’ performance on the Intention-Verb task, a third ANOVA was conducted. This analysis followed a two-way 4 (implicit accuracy: lie, steal, copy, hide) x 3 (age group: younger children, older children, adults) mixed design. Because most adults should already have a sufficient understanding of the intentionally-laden verbs *lie*, *steal*, *copy*, and *hide*,

accuracy differences were not expected for this age group. However, as previously discussed, variations in adults' moral difference and punishment difference scores were expected, and such scores were expected to predict where variations in children's implicit accuracy scores would be observed.

Overall, there was a main effect for implicit accuracy scores, $F(2.94, 261.62) = 4.54$, $MSE = 0.15$, $p = .004$, $\eta_p^2 = .05$, as well as an age effect, $F(2, 89) = 34.22$, $MSE = 0.26$, $p < .001$, $\eta_p^2 = .44$. There was no significant interaction between implicit accuracy between the verb scenarios by age group, $F(5.88, 261.62) = 0.99$, $MSE = 0.15$, $p = .43$, $\eta_p^2 = .02$. Thus, the hypothesis that the pattern of results observed among the adult age group for moral difference scores and punishment difference scores would be predictive of children's performance was not supported for implicit intention accuracy.

Figure 4

Mean Scores for Implicit Accuracy per Verb by Age Group



Note. Mean scores for implicit accuracy ($N = 92$) for lie, steal, copy, and hide per age group. Error bars: 95% CI.

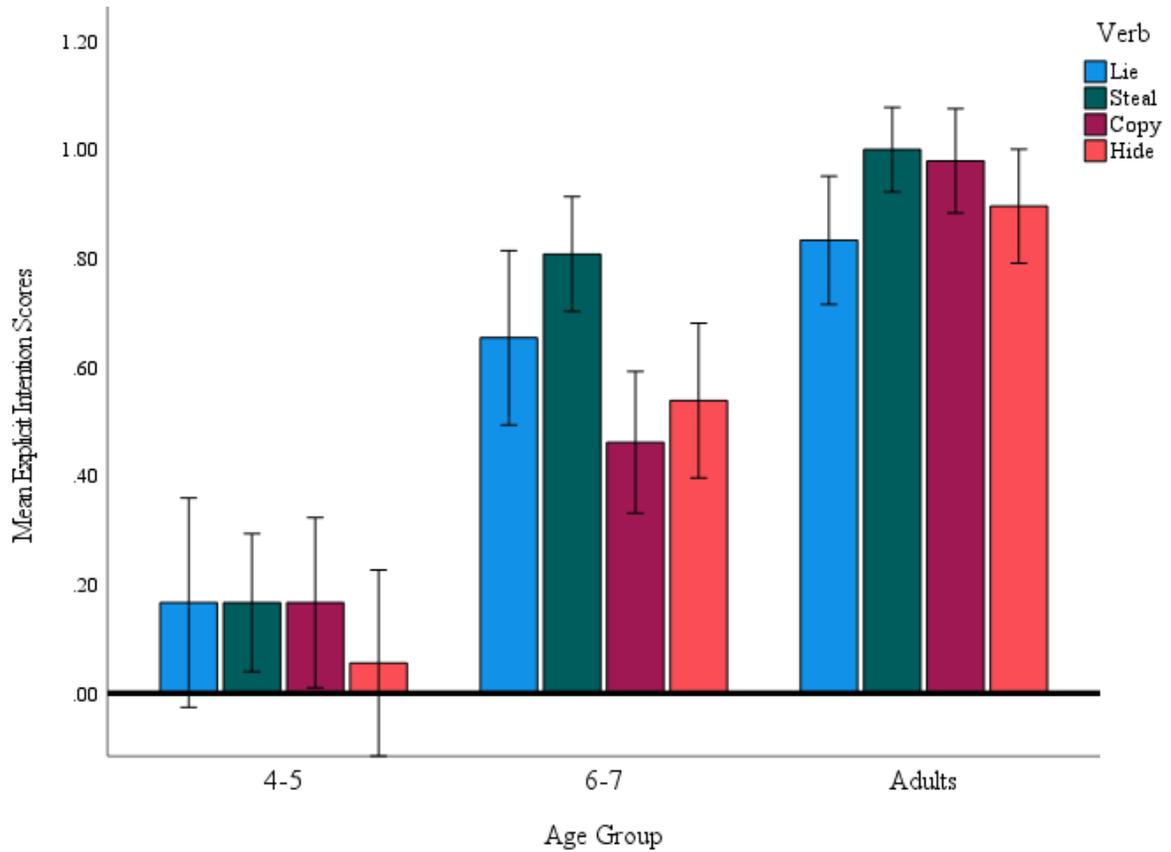
Finally, to test the hypothesis that the variation in children’s explicit accuracy scores would follow a similar pattern to adults’ performance on the Intention-Verb task, the fourth ANOVA followed a two-way 4 (explicit accuracy: lie, steal, copy, hide) x 3 (age group: younger children, older children, adults) mixed design. Similar to the previous ANOVA, accuracy differences were not expected for adults, but instead variations in adults’ moral difference and punishment difference scores were expected to predict where variations in children’s explicit accuracy scores would be observed.

There was a significant overall effect of verb in explicit accuracy scores, $F(2.66, 237.13) = 3.74$, $MSE = 0.11$, $p = .02$, $\eta_p^2 = .04$, as well as between ages, $F(2, 89) = 88.52$, $MSE = 0.19$, $p < .001$, $\eta_p^2 = .67$. The analyses further revealed a significant interaction between explicit accuracy and age, $F(5.33, 237.13) = 2.55$, $MSE = 0.11$, $p = .03$, $\eta_p^2 = .05$. Post-hoc comparisons with a Bonferroni correction were run. As seen in Figure 5, for the older children, explicit accuracy scores were significantly higher for the stealing scenario in comparison to the copying scenario, $M_{DIFF} = 0.35$, $p < .001$, as well as the hiding scenario, $M_{DIFF} = 0.27$, $p = .01$. There were no significant differences between any of the verb scenarios for the younger children. Although no differences were expected among the adults, a significant difference did exist between steal and lie, $M_{DIFF} = 0.17$, $p = .05$. It is worth noting that older children's explicit accuracy scores were the highest for steal in comparison to the other verbs, which aligns with the observation that adults demonstrated the most sensitivity to *steal* in their moral difference and punishment difference scores.

Overall, the hypothesis that adults' moral difference and punishment difference scores would be predictive of children's implicit and explicit accuracy had very little support. In line with the pattern of adults' moral difference and punishment difference scores, the older children were significantly more accurate at explicit intention attributions for the stealing scenario in comparison to the copying and hiding scenario. Thus, adults' moral difference and punishment difference scores are somewhat similar to that of older children, but the hypothesis was not fully supported.

Figure 5

Mean Scores for Explicit Accuracy per Verb by Age Group



Note. Mean scores for explicit intention attribution ($N = 92$) for lie, steal, copy, and hide per age group. Error bars: 95% CI.

Table 6

Summary of Explicit Accuracy Contrasts

Contrast	Adults' Judgements		Children's Explicit Accuracy	
	Moral Differences	Punishment Differences	Younger Children	Older Children
Lie vs. Steal	✓	✓	X	X
Lie vs. Copy	✓	✓	X	X
Lie vs. Hide	X	X	X	X
Steal vs. Copy	✓	✓	X	✓
Steal vs. Hide	✓	✓	X	✓
Copy vs. Hide	✓	✓	X	X

The fourth, and final, set of hypotheses focused on children's performance on the ToM and MoToM tasks, as well as how this performance was related to their performance on the Intention-Verb task. Preliminary analyses revealed that there were no issues with the main assumptions for all of the following analyses, including Pearson's partial correlation (linear relationships between all variables, normality, outliers), ANCOVA (normality, linearity, homogeneity of variance), and hierarchical regression (outliers, linearity, homoscedasticity, collinearity), validating that these analyses were appropriate.

First, it was hypothesized that age would be related to performance on both ToM and MoToM, even after controlling for general language ability. To test this, a Pearson's partial correlation involving age in months, ToM, and MoToM, controlling for general language ability, was run (see Table 3 Above). The main analysis revealed that after controlling for general language ability, there was a significant, positive correlation between age and ToM, $r(36) = .57$, $p < .001$, but that the relation between age and MoToM was not significant, $r(36) = .28$, $p = .10$.

Thus, the hypothesis that age would be related to both ToM and MoToM, even after controlling for general language ability, was only partially supported. Although it was not a part of this hypothesis, correlations between ToM and MoToM with other study variables (i.e., implicit accuracy, explicit accuracy, moral differences, and punishment differences) can be seen in Table 3.

Additionally, it was hypothesized that overall, children would have more difficulty with the MoToM task in comparison to the ToM task, even after controlling for age. To compare children's performance on the ToM and MoToM tasks, an Analysis of Covariance (ANCOVA) was conducted, in which ToM and MoToM performance were used as the within-subject variables, and to control for age, children's age in months was used as the covariate. Because these variables have different maximum raw scores, scaled ToM scores were used to appropriately compare the means for ToM and MoToM (recall that these scores were converted to be out of 4 by multiplying the ToM total by 4/5). The analysis revealed that after controlling for age, there was no significant difference between children's ($n = 44$) performance for ToM and MoToM, $F(1, 42) = 0.13$, $MSE = 0.80$, $p = .72$, $\eta_p^2 = .003$. There was, however, an effect of age, $F(1, 42) = 16.43$, $MSE = 1.52$, $p < .001$, $\eta_p^2 = .28$, likely suggesting that older children performed better on these tasks in comparison to younger children. A paired-samples t-test comparing ToM and MoToM revealed that when age was not controlled for, children did perform significantly better on ToM ($M = 2.87$, $SD = 1.10$) in comparison to MoToM ($M = 2.52$, $SD = 1.28$), $t(43) = 1.85$, $p = .035$, one-tail. Thus, the hypothesis that children would have more difficulty on the MoToM task in comparison to the ToM task even after controlling for age was not supported, because a significant difference between these measures only existed when age was not included in the analysis.

For the remaining component of this final set of hypotheses, it was expected that performance on both the ToM and MoToM tasks would predict performance on the Intention-Verb task, but that MoToM would be the greater predictor, above and beyond both language ability and age. To examine this, four hierarchical regression analyses were run (one per variable of interest). Specifically, these analyses explored whether performance on ToM and MoToM predicted performance on the Intention-Verb task (implicit accuracy, explicit accuracy, moral accuracy, and punishment accuracy), above and beyond both language ability and age (in months). A separate analysis was run per each dependent variable and the predictors were entered into the model in four steps: general language ability, age in months, ToM scores, and MoToM scores, respectively.

The first hierarchical regression examined implicit intention accuracy. The full model of general language ability, age, ToM and MoToM to predict implicit accuracy (Model 3) was statistically significant, $R^2 = .384$, $F(4, 34) = 5.306$, $p = .002$, adjusted $R^2 = .312$. As shown in Table 7, general language ability and age (Model 1) significantly predicted implicit accuracy, $R^2 = .324$, $F(2, 36) = 8.619$, $p < .001$, adjusted $R^2 = .286$, however, the addition of ToM (Model 2) did not account for any additional variance in the prediction implicit intention attribution, $R^2 = .346$, $F(1, 35) = 1.192$, $p = .282$, adjusted $R^2 = .290$, nor did the addition of MoToM (Model 3), $R^2 = .384$, $F(1, 34) = 2.114$, $p = .155$. Thus, the hypothesis that performance on ToM and MoToM would be predictive of performance on implicit intention attribution was not met.

Table 7

Hierarchical Multiple Regression Predicting Implicit Intention Accuracy

Predictor Variables	R^2	Adjusted R^2	ΔR^2	$B (SE B)$	β
Step 1	.324	.286	.324**		
WPPSI				-.066(.051)	-.197
Age				.045(.015)	.456
Step 2	.346	.290	.022		
WPPSI				-.078(.052)	-.234
Age				.033(.018)	.340
ToM				.180(.165)	.183
Step 3	.384	.312	.038		
WPPSI				-.074(.051)	-.223
Age				.031(.018)	.319
ToM				.114(.168)	.115
MoToM				.226(.156)	.213

* $p < .05$. ** $p < .01$.

The second hierarchical regression examined explicit intention accuracy. The full model of general language ability, age, ToM and MoToM to predict explicit accuracy (Model 3) was statistically significant, $R^2 = .488$, $F(4, 34) = 8.092$, $p < .001$, adjusted $R^2 = .427$. Similar to the results for implicit accuracy, ToM and MoToM did not significantly predict performance on explicit accuracy. As seen in Table 8, general language ability and age (Model 1) significantly predicted explicit accuracy, $R^2 = .430$, $F(2, 36) = 13.586$, $p < .001$, adjusted $R^2 = .398$, but the addition of ToM (Model 2) did not account for any additional variance, $R^2 = .435$, $F(1, 35) =$

.321, $p = .57$, adjusted $R^2 = .387$. The addition of MoToM (Model 3) also did not account for any additional variance, but it approached significance with an increase in R^2 of .052, $F(1, 34) = 3.477, p = .07$.

Table 8

Hierarchical Multiple Regression Predicting Explicit Intention Accuracy

Predictor Variables	R^2	Adjusted R^2	ΔR^2	$B (SE B)$	β
Step 1	.430	.398	.430**		
WPPSI				-.037(.051)	-.103
Age				.065(.015)	.605
Step 2	.435	.387	.005		
WPPSI				-.044(.052)	-.120
Age				.059(.018)	.549
ToM				.095(.167)	.088
Step 3	.488	.427	.052		
WPPSI				-.039(.051)	-.108
Age				.056(.018)	.524
ToM				.010(.168)	.009
MoToM				.289(.155)	.249

* $p < .05$. ** $p < .01$.

The third hierarchical regression examined whether the addition of ToM and MoToM improved the prediction of moral accuracy scores over and above general language ability and age. The full model of general language ability, age, ToM and MoToM to predict moral accuracy (Model 3) was statistically significant, $R^2 = .320$, $F(4, 34) = 3.997$, $p = .009$, adjusted $R^2 = .240$. As shown in Table 9, general language ability and age significantly predicted moral accuracy, $R^2 = .200$, $F(2, 36) = 4.493$, $p = .02$, adjusted $R^2 = .155$. Partially supporting the hypothesis, the addition of ToM to predict moral accuracy (Model 2) led to a statistically significant increase in R^2 of .120, $F(1, 35) = 6.172$, $p = .02$. However, there was no significant increase from the addition of MoToM (Model 3), $R^2 = .320$, $F(1, 34) = 0.007$, $p = .94$.

Table 9

Hierarchical Multiple Regression Predicting Moral Accuracy

Predictor Variables	R^2	Adjusted R^2	ΔR^2	$B (SE B)$	β
Step 1	.200	.155	.200*		
WPPSI				.028(.058)	.081
Age				.049(.017)	.476
Step 2	.320	.261	.120*		
WPPSI				-.001(.055)	-.003
Age				.021(.019)	.207
ToM				.439(.177)	.424
Step 3	.320	.240	.000		
WPPSI				-.001(.056)	-.002
Age				.021(.020)	.206
ToM				.435(.186)	.420
MoToM				.014(.172)	.013

* $p < .05$. ** $p < .01$.

The fourth and final hierarchical regression analysis examined whether the addition of ToM and MoToM improved the prediction of punishment accuracy over and above language ability and age. The full model of general language ability, age, ToM, and MoToM to predict punishment accuracy (Model 3) was statistically significant, $R^2 = .395$, $F(4, 34) = 5.554$, $p = .001$, adjusted $R^2 = .324$. As shown in Table 10, general language ability and age (Model 1) significantly predicted punishment accuracy, $R^2 = .390$, $F(2, 36) = 11.519$, $p < .001$, adjusted $R^2 = .356$. Further refuting the hypothesis, there were no significant increases to the prediction of

punishment accuracy with the addition of ToM (Model 2), $F(1, 35) = 0.267, p = .61$, or MoToM (Model 3), $F(1, 34) = 0.020, p = .89$.

Table 10

Hierarchical Multiple Regression Predicting Punishment Assignments

Predictor Variables	R^2	Adjusted R^2	ΔR^2	$B (SE B)$	β
Step 1	.390	.356	.390**		
WPPSI				-.028(.060)	-.066
Age				.073(.018)	.593
Step 2	.395	.343	.005		
WPPSI				-.021(.062)	-.050
Age				.079(.022)	.646
ToM				-.102(.198)	-.083
Step 3	.395	.324	.000		
WPPSI				-.020(.063)	-.049
Age				.079(.022)	.644
ToM				-.110(.209)	-.090
MoToM				.028(.193)	.021

* $p < .05$. ** $p < .01$.

Overall, the results of these hierarchical regression analyses showed little support for the hypothesis that performance on ToM and MoToM would be predictive of performance on the Intention-Verb task. After controlling for general language ability and age, ToM significantly predicted moral accuracy, but did not account for any additional variance for implicit accuracy,

explicit accuracy, or punishment accuracy. Contradicting the expectation that MoToM would be an even better predictor than ToM, MoToM did not significantly predict performance on any components of the Intention-Verb task over and above the other factors.

Discussion

The main goal of the present study was to examine young children's sensitivity to intention in various scenarios, and how this skill is related to mental state reasoning, specifically ToM and MoToM. Additionally, I was interested in how age was related to these skills. The first goal was to determine whether there were differences between children's attribution of intention when it was stated explicitly in comparison to when it was implicitly encoded in language. This goal was addressed using the Intention-Verb task. Children were presented with four stories, each of which involved actions that could be described by the intentionally-laden verbs: *lie*, *steal*, *copy*, and *hide*. In each of these scenarios, there were three characters: two whose overt behaviours were identical, but differed based on their intention and beliefs, and one character who was affected by these behaviours. Children were asked questions about which description fit the two actors: one question that had intention implicitly encoded in language such as 'steal someone's toy', and one question that explicitly stated the character's intention, such as 'take someone's toy *on purpose/by accident*'. To further explore children's understanding of intention, the current study was additionally interested in how participants would morally judge the intentional and unintentional characters, as well as indicate whether or not either of them were deserving of punishment, and if so, how much.

The second goal of this study was to examine the uniformity of participants' consideration of intention across different contexts, as well as their ability to correctly use the

verbs that require its consideration. To address this goal, children's consideration of intention was compared across each of the four scenarios in the Intention-Verb task. Additionally, a group of adults were included in the study to compare their consideration of intention across the various scenarios to that of the children. Finally, the third goal was to investigate the relation between performance on the Intention-Verb task with ToM and MoToM. Though not the purpose of the current study, children's performance on prototypical ToM and MoToM were compared to explore whether there was a developmental difference between the two.

It is worth noting that the originally proposed sample size of the current thesis was not met, and thus is smaller than ideal ($n = 44$ children). While data collection is ongoing, and the current study will be continued in the Children's Representational Development Lab until it is completed, this thesis is based on data that was collected by the end of December, 2022. The SARS-CoV-2 pandemic made participant recruitment particularly challenging, and the desired number of participants was not able to be obtained. While I do discuss my findings in relation to my hypotheses based on this sample, it is important to remember that my interpretations are limited by my sample size.

The Relation Between Age and Children's Sensitivity to Intention

There was support for my first hypothesis that children's age would be related to their sensitivity to intention on various components of the Intention-Verb task, even after general language ability was statistically controlled in the analysis. Specifically, age was positively correlated with my four main measures of sensitivity to intention: implicit accuracy, explicit accuracy, moral difference scores, and punishment difference scores. These findings are in line with extensive previous research that has observed children's sensitivity to intention increases with age (e.g., Killen et al., 2011; Maas, 2008; Wandrey et al., 2012).

These findings indicate that children's sensitivity to intention undergoes development during the age range examined, and that this sensitivity is not limited to assessing intention using a single approach. Rather, these findings demonstrate that young children's sensitivity to intention is captured using a variety of different approaches. This supports previous findings and lends credibility to the approach employed in this thesis.

Comparing Children's Implicit and Explicit Accuracy

The second hypothesis, that children would demonstrate more accuracy when intentions were explicitly stated, in comparison to when they were encoded in language implicitly, was not supported, as there was not an overall effect of verb type. Interestingly, younger children's performance was trending in the opposite direction from what was expected, with greater implicit accuracy ($M = 1.00$, $SD = 0.97$) in comparison to explicit accuracy ($M = 0.56$, $SD = 0.86$), though there was not a significant difference between the mean scores. However, given that younger children's accuracy was low overall, as well as the small sample size, these results are difficult to interpret. For the older children, intention accuracy was almost identical for implicit ($M = 2.42$, $SD = 1.21$) and explicit ($M = 2.46$, $SD = 1.27$). Older children demonstrated more intention accuracy overall in comparison to the younger children.

These results are interpreted to mean that though there are significant improvements in children's overall intention accuracy between the ages of four- to seven-years, the lack of difference between their implicit and explicit accuracy scores even at six- to seven-years of age suggests that children's sensitivity to intention as expressed by their ability to correctly describe it with either explicit language or with it being implicitly embedded in language, does not develop differentially. This finding suggests that once children are able to refer to intention with

language, they are able to do so both implicitly and explicitly. Additional data collection will provide more insight into whether this holds up with a larger sample size.

Although the expected difference between children's implicit and explicit accuracy was not found, the improvements in children's intention accuracy between four- to seven-years-old are in line with previous research demonstrating that children are sensitive to intention by around the age of five (Maas, 2008; Vendetti et al., 2019). The prediction that children would have greater explicit accuracy in comparison to implicit accuracy was expected based on previous research suggesting that children's ability to understand the verbs that describe intention continues to develop up until the age of eight (Peterson et al., 1983; Wimmer et al., 1984, 1985). Further, explicit language highlights intention with the phrases *on purpose* and *by accident*, whereas implicit language, such as *lie*, may be more ambiguous to children, considering it has been observed in research focused on children's understanding of lying that four- to five-year-old children label accidental false statements as lies, despite otherwise demonstrating an understanding of the speaker's innocent intentions (Wimmer et al., 1984).

However, it is important to note that although the aforementioned research has suggested that children's implicit understanding of intention can be observed before their explicit understanding, implicit and explicit accuracy were operationalized differently in such studies. Specifically, researchers interpreted such findings by comparing children's sensitivity to intention through moral judgements and/or assignments of punishment to intentional and unintentional story characters in contrast to their ability to describe intention with language, or appropriately use the verbs that describe it. In comparison, the current study was interested in children's ability to accurately describe intention in language explicitly (e.g., by saying that the story character said something untrue *on purpose* versus *by accident*), in contrast to their ability

to appropriately use the verbs that describe it, independent from their moral judgements and assignments of punishment. Thus, aside from a small sample size, it is possible that these differences contributed to the hypothesis being unsupported.

Although the current study observed that older children's implicit and explicit accuracy does not develop differentially, their overall accuracy demonstrated sensitivity to the character's intentions. On the other hand, the youngest children did not demonstrate much sensitivity, as their implicit and explicit accuracy scores were considerably low. Examining differences in children's moral judgements and assignments of punishment will provide more insight regarding their understanding of intention (see below), as previous research has observed children's sensitivity to intention being apparent in moral judgements at a younger age than their ability to describe it with language (Peterson et al., 1983; Wimmer et al., 1984, 1985). Further, if younger children's moral judgements demonstrate no effect of intention, thus contradicting previously established trajectories of children's understanding of intention, it is likely that the methods used in the current study are not the best way to measure this ability in young children. This issue will be revisited after discussing children's moral and punishment judgements.

Comparing Children and Adults' Performance Across Verb Scenarios

Partial support was found for the first part of the third set of hypotheses, which was that adults' sensitivity to intention, as demonstrated by their moral difference scores and punishment difference scores, would vary across the four verb scenarios, based on the perceived severity of harm. These scores were taken to indicate adults' beliefs about the degree of the transgressions related to the various moral transgressions across the scenarios. It was specifically hypothesized that adults would rate the lying and stealing scenarios as more significant moral transgressions than the copying and hiding scenarios, as demonstrated with higher difference scores (remember

that difference scores indicate the difference in judgement between the unintentional character and the intentional character). Regardless of where the moral and punishment differences existed across the verb scenarios, it was expected that children's differences in accuracy would reflect adults' sensitivity to intention, as indicated by their moral difference scores and punishment difference scores.

As hypothesized, adults' ratings (moral judgements and punishments) of someone acting intentionally were more negative than their ratings of someone acting unintentionally. However, this was only the case for some scenarios. For example, adults rated *lying* to be a greater moral violation, as demonstrated by greater moral difference and punishment difference scores, in comparison to *copy*. This was also the case with *stealing* being rated a greater moral violation than were *copy* and *hide*. Contrary to my hypothesis, no difference was revealed for adults' judgements between *lie* and *hide*. This was unexpected, because although the perceived difference between intentional and unintentional actions associated with these verbs may vary depending on the specific context, it was expected that *lie* and *steal* would be interpreted as a greater violation in comparison to *copy* and *hide* based on how they were embedded in the story-based scenarios in the present study. Adults' moral difference and punishment difference scores also demonstrated that *steal* was rated a greater moral violation in comparison to *lie*, as well as for *hide* in comparison to *copy*. While the differences that were observed between the verb scenarios were not exactly as expected, the differences that were observed between verbs for adults' moral difference scores matched those for their punishment difference scores. Given the consistencies between their ratings, this supports that their sensitivity to the story characters' intentions did vary based on their perceived degree of moral transgression for each scenario. Comparing such results to that of the children (described below) may provide more insight about

what this unexpected pattern may tell us about the differing degree of harm across the verb scenarios.

There was little support for the hypothesis that children would demonstrate the most sensitivity where adults perceived the greatest moral violations, as there were not as many differences found across the verb scenarios for children's moral difference scores and punishment difference scores. For older children, *lying* was rated as a greater moral violation (as evidenced by larger difference scores) in comparison to *copying*, however, this was the only observed difference that was significant. For punishment ascriptions, older children also rated *lying* as deserving more punishment, presumably because it is a greater moral violation, to that of *copying* (again, as evidenced by larger difference scores), in addition to rating *stealing* and *hiding* as a greater transgression to that of *copying*. Younger children did not show any differences in their ratings of the intentional and unintentional characters across the verb scenarios. Although children did not demonstrate as many significant differences as was expected between the verb scenarios, the differences that did exist, for older children, were ones that were observed within the adults. Thus, for some verbs, children did demonstrate the most sensitivity to the intentional and unintentional characters' intentions where adults did.

These findings are interpreted to mean that as children get older, they acquire a developing ability to consider intentional and unintentional characters' intentions in various moral contexts, varying based on the degree of the moral transgression. The development of children's ability to consider intention in moral contexts has been previously established in lying research (D'Esterre et al., 2019), however, the current study provides novel information regarding the acquisition of this ability compared across various moral contexts. Notably, older children and adults consistently rated *copying* to be the least severe moral violation, as

demonstrated by their moral evaluations and assignments of punishment, in comparison to the other verbs. Older children and adults' low moral difference and punishment difference scores for *copy* demonstrate that there was not much of a difference in how these participants rated someone who copied another's artwork intentionally in comparison to someone who unintentionally created the same artwork as someone else. In comparison, adults consistently rated *stealing* to be the greatest moral violation, and older children's sensitivity to the characters' intentions for *steal* and *lie* were consistently similar to one another (with *lie* eliciting slightly greater sensitivity).

Although it was part of my prediction that *copying* would be rated a lesser moral violation in comparison to *lying* and *stealing* in the context of the current study, the consistent degree of the difference for older children and adults' ratings for *copy* in comparison to *steal* is interesting based on previous research that has suggested these moral violations are conceptually similar (Olson & Shaw, 2011). Specifically, they are similar because *stealing* involves intentionally taking someone's physical property, while *copying* involves intentionally taking someone's ideas. The study by Olson and Shaw (2011) differed from the present study because instead of moral judgements and assignments of punishment, the participants (who were six- to eleven-years-old) were asked to indicate how much they liked story characters in an art class where another's work was replicated either intentionally or coincidentally. Although different, the methodology used by Olson and Shaw (2011) nonetheless demonstrated that children are sensitive to intention in the context of *copying*, as the character who intentionally copied another's work was observed to be less preferred. Thus, while I was expecting that *copy* would be perceived as a lesser moral transgression compared to *steal* based on the context of the moral transgressions the verb scenarios in the current study, the lack of difference between the

evaluations the intentional character in comparison to the unintentional character for this scenario was interesting. Perhaps if the verb scenario in the current study involved an evaluation component (i.e., if it was stated that the characters' artwork was going to be graded), the perceived severity of *copying* would be greater, as this may increase the perceived consequences of the moral transgression. In other words, maybe the moral salience of copying in the scenario employed was not sufficient.

Further, children and adults' sensitivity to *hide* was consistently similar to that of *lie*, whereas it was predicted that *hiding* would be considered a lesser moral violation along with *copying*, while *lie* would be considered a greater moral violation in comparison to the two. Based on the similarity between participants' evaluations of *hide* in comparison to *lie*, it seems that the moral transgression described in the story for the verb *hide* was perceived to be a greater moral violation than I expected. However, no known research to date has examined children's understanding of the intentionally-laden verb *hide*, thus, the expectations regarding differences in the degree of which participants would perceive *hiding* to be, in comparison to the other verb scenarios, was not predicted based on any previous findings. Further, the current study addresses gaps in the literature about children's understanding of intention by examining it in novel morally relevant contexts.

Despite the observation that the youngest children showed little sensitivity to intention within their moral difference scores and punishment difference scores, older children's sensitivity was observed to be moving in the right direction. That is, it seems that by the time children are six- to seven-years-old, their consideration of intention in various moral contexts starts to become more similar to that of adults'. Collectively, these findings are interpreted to support the idea that in relation to moral differences and punishment differences, children's

sensitivity to intention across different moral contexts varies based on how harmful the scenario or behaviour is perceived to be.

Relating back to the previously discussed findings concerning children's implicit and explicit accuracy, employing moral judgement and punishment measures offers an additional approach to explore children's sensitivity to intention. The results of the current study revealed that in addition to having low accuracy for both implicit and explicit intention, younger children's low moral difference and punishment difference scores demonstrated that across *all* verb scenarios, their ratings of someone acting intentionally did not meaningfully differ from their ratings of someone acting unintentionally. Taken together, younger children were not sensitive to intention across the Intention-Verb task, as demonstrated by their overall low performance. Such results contradict extensive previous research observing that children as young as four-years-old demonstrate sensitivity to intention when making moral judgements (e.g., Mulvey et al., 2020; Peterson et al., 1983; Wimmer et al., 1984, 1985; Zelazo et al., 1996).

Upon reflection, the scenarios used in the current study may have affected children's performance, as the transgressions were relatively minor. In such situations, especially for the younger children, the role or relevance of intention may not have been sufficiently salient for the participants to consider intention information while evaluating the story characters' behaviours. Supporting this interpretation, the moral transgressions described in previous research were more severe in comparison to those in the current study. For example, early research examining children's understanding of *lying* observed five-year-old children to demonstrate sensitivity to intention while making moral judgements, however, some of the lying scenarios involved consequences of physical punishment or harm (Peterson et al., 1983). Demonstrating children's attention to the degree of harm in a transgression more generally, Mulvey et al. (2020) presented

children with stories in which either the victim or the transgressor was negligent, with such transgressions causing either property damage (i.e., a thrown-out cupcake) or physical harm (i.e., a bike crash). Three- to six-year-old children evaluated the transgressor whose negligence led to a bike crash equally negative as did the seven- to twelve-year-olds, whereas for the thrown-out cupcake scenario, younger children evaluated the negligent transgressor significantly less negatively than did the older children. Given that the consequences of a bike crash are much greater than that of a thrown-out cupcake, such results demonstrate children's increased attention to the role of intention-based information when the transgression involves a greater degree of harm. Perhaps if the perceived degree of harm described across the verb scenarios in the current study were more severe, the results would have been more reflective of such previous research. However, it is difficult to create scenarios that would elicit a similar degree of perceived harm while keeping the stories appropriate for young children. Aside from the nature of the tasks, it is additionally possible the results may have been influenced by the small sample size of the younger children, the results of the current study thus far do not reveal an understanding of intention amongst four- to five-year-old children. However, it is possible for the results to change with the addition of participants as data collection continues.

For the second part of the third set of hypotheses, that the variations in adults' moral evaluations and assignments of punishment would predict where variations in children's accuracy at attributing intention implicitly and explicitly would be, there was also little support. Contrary to the hypothesis regarding the ability to describe intention as it was implicitly embedded in language, there were no differences in children's accuracy across the verb scenarios for either the younger or older children. Regarding children's ability to describe intention with explicit language, no differences in accuracy were observed between the younger children, but

the hypothesis was partially supported by older children, as they demonstrated greater accuracy for *steal* in comparison to *copy* and to *hide*. Although not all of the expected differences were observed, the differences that did exist in older children's accuracy at explicitly describing intention were where differences existed in adults' moral difference scores and punishment difference scores. This finding is interpreted to mean that transgressions that are considered by adults to be more severe are the ones that are the most salient for children, so if there is piecemeal development, it would make sense that these contexts are the ones for which children show earlier sensitivity.

Although the hypothesis was not fully supported, this study provides novel research exploring the uniformity of the acquisition of various intentionally-laden verbs within a single group of children. Younger children demonstrated poor accuracy overall across the verbs for both implicit and explicit intention, and their performance did not seem to follow any trend. Thus, these findings suggest that developmental changes in children's understanding of the language of intention occur sometime between the ages of four- to five-years and six- to seven-years-old. However, this finding is difficult to interpret because it is likely that the performance observed in younger children is related to small sample size ($n = 18$), and the observed developmental differences may be magnified due to the sample size being unequal to that of the older children ($n = 26$). Given that older children's implicit accuracy, explicit accuracy, moral differences, and punishment differences across the verb scenarios followed similar trends to that of adults', but that only some of the differences were significant, it is possible that a larger sample size would have made the analyses more sensitive to additional differences.

One possible explanation for the lack of differences among the older children across the verbs may be that children's understanding of the language of intention develops more

simultaneously across the moral contexts related to the verbs *lie*, *steal*, *copy* and *hide*, rather than more gradually. This interpretation is especially relevant to children's sensitivity to intention as it was encoded in language implicitly, because participants' accuracy was the most similar across the verb scenarios for this type of intention language. As for children's sensitivity to intention when it was explicitly stated in language, although there were only two observed differences, it is interesting to note that older children's performance was trending in the direction matching that of adults' moral difference and punishment difference scores. That is, although the only significant differences were between older children's sensitivity to *steal* in comparison to *copy* and *hide*, their sensitivity across the verbs ranging from most sensitive to the least were for *steal*, *lie*, *hide*, and then *copy*, respectively. This observed trend in children's understanding of intention as it is expressed in language explicitly across various moral contexts are in line with more recent research suggesting that children's ability to emphasize this information improves when the harm is more severe (Mulvey et al., 2020). While not all of the differences in children's consideration of intention across the scenarios were significant, the pattern of older children's results is interpreted to be meaningful, as they are consistent with that of the adults. Overall, it appears that children's consideration of intention across different contexts. As well, their ability to correctly use the language that require its intention is not uniform across verb scenarios.

ToM Performance and the Relation to Children's Understanding of Intention

The first part of the fourth set of hypotheses, that age (in months) would be related to children's ToM and MoToM abilities while controlling for their general language ability, was partially supported. Specifically, this hypothesis was supported for prototypical ToM (using Wellman and Liu's 2004 scale), as a positive relation remained between age and ToM after controlling for general language. This demonstrates that older children had greater ToM

accuracy, which is in line with extensive previous research demonstrating that mental state knowledge improves with age (e.g., Baird & Astington, 2005; Lee & Imuta, 2021; Wellman et al., 2001). However, contrary to the hypothesis, there was no relation between age and MoToM after controlling for language; however, the relation between these variables was significant (at the $p < .05$ level) when not controlling for general language ability. Although previous research has observed significant increases in MoToM performance with age (Killen et al., 2011), such research did not control for general language ability, which may explain why the relation between age and MoToM performance was only significant when language ability was not controlled. It should be noted, however, that general language ability is related to age, so controlling for general language may have also controlled for age, to some effect.

To investigate this surprising result further, a one-way ANOVA was run to examine whether there was an age difference between the younger and older children for these ToM measures. The analysis revealed a significant effect of age on MoToM performance, with older children ($M = 2.92$, $SD = 1.09$) performing better than younger children ($M = 1.94$, $SD = 1.35$), $p = .01$. This is consistent with previous research by Killen et al. (2011) which found that children did not demonstrate a sophisticated understanding of the unintentional transgressor's positive intentions in the MoToM task until they were a bit older, around seven and a half years of age, suggesting that intention understanding is continuing to develop during the age range of the current study.

Considering that previous research has not controlled for language ability (Killen et al., 2011), and that the current study was similarly only able to replicate the significant relation between age and MoToM performance when language ability was not controlled, these findings demonstrate an influence of children's language ability on the task. Broadly, language ability

describes one's ability to understand and express language, and unsurprisingly, this skill is related to listening comprehension (Foorman et al., 2015). The current study uses a receptive vocabulary measure (drawn from WPPSI – IV CDN; Wechsler, 2012) to assess children's language abilities, as such assessments are an effective way to capture children's level of ability because they are relatively independent of other language abilities (Milligan et al., 2007). Based on such findings, it can be interpreted that children's ability to listen, understand, and express language plays a role on their performance on the story based MoToM tasks that were used in the current study (Andrews et al., 2017; revised from Killen et al., 2011). Additionally, mental states are not observable, and therefore children must rely on language for information about what the story characters' intentions are, as well as for their ability to express these intentions (Miller, 2006). The results of the current study in combination with that of Killen et al.'s (2011), as well as literature demonstrating the importance of language comprehension, are interpreted to suggest that children's language ability has a greater influence on MoToM performance than does age.

The second part of this set of hypotheses, which was that children would have more difficulty with the MoToM task in comparison to the ToM task after controlling for age was not supported. Contrary to the hypothesis, when age (in months) was used as a covariate, there was no significant difference between children's performance on the MoToM task in comparison to the ToM tasks. This finding contradicts previous research that has found differences between children's ToM and MoToM abilities, even after controlling for age (Killen et al., 2011). When age was no longer controlled, children's performance on the ToM task (scaled score) was significantly better than performance on the MoToM task. However, it is worth noting that the analysis did reveal an effect of age, which demonstrates that overall, older children performed

better on these tasks in comparison to younger children. This age effect is in line with previous research and is not surprising, as the addition of moral relevance makes MoToM performance require a more sophisticated understanding of mental states in comparison to ToM (Killen et al., 2011). Although not the focus of this hypothesis, children's performance on the ToM and MoToM tasks were further compared by removing age as a covariate, in which children's ToM performance became significantly greater than that of the MoToM task.

These results in terms of average performance across the ToM measures were unexpected, as the expectations throughout this set of hypotheses were mainly justified by previous findings regarding children's MoToM performance (Killen et al., 2011). However, the inconsistencies between such findings and the current study may be explained by differences in how MoToM was measured. Specifically, in Killen et al.'s (2011) study, the moral judgement measure was embedded *within* the MoToM task, which means that the moral judgment and MoToM measures were not independent. In fact, they relied on the same story details, with the MoToM requiring additional inference. For example, the stories within the task did not provide context for how the false belief that led to the accidental transgression emerged. The current study addressed these limitations by using an independent measure of MoToM, as well as by making the context related to the accidental transgression clear (Andrews et al., 2017; revised from Killen et al., 2011). Therefore, it is possible that these differences influenced children's MoToM performance, thus changing the previously observed relation between ToM and MoToM performance. If this methodological change accounts for this difference in findings, this raises questions about the MoToM task as a more relevant measure of mental state reasoning for morally relevant situations. However, once again, the limited sample size of the current thesis limits the conclusions that can be drawn.

It was additionally hypothesized that performance on both the ToM and MoToM tasks would predict accuracy performance on the Intention-Verb task after controlling for age and language ability, specifically: implicit accuracy, explicit accuracy, moral accuracy, and punishment accuracy, above and beyond both language ability and age. Regression analyses indicated that these hypotheses were mostly unsupported. While ToM significantly predicted moral accuracy, it did not account for any additional variance for implicit accuracy, explicit accuracy, or punishment accuracy above and beyond language ability and age (in months). These results were unexpected, as intentions are one of the mental states that fall within ToM, and therefore mental state reasoning was expected to be related to all measures of intention sensitivity. Additionally, it was surprising that ToM significantly predicted moral accuracy, but not punishment accuracy, as they are conceptually similar. That is, moral judgements and assignments of punishment both provide similar insight regarding children's evaluation of the severity of a transgressor's behaviour. Given the conceptual similarities between these measures of intention, it is likely that these unexpected results can be explained by small sample size.

Further, MoToM, which was expected to be an even greater predictor in comparison to ToM, did not significantly predict performance on any components of the Intention-Verb task beyond that done by ToM performance. Such predictions were based on Killen et al.'s (2011) findings related to children's consideration of intention in their moral and punishment judgements of the accidental actors in the MoToM tasks, which made the results of the current study surprising. However, a notable difference between previous research and the current study is that such research did not control for language ability. To explore whether this difference was responsible for the inconsistencies between the findings of the current study with previous research, the analyses were re-run without controlling for language, but these analyses did not

yield different results. Thus, it can be concluded that this difference is not responsible for the current study's unexpected results.

The current study intended to expand on Killen et al.'s (2011) findings by making the MoToM tasks independent of children's moral judgements, and by comparing MoToM performance to additional measures of children's sensitivity to intention, including implicit intention attribution, explicit intention attribution, and assignments of punishment. For exploratory purposes, the analyses were re-run with MoToM entered into the model before ToM. The only noteworthy finding was that the additional variance of MoToM on explicit accuracy, above and beyond both language ability and age, approached significance ($p = .055$).

Given that the current study did not find that MoToM was not more difficult than ToM, it is not necessarily surprising that it did not account for more variance. As discussed above, there were differences in the MoToM tasks that were used in the current study in comparison to previous research, which may have influenced children's MoToM performance, and thus could help explain the lack of expected results. In addition to measuring MoToM performance differently than done by Killen et al. (2011), there were differences in the considerations required for the moral and punishment judgements that children made, along with additional measures of children's intention understanding (i.e., accuracy for implicit and explicit intention attribution). Specifically, children were required to consider the intentions of both an intentional and unintentional transgressor in their moral judgements and assignments of punishment (as well for their intention attributions), whereas in Killen et al.'s (2011) study, children only made judgements of an unintentional transgressor, and an intentional one was not included. Although previous research did not include children's accuracy at attributing intention when it is encoded in language implicitly as well as when it is stated in language explicitly, and thus the results

related to these measures cannot be compared to the results of Killen et al.'s (2011) study, the observed lack of influence of MoToM performance on children's moral judgements and assignments of punishment in comparison to such research stands out.

If the aforementioned differences are responsible for the inconsistencies between the current study and previous findings, it may bring into question what the most effective way to measure MoToM and its relation to other morally relevant tasks is. If previous findings between MoToM, moral judgements, and punishment judgements are specific to when the measures are embedded into one task, and when children are only required to consider the intentions of an accidental transgressor, the methodology used in the current study may be more informative. However, as mentioned above, with the limited sample size within the current study, it is difficult to draw this conclusion.

Children's Sensitivity to Intention and its Expression in Language

Although not part of this hypothesis (due to an oversight, as this was one of the goals of this study), a correlational analysis was used to further understand children's sensitivity to intention across the study variables. When controlling for language ability, there were significant, positive correlations between all of the Intention-Verb task variables (implicit accuracy, explicit accuracy, moral differences, and punishment differences), as well as between ToM and the Intention-Verb task variables. Additionally, there was a significant, positive correlation between ToM and MoToM. These relations between ToM and the various components of the Intention-Verb task would be expected, as the ability to infer others' mental states is crucial to being able to interpret the intentions underlying their behaviour. Being able to accurately attribute intention both implicitly and explicitly, as well as appropriately evaluate

others' behaviours with moral judgements and assignments of punishment, requires the ability to consider intentions (i.e., a mental state that falls within ToM).

Interestingly, MoToM was positively correlated with implicit and explicit accuracy, but was not significantly related to either moral difference or punishment difference scores. Considering that the verb scenarios similarly require moral considerations, the lack of significant correlations between MoToM, moral differences, and punishment differences is surprising. However, the age in which children succeed at standard ToM tasks exceeds that of morally relevant ones (Killen et al., 2011), which may explain why ToM was related to all four components of the Intention-Verb task, while MoToM was only related to implicit and explicit accuracy. When only controlling for language, children's overall performance on the ToM (scaled $M = 2.87$, $SD = 1.10$) was significantly greater than that of the MoToM ($M = 2.52$, $SD = 1.28$). While this difference is in line with previous research, it is worth noting that the MoToM tasks have greater verbal demands in comparison to standard ToM tasks, which may influence children's performance (see Appendices I-J for full tasks). Thus, it is possible that overall, children did not perform well enough on the MoToM tasks to capture any significant relations with moral and punishment difference scores.

To further explore the relation between ToM, MoToM, and the Intention-Verb task (implicit accuracy, explicit accuracy, moral differences, and punishment differences), the analysis was re-run controlling for age in addition to general language. When controlling for both, the relations between implicit accuracy and the other Intention-Verb task variables (explicit accuracy, moral difference scores, and punishment difference scores) remained significant, but was no longer related to ToM and MoToM performance. Additionally, explicit accuracy was no longer significantly related to moral differences, punishment differences, ToM, or MoToM, but

the relation between explicit accuracy and MoToM performance approached significance ($p = .055$). Such findings suggest that implicit accuracy, moral judgements, and punishment attributions may share some sort of related skill in comparison to the other study variables. Interestingly, in previous studies (Peterson et al., 1983; Wimmer et al., 1984, 1985), researchers interpreted children's implicit understanding of intention through moral judgements and/or assignments of punishment, whereas in comparison, the current study operationalized implicit intention as children's appropriate verb usage. While the current study was interested in examining children's ability to understand intention when it is implicitly encoded in language, independently from moral judgements and punishment attributions, the relation between these variables may suggest that they similarly measure children's implicit understanding of intention. However, it is interesting that the same relations were not observed for explicit accuracy. These findings can be further explored by examining the differences in children's performance on these variables by age.

Implicit accuracy was significantly greater for older children ($M = 2.42$) in comparison to younger children ($M = 1.00$), and the same was true for explicit accuracy ($M = 2.46$ and $M = 0.56$, respectively). As was discussed in relation to my second hypothesis, it was unexpected that the younger children's accuracy for explicit intention were lower than implicit intention, but the overall low performance of the younger age group makes this pattern of results difficult to interpret. Total moral judgement scores were significantly greater for older children ($M = 2.54$) in comparison to younger children ($M = 1.39$), and the same was true for punishment scores ($M = 2.46$ and 0.83 , respectively). Additionally, ToM performance was significantly greater for older children (scaled $M = 3.35$) in comparison to younger children ($M = 2.18$), and the same was true for MoToM performance ($M = 2.92$ and 1.94 , respectively).

In short, it can be concluded that implicit accuracy, explicit accuracy, moral differences, and punishment differences showed some relations to each other beyond the influence of age (though the causality of these relations cannot be determined). In contrast, age seemed to carry the relation between ToM and the Intention-Verb task (implicit accuracy, explicit accuracy, moral differences, and punishment differences), as well as between explicit accuracy and moral differences, punishment differences, and MoToM performance, such that these relations disappeared once age was statistically controlled. While an influence of children's age can be expected, it is surprising that it had a greater influence on the relations between children's explicit accuracy and the other study variables in comparison to that of implicit accuracy. However, it is important to reiterate that the younger children's performance on implicit accuracy, explicit accuracy, moral differences, and punishment differences across the verb scenarios did not seem to follow any meaningful trends, while the performance of older children on these variables followed a trend similar to that of adults (discussed within my third set of hypotheses).

While these patterns of results may suggest that children's mental state understanding, namely their sensitivity to intention and their ability to describe it with language, becomes significantly more sophisticated by six- to seven-years-old in comparison to when they are four- to five-years-old, it must also be considered that children's overall low performance across the Intention-Verb task may be related to the relatively benign transgressions employed. In other words, the main task in the current study may have underestimated young children's sensitivity to intention, thus exaggerating the influence of age.

Limitations and Future Directions

While the current study expands our understanding of children's sensitivity to intention in their implicit accuracy, explicit accuracy, moral judgements, and assignments of punishment, as well as how these abilities are related to ToM and MoToM, there are some noteworthy limitations. Predominately, the current study would have likely benefitted from a larger sample size. As previously discussed, although the sample size likely influenced the overall results of this study, a larger sample size was planned, but was not able to be obtained due to the challenges of participant recruitment during the pandemic. However, the current study is ongoing, and therefore it is possible that the final sample will yield more of the expected results. Additionally, while the younger children's overall low performance may bring into question the appropriateness of the story contexts and transgressions used to measure their understanding of intention in the present study, this performance can also be explained by the small size of this group of children ($n = 18$).

An additional limitation may have been the nature of the data collection, which took place entirely online due to the SARS-CoV-2 pandemic. Although all researchers strive to be as enthusiastic and interactive with each participant as possible, it may be difficult for children of this age, especially the younger ones, to maintain their attention for the duration of the study through a computer screen. Further due to the study's online nature, participant sessions often occurred outside of regular school hours, such as late evening, and thus children may not have as much energy as they would under other circumstances (i.e., in comparison to if researchers could complete participant session in-person through daycares). It is possible that the online nature of the study may contribute to children's ability to maintain attention and considering that the methodology involves story-based scenarios, full attention is necessary for comprehension.

However, it is important to note that many distractions associated with remote participant interactions are similar to that of what may occur for in-person settings such as daycares (e.g., interference from others such as peers or siblings, background noises).

There were, however, some positive aspects of completing the study online. Specifically, utilizing popular social media platforms for participant recruitment broadened the study range beyond what would have been possible if data collection was completed in-person. While recruitment posters were posted on various platforms (i.e., Instagram and Twitter), paid Facebook advertisements brought in the majority of participants. Such paid advertisements allowed the post to reach thousands of people (i.e., those who either saw the post or at least scrolled by it on their feed), and just under 500 people engaged with the post (e.g., commented, shared, 'liked', clicked on the post, etc.), which would not be feasible for in-person data collection. Although demographic information was not collected, some participants had indicated that they were in the United States, and the analytics from the advertisement on the Children's Representational Development Facebook page revealed that the post reached people in various provinces within Canada. Further, while only 54 participants were tested at the time that I proceeded with my analyses (December 31, 2022), 89 people had emailed the Children's Representational Development Lab to further inquire about the study (and more have reached out since). The discrepancy between those who contacted the lab and those that completed the study is accounted for by parents who either did not respond to our follow-up email after their initial inquiry or did not show up to their scheduled tested session.

As for the study measures, a possible limitation may be how some of the story illustrations were interpreted by the participants. For the purpose of the current study, multiple illustrations were created for each verb scenario to make each point of the various stories clear.

However, the context of the story for *copy* was particularly difficult to illustrate, because while the story context for *lie*, *steal*, and *hide* could be made clear using 2D illustrations, 3D illustrations were necessary to demonstrate the relevant story details for *copy*. Although not consistent with the youngest children, whose data did not seem to follow any trend, both older children and adults demonstrated the least sensitivity in their moral difference and punishment difference scores across the verb scenarios for *copy*. Although this may be interpreted to demonstrate that the context of the copying scenario was perceived to be the least severe, it may also indicate a comprehension issue for this verb scenario. For reference, the story describing how the unintentional transgression occurred is as follows (see Appendix I for corresponding images):

- Claire sees a pretty flower outside the window and draws it. Martin's desk is far away from Claire's and he cannot see her drawing.
- Martin looks out the window and sees the same flower that Claire saw. Martin also draws that flower. Martin cannot see that Claire is already drawing this flower.

3D features (specifically, depth) were necessary to demonstrate how Martin (the unintentional character) was not able to see Claire's drawing, while also demonstrating how Claire and Martin could both be looking at the same flower out the window at the same time. Further, when Anna (the intentional character) joins Claire at her desk, the illustration had to demonstrate that Anna did not see the flower outside of the window, despite being at the same table as Claire, who *can* see out the window. Although participants were required to demonstrate their understanding through a series of comprehension questions before proceeding to the target ones, this possibility is worth considering. The relevant story illustration is presented with each

story question as a memory aid (for both the comprehension and target questions), however, if the nature of the illustration is not clear to the participant, using it as an aid while answering the target questions may lead to confusion. If the relevant details are not clearly interpreted from the photo, the difference in knowledge between the intentional and unintentional character may not have been salient.

If the alternative option is true, and participants simply interpreted *copying* to be significantly less of a moral transgression than that of the other scenarios, this may bring other aspects of the story context into consideration. While it is not necessarily a limitation, because the context of the moral transgression in the current study nonetheless explored children's understanding of the intentionally-laden verb *copy*, participants' evaluation of the behaviour may have been less representative of their attitudes toward this moral violation without an evaluation component being incorporated into the story. Specifically, perhaps if it was stated that the story characters were being evaluated on their drawings (which would fit into the context of them being in art class), intentionally creating the same work as another person would be evaluated more harshly, and then be more in line with the other transgressions included in this study. Though previous research has observed a greater sensitivity of intention in the context of copying without an evaluation component, as demonstrated by observed differences in children's preferences of someone who either drew another's work intentionally in comparison someone who did so coincidentally (Olson & Shaw, 2011), the participants were six- to eleven-years-old. Considering that the current study used a younger participant sample, it would be interesting to explore whether adding an evaluation component to the *copying* scenario would increase the perceived severity of the moral violation, thus making it more salient to participants.

Future research should use different story-based scenarios to examine children's understanding of the morally relevant verbs that were used in the current study, as this would explore whether a similar pattern of results would be observed if these verbs were embedded in different morally relevant contexts. While children's understanding of lying has been reliably demonstrated through previous research (e.g., Evans & Lee, 2013; Maas, 2008; Talwar & Lee, 2013; Vendetti et al., 2019; Wandrey, et al., 2012), the literature continues to lack information about children's understanding of other morally relevant verbs. For example, the results of the current study related to children's moral judgements and punishment judgements for *hide* were surprising, as based on the context of the described moral transgression, this scenario was expected to be evaluated in a similar fashion to copying. Instead, hiding was evaluated more negatively (though this difference was only significant for punishment judgements), and thus it would be interesting to see how the pattern of results in the current study may change based on the context of the verb scenarios. Additionally, such research should additionally consider other verbs that may have intention implicitly embedded in their meaning, which would further contribute to our understanding of children's acquisition of the language that describes intention.

An additional suggestion for future research would be to include a measure of working memory, which would make it possible to control for any potential influences of this ability on children's performance with story-based tasks such as the ones used in the current study. Working memory is defined as "a system that has evolved for the short-term maintenance and manipulation of information necessary for the performance of such complex tasks as learning, comprehension, and reasoning" (Baddeley, 1998, p. 234). Although each of the story scenarios were short, and the questions corresponding to each verb immediately followed the relevant story, it is possible that children's working memory abilities may influence their performance on

such tasks, as they rely on listening comprehension as well as reasoning. To succeed on these tasks, children needed to remember important details from the story-based scenarios to meaningfully answer the questions. Thus, if future research controlled for this extraneous variable and yielded similar findings, it could rule out the possibility of this ability confounding the results. It may also be valuable for future research to measure participant demographic information. While a requirement of the current study was English fluency, which in part may control for possible socio-economic differences, collecting demographic information could further reduce such concerns, and strengthen the generalizability of the results.

It is worth noting that including a working memory measure in the current study was considered, but it did not seem feasible due to time constraints. As the study was, the sessions took approximately 35 minutes to complete, and therefore adding additional measures would have required splitting the data collection into two sessions per participant, which could have led to problems with attrition, or to having a longer testing session which would have resulted in a greater chance of participant fatigue. While the current study did not control for working memory, memory constraints were addressed by having the relevant story photo visible while the participants answered the questions for each of the verb scenarios during the Intention-Verb task. Although continually exposing the participants to these illustrations was likely an effective memory aid, participants are nonetheless required to remember and reason about relevant story details, as the illustrations by themselves can not depict the characters' mental states.

Conclusion

Children's ability to infer others' mental states, such as their beliefs and intentions, are important to appropriately interpret human behaviour. Thus, this ability is integral to children's development of moral cognition, as a consideration of these mental states are required to

evaluate the intentions that led to a particular morally relevant outcome. Despite not all of the hypotheses being supported, the current study provides a novel approach to investigating the uniformity of the acquisition of a consideration of intention and the use of verbs that require its consideration. While there has been some research examining children's understanding of the verb *lie* (e.g. Peterson et al., 1983; Vendetti et al., 2019; Wimmer et al., 1984, 1985), the literature lacks information about children's understanding of other intentionally-laden verbs, as well as whether this understanding develops simultaneously across contexts, or more gradually. The current study addresses such gaps by examining additional morally relevant verbs, including *steal*, *copy*, and *hide*, as well as by being the first known study to compare children's understanding of these verbs within single group of children, and how this understanding is related to mental state knowledge (i.e., ToM and MoToM). By exploring children's sensitivity to intention in contexts beyond lying, the current study enhances the representativeness of research on such sensitivity by observing how children may apply their moral knowledge in additional situations relevant to everyday life.

Children's sensitivity to intention undergoes developmental improvements between the ages of four- to seven-years-old, and this sensitivity is not limited to a specific approach or context. Specifically, children within this age range are increasingly able to consider intentions while describing it with language, making moral judgements, and assigning punishment to intentional and unintentional actors involved in various morally relevant contexts. At the same time, these children undergo improvements in their ToM and MoToM abilities. However, in the context of the current study, it appears that children's sensitivity to intention in various morally relevant contexts is independent of their ToM and MoToM abilities, suggesting that the development of children's mental state knowledge and its application in real-world scenarios

may be more complex than previously thought. Again, a larger sample size will assist in determining the relations.

Further, while children's ability to attribute intention increases with age, there does not appear to be a difference in children's acquisition of the ability to describe intention when it is implicitly encoded in language in comparison to when it is explicitly stated, and thus children's ability to express intention with these forms of language seems to develop simultaneously. There are, however, differences in the way children consider intentions when they make moral judgements and assignments of punishment in various scenarios, demonstrating that the degree of a moral violation influences children's ability to appropriately interpret behaviours. In conclusion, the present study adds to our knowledge about children's developing ability to consider intentional and unintentional behaviours, their ability to use the language that describes it, and the relation to mental state reasoning (ToM).

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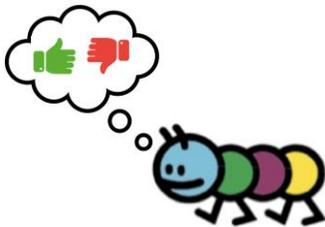
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Appendix A: Recruitment Notices**Recruitment Notice for Online Research recruitment (e.g., ChildrenHelpingScience.com)**

Title: Understanding Intention

A super-short 1-sentence summary. What do children think about doing things on purpose or by accident?

A picture.



A short summary, below picture, <75words

In a 35-minute study (over Zoom with parents) we will read short stories to children that each contain two characters: one who does something wrong on purpose, and one who does something wrong by accident. We're interested in children's thoughts about these characters and how they evaluate their actions. Parents are welcome to watch!

Recruitment Notice for Facebook

Online Invitation *To be posted on **Facebook and other types of social media***

WHAT DO CHILDREN THINK ABOUT DOING THINGS ON PURPOSE OR BY ACCIDENT?



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



PARENTS!

We are looking for English speaking 4- to 7-year-olds!



CONTRIBUTE TO SCIENCE AND PARTICIPATE IN A FUN 35-MINUTE STUDY VIA ZOOM!



We will read short stories to your child about story characters who do something wrong on purpose or by accident. We will also play games to see how they understand that others have thoughts that are different than their own.

To thank you for your time, you will receive a \$10 Amazon gift card.



To sign up, or if you have any other questions, email us at

CRDL@CARLETON.CA

Please put "Intention Study" in the subject line.

This research has been cleared by Carleton University Research Ethics Board-B (CUREB-B Clearance #115877)
Faculty Supervisor: Dr. Deepthi Kamawar

Recruitment Notice for Physical Advertisement

Note: Only difference between this and above poster is the QR code (direct email link)

WHAT DO CHILDREN THINK ABOUT DOING THINGS ON PURPOSE OR BY ACCIDENT?



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



PARENTS!

We are looking for English speaking 4- to 7-year-olds!



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To thank you for your time, you will receive a \$10 Amazon gift card.



To sign up, or if you have any other questions, email us at **CRDL@CARLETON.CA**
Please put "Intention Study" in the subject line.



This research has been cleared by Carleton University Research Ethics Board-B (CUREB-B Clearance #115877)
Faculty Supervisor: Dr. Deepthi Kamawar

Recruitment Notice for Daycares



Children's Representational Development Lab

www.carleton.ca/crdl

Dear Program Coordinator,

As part of a new project on children's cognitive development titled *Understanding Intention*, we are talking to children to learn about their developing understanding of purposeful behaviour. This research has been cleared by Carleton University Research Ethics Board-B (CUREB-B Clearance #115877).

Given the current COVID-19 social distancing restrictions, we are conducting this study through an online platform (Zoom).

We are asking if you would be willing to send out (via email) a recruitment notice to the parent(s) or guardian(s) of the four- to seven-year-old children in your centre. This notice has more details about our study and information about how to sign up. We have attached the recruitment notice to this email.

Please feel free to contact us with any further questions. The research supervisor of this project is Dr. Deepthi Kamawar and she may be reached by email at deepthi.kamawar@carleton.ca. The primary researcher involved in this project is Emma Jameson. She can be reached by email at emma.jameson@carleton.ca.

Thank you for your consideration.

Sincerely,

Deepthi Kamawar, PhD
Associate Professor
Psychology/Cognitive Science

Emma Jameson
Research Assistant
Psychology

Children's Representational Development Lab
Carleton University

Letter to attach to this email:

- Recruitment Letter to Parents (see Appendix B – Email A)

Recruitment Notice for SONA**SONA Psychology/Neuroscience Recruitment Notice****Children's Representational
Development Lab**

www.carleton.ca/crdl

Study Title: Understanding Intention

Description: We are currently investigating children's understanding of purposeful behaviour. We are interested in what they think about story characters who do things on purpose or by accident. We will collect data from an adult sample of participants as a comparison for children's performance on this task. Adult participants will read a set of short stories and then answer questions about the characters' actions. The stories and questions will be presented via an online questionnaire.

Eligibility Requirements: Participants must 17 years of age (or older), read/write fluently in English, and be enrolled in one of the following Carleton University courses: PSYC 1001, 1002, 2001, or 2002.

Risks: There will be no more physical risk than sitting in front of a computer for a 20-minute period.

Duration and Locale: Approximately 20 minutes online.

Compensation: You will receive 0.25% towards the completion of your course: PSYC 1001, 1002, 2001, or 2002.

Researchers:

Dr. Deepthi Kamawar (research supervisor), email: Deepthi.Kamawar@carleton.ca; Emma Jameson (primary researcher), email: Emma.Jameson@carleton.ca.

This research has been cleared by Carleton University Research Ethics Board-B (CUREB-B Clearance #115877) and has been deemed minimal risk. Should you have any ethical concerns with the study, please contact the REB Chair, Carleton University Research Ethics Board-B (by email: ethics@carleton.ca). For all other questions about the study, please contact the researcher.

Appendix B: Emails to Parents/Guardians

Email A: Reply to parents who expressed interest in participating

Dear [Name],

Thank you for your interest in taking part in our study, *Understanding Intention*. We look forward to meeting you and your child!

Who we are?

We are The Children's Representational Development Lab (CRDL) at Carleton University in Ottawa, Canada. You can learn more about our research at <http://www.crdl.ca/about/>

What is our study about?

We are investigating children's understanding of purposeful behavior. We are interested in what they think about story characters who do things on purpose or by accident. We are also interested their ability to think about what other people are thinking about, and whether all these abilities are related to each other.

Who can participate in our study?

Children between 4 to 7 years of age who can participate in English.

What to expect during the study?

We will meet with you and your child online using a video-conferencing platform (Zoom). We will read a series of stories accompanied by simple illustrations to your child. Children usually enjoy these kinds of activities! Participation in this study is completely *voluntary*. Children will be asked if they want to participate, and if they don't, they will not be pressured into participating.

How long does the study take?

We will meet with your child once for approximately 35 minutes.

We would like to thank you for participating!

A \$10 Amazon gift card will be provided to the parents of each child who participates. Children can stop participating at any time during the session and the \$10 gift card will still be given. The gift card will be given when the session ends.

PLEASE READ the informed consent document

We require your consent for your child to participate in our study. Due to the current COVID restrictions, we cannot easily obtain written consent a secure manner. For this reason, we request that you allow us to make a recording while you read out a statement providing this consent. If you do not wish to be video-recorded, you can turn off your camera and your statement will be audio-recorded only.

At any time during the session you can choose to withdraw your consent. If you withdraw your consent for your child's participation, we will destroy all of your child's records, including all of

their response data, video-recordings and consent-recording. We can only do this until we have deleted the information linking children to the participant ID numbers (we estimate that this will take place by June 30th, 2022). We will also ask for your consent to video and audio record the session with your child (your child can still participate if you do not wish for them to be recorded).

Detailed information can be found in the attached document, which describes the risks and benefits of this study and how we will securely store your data and your child's data. Please read this information before you sign up for the study.

How do I sign up?

The following appointment times are available. Please choose one and reply to this email with your preference. All times are in EDT.

[A list of possible dates and times]

We will reply with confirmation of your appointment. If none of these times are convenient for you, please reply to us and we will find another time.

We have also attached a Zoom Protocol (CUREB-B Clearance #110069) letter that details how we will be using Zoom to meet with you. Please read over this letter before your scheduled session time.

This research has been cleared by Carleton University Research Ethics Board-B (CUREB-B Clearance #115877).

If you have any questions or concerns, or if you would like to sign up but none of these times are convenient, please reach out to the Children's Representation Development Lab at crdl@carleton.ca.

Thank you for your interest!

Sincerely,

Deepthi Kamawar, PhD
Associate Professor
Psychology/Cognitive Science

Emma Jameson
MA Student
Psychology

Children's Representational Development Lab
Carleton University

Documents attached to this email:

- Consent Information Form for Parents and Guardians (see Appendix D)
- Zoom Protocol Form (see Appendix E)

Email B: Confirmation Email

Dear [Name],

Thank you for scheduling to meet with us!

We will see you and your child at [TIME] on [DAY]. [COPY/PASTE SCHEDULE ZOOM MEETING LINK]

(Example:

CRDL is inviting you to a scheduled Zoom meeting.

Topic: Understanding Intention

Time: [TIME]

Join Zoom Meeting:

[INFORMATION—SHOULD INCLUDE PASSWORD]

In our previous email we attached a Zoom Protocol document. We would appreciate your taking the time to read it before our meeting. It explains how to use Zoom and enter the meeting, as well as the steps you can take to further protect your privacy and the measures we will be implementing to maintain confidentiality.

At the beginning of the meeting, we will audio and video record your consent for your child's participation. If you or your child choose to withdraw consent at this time, we will thank you for your participation and delete your data and/or recordings (see consent letter for more details). The \$10 Amazon gift card will still be provided.

Sincerely,

Deepthi Kamawar, PhD
Associate Professor
Psychology/Cognitive Science

Emma Jameson
MA Student
Psychology

Children's Representational Development Lab
Carleton University

Email C: Follow-Up Email after Initial Inquiry

Dear [NAME],

Thank you for your previous email indicating your interest in participating in our study, *Understanding Intention* with the Children's Representational Lab at Carleton University!

We are writing to ask if you are still interested in participating in this study. If so, please respond to this email indicating which time slot works for you.

[List of possible times]

If none of these times are convenient for you, please reply to us and we will find another time.

Thank you,
Emma Jameson
Children's Representational Development Lab

Details about our study:

Who can participate in our study?

Children between 4 to 7 years of age who can participate in English.

What to expect during the study?

We will meet with you and your child online using a video-conferencing platform (Zoom). We will read a series of stories accompanied by simple illustrations to your child. Children usually enjoy these kinds of activities! Participation in this study is completely *voluntary*. Children will be asked if they want to participate, and if they don't, they will not be pressured into participating.

How long does the study take?

We will meet with your child once for approximately 35 minutes.

We would like to thank you for participating!

A \$10 Amazon gift card will be sent for each child who participates. Children can stop playing at any time during the session and the \$10 gift card will still be sent. The gift card will be sent at the after your session.

PLEASE READ the informed consent document

We require your consent for your child to participate in our study. Due to the current COVID restrictions, we cannot easily obtain written consent a secure manner. For this reason, we request that you allow us to make a recording while you read out a statement providing this consent. If you do not wish to be video-recorded, you can turn off your camera and your statement will be audio-recorded only.

At any time during the session you can choose to withdraw your consent. If you withdraw your consent for your child's participation, we will destroy all of your child's records, including all of their response data, video-recordings and consent-recording. We will also ask for your consent to video and audio record the session with your child (your child can still participate if you do not wish for them to be recorded).

Detailed information can be found in the attached document, which describes the risks and benefits of this study and how we will securely store your data and your child's data. Please read this information before you sign up for the study.

Documents to attach to this email:

Informed Consent Letter

Zoom Protocol

Email D: Reminder Email with Zoom Link

This is a reminder of your scheduled session on [DAY] at [TIME] with the Children's Representational Development Lab at Carleton University. If your schedule has changed and you would like to pick another time, please let us know by emailing us at crdl@carleton.ca

We look forward to seeing you!

We will see you and your child at [TIME] on [DAY]. [COPY/PASTE SCHEDULE ZOOM MEETING LINK]

(Example:

CRDL is inviting you to a scheduled Zoom meeting.

Topic: Understanding Intention

Time: [TIME]

Join Zoom Meeting:

[INFORMATION—SHOULD INCLUDE PASSWORD]

(This reminder email will be sent the day before the scheduled session if participants signed up 3+ days before the session)

Email E: Follow-up Email for Missed or Late Session

1. *If session is missed.*

Dear [NAME]

Sorry we missed each other today!

If you're still interested in participating in the *Understanding Intention* study, we would be happy to find another time that works. Please respond and let us know.

This research has been cleared by Carleton University Research Ethics Board-B (CUREB-B Clearance #115877).

Sincerely,

Deepthi Kamawar, PhD
Associate Professor
Psychology/Cognitive Science

Emma Jameson
MA Student
Psychology

Child's Representational Development Lab
Carleton University

2. *Email template for researcher to send at the time of the meeting when a parent doesn't appear at the online session after 10 minutes has passed.*

Hi [Name]

This is [researcher's name] from the Children's Representational Development Lab at Carleton University.

We have you scheduled right now for a Zoom meeting for the *Understanding Intention* study. I will keep this Zoom session open for another 10 min. I hope you can join! (Include Zoom link)

If this is not a good time, we would be happy to reschedule. Please reply to let me know what you would like to do.

Sincerely,

[Researcher's name]

MA Student

Child's Representational Development Lab
Carleton University

This research has been cleared by Carleton University Research Ethics Board-B (CUREB-B Clearance #115877).

Email F: Follow-Up Email

Dear [NAME],

We would like to sincerely thank you for you and your child's participation in our study, *Understanding Intention!* As previously mentioned, we have included a \$10 digital Amazon gift card with this email.

Please read the attached letter that describes the purpose of the stories that your child read with us in our online session.

The Children's Representational Development Lab will be conducting more studies in the future! If you enjoyed participating in the *Understanding Intention* study and are willing to participate in future studies, many opportunities are waiting for you.

If you would like us to contact you for future studies, please reply to this email with the following statement:

You have my permission to add my contact information to your email list. You have my permission to contact me in the future for inquiries into further participation. I am aware that this does not oblige me to participate in future studies.

Thank you for your cooperation and participation.

Sincerely,

Deepthi Kamawar, PhD
Associate Professor
Psychology/Cognitive Science

Emma Jameson
MA Student
Psychology

Children's Representational Development Lab
Carleton University

Documents Attached to this email:

- Debrief Letter (See Appendix F)
- Certificate of Participation

Appendix C

Recruitment Letter to Parents

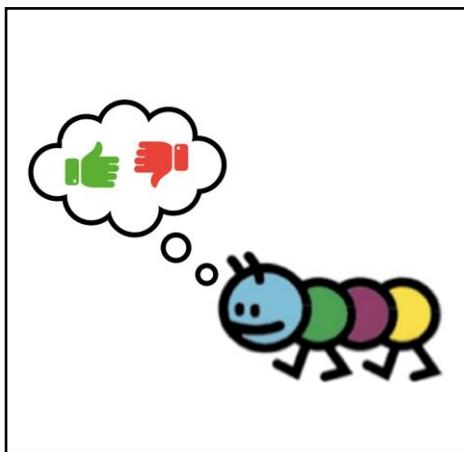


**Children's Representational
Development Lab**

www.carleton.ca/crdl

Summer/Fall/Winter 2021/22

Understanding Intention Study at Carleton University



**What do children think about doing things on purpose
or by accident?**

Hello parents and guardians!

Are you looking for something fun for your children to do? Are you interested in contributing to science?

We are looking for four- to seven-year-old children to participate in our study.

In a 35-minute study (over Zoom with parents) we will read short stories to children that each contain two characters: one who does something wrong on purpose, and one who does something wrong by accident. We're interested in children's thoughts about these characters and how they evaluate their actions. Parents are welcome to watch!

With your consent, we will audio and video record the session. All audio/video-recordings will be stored on a password-protected hard drive and kept in a locked cabinet. All recordings and research data will only be accessible to researchers involved in the study.

To thank you for your time, we will provide a \$10.00 Amazon gift card for every child that participates!

Participation in this study 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 the \$10 gift card will still be provided.

To sign up, or if you have any other questions, email us at **the Children's Representational Development Lab** at crdl@carleton.ca. We will send you an information sheet with details of the study, including the consent procedure, what to expect during the online session, how we will collect and safely store your data, and available sign-up times.

This research has been cleared by Carleton University Research Ethics Board-B (CUREB-B Clearance #115877).

Should you have any ethical concerns with the study, please contact the REB Chair, Carleton University Research Ethics Board-B (by email: ethics@carleton.ca). For all other questions about the study, please contact the researcher at crdl@carleton.ca.

Thank you for your consideration.

Sincerely,

Deepthi Kamawar, PhD
Associate Professor
Psychology/Cognitive Science

Emma Jameson
MA Student
Psychology

Children's Representational Development Lab
Carleton University

Appendix D: Informed Consent Letters

Informed Consent Letter for Parents



**Children's Representational
Development Lab**

www.carleton.ca/crdl

Summer/Fall/Winter 2021/22

Information about the *Understanding Intention* Study at Carleton University

Dear parent(s) or guardian(s),

As part of a current project on children's cognitive development, we are talking to children about their developing understanding purposeful behaviour [Ethics Clearance #115877]. 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.

Overview of the Online Session

Children will talk to a researcher, and will be read stories in which there are two characters: one who performs an action on purpose, and one who performs the same action by accident. Children will be asked questions relating to the intentions of each character, as well as make evaluations of the characters' behaviours. Children will also play other games in which where they will be told stories about other characters and asked about what those character were thinking. We are interested in whether these kinds of skills are related.

Compensation

Children usually enjoy these kinds of activities! To thank you for your participation, we will provide a \$10 Amazon gift card for each child that participates.

Participation is Voluntary

We will meet with your child once for approximately 35 minutes (parents are welcome to watch). Participation in this study 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 the \$10 gift card will still be provided.

Zoom

We will use Zoom, a video conferencing software, to meet with you and your child online. Zoom uses encrypted technology to ensure users' privacy. Our lab holds a Zoom license which allows us to configure the security settings. Details of the specific settings have been sent to you in this email as a separate attachment, which will also provide further information on steps you can take to further protect your privacy.

Consent Procedure

At the beginning of the session we will ask for your verbal consent to allow your child to participate in our study. Your consent will be audio-video recorded for our records. Due to the current COVID restrictions, we cannot easily obtain written consent a secure manner. For this reason, we request that you allow us to make a recording while you read out a statement providing this consent. If you do not wish to be video-recorded, you can turn off your camera and your statement will be audio-recorded only.

We will also ask for your consent to video and audio record the session with your child (your child can still participate if you do not wish for them to be recorded). At any time during the session you can choose to withdraw your consent. If you withdraw your consent for your child's participation, we will destroy all of your child's records, including all of their response data, video-recordings and consent-recording.

We will also ask for your verbal consent to allow us to video and audio record your child. There will be no identifying information on the video recording, such as your child's last name or birthdate and only lab members directly involved in this study will have access to the recordings. However, if you do not wish for your child to be recorded, that is okay. Your child can still participate in our study.

If you choose, you can also give us your permission to use this video for educational purposes. This will allow us to show the video to students and other researchers for teaching and communication purpose, but not to the general public. These recordings will be kept indefinitely. This is optional. Before we obtain your consent, we will explain the options to you and ask you to choose the level you are comfortable with. At any time during the session, you can choose to change the level of consent or withdraw it completely. If you withdraw your consent to have your child recorded, we will immediately delete any video recordings of your child. If you withdraw your consent completely for your child's participation, we will destroy all of your child's records, including all of their response data and any video/audio recordings.

Storing the Qualtrics Data and Zoom Recordings

Your verbal consent will be recorded as a separate file, and this recording will be given a unique identification code which will be stored apart from your child's recording and your child's data. All recordings will be stored *only* on a local password-protected hard drive accessible only to researchers and will be destroyed after 2 years. We will use Zoom's built-in recording feature for all of our video and audio recordings. These recordings will be stored locally on Carleton researchers' password-protected external hard drives, not on Zoom servers. However, note that Zoom does store session metadata. We will only use servers situated in the USA (default setting required by Zoom) and Canada (where we are located). Any personal data stored and protected by Zoom on servers in Canada or the United States may be disclosed via a court order or data breach.

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. As soon as we have finished talking with all of the children that will be participating in the study,

we will shred the paper document linking the children's names to their identification numbers used in the datafile and video files. 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 after this time. We estimate that this will occur by June 30th, 2022. Analyses presented in presentations or written publications will only contain group data, with no identification of individuals who participated in this study.

Children's responses will be entered into a database using Qualtrics, a survey platform. Data collected through Qualtrics will be stored on Qualtrics servers located in Canada. This data is anonymized and will not contain any identifying information that can be linked to your child. Any personal data stored and protected by Qualtrics on servers in Canada may be disclosed via a court order or data breach.

Risks and Benefits

This research has been cleared by Carleton University Research Ethics Board-B (CUREB-B Clearance #115877) 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). We have used similar stories with children in the same age ranges over the past 19 years and found this reaction to be extremely rare. Should you have any ethical concerns with the study, please contact the REB Chair, Carleton University Research Ethics Board-B (ethics@carleton.ca). For all other questions about the study, please contact the researcher.

Contact Us

The research supervisor of this project is Dr. Deepthi Kamawar and she may be reached at deepthi.kamawar@carleton.ca. The primary researcher involved in this project is Emma Jameson. She can be reached by email at emma.jameson@carleton.ca.

Thank you for your consideration.

Sincerely,

Deepthi Kamawar, PhD
Associate Professor
Psychology/Cognitive Science

Emma Jameson
MA Student
Psychology

Children's Representational Development Lab
Carleton University

Informed Consent Letter - SONA

**Children's Representational
Development Lab**

www.carleton.ca/crdl

Summer/Fall/Winter 2021/22

Information about the *Understanding Intention* Study at Carleton University

Dear Participant

In this letter, we will describe our study and ask for your consent to participate. The purpose of an informed consent is to ensure that you understand the purpose of the study and the nature of your involvement. The informed consent must provide sufficient information such that you have the opportunity to determine whether you wish to participate in this study.

The purpose of our current research program is to investigate children's understanding of purposeful behaviour. As part of this research, we have developed a task to measure how children evaluate story characters who perform various actions on purpose or by accident. We need data from an adult sample of participants to compare to children's responses, as well as to assess the validity and comprehensibility of the questions. You will read some short stories wherein there are two characters: one who performs an action on purpose, and one who performs the same action by accident. You will then answer questions relating to the intentions of each character, as well as make evaluations of the characters' behaviours.

You will receive compensation for your participation as 0.25% credit towards the completion of the course you are currently registered in: PSYC 1001, 1002, 2001, NEUR 2001, 2002, or 2002.

The questionnaire will take approximately 20 minutes to complete. Your participation in this study is completely *voluntary*. At any point during the study, you have the right to not complete certain questions, or to withdraw without penalty. If you withdraw consent during the session, you have the right to require that your data be deleted. You will still receive course credit. By consenting to participate in this study, you are not waiving any rights nor releasing the researchers from any liability.

Once you have signed up for this study, you may complete it any time before the last day of classes: Aug. 16th, 2021 to receive course credit for the Summer term and December 10th, 2021 to receive course credit for the Fall term. Your responses to the questionnaire will be recorded through Qualtrics, an online survey platform. Data collected through Qualtrics will be stored on Qualtrics servers located in Canada. This data is anonymized and will not contain any identifying information that can be linked to you. Qualtrics provides the option of collection IP addresses—this option will be disabled. Any personal data stored and protected by Qualtrics on servers in Canada may be disclosed via a court order or data breach.

The information collected in this study is confidential and will be coded such that a participant'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. Once we have finished collecting data from all adult participants, we will remove the information linking the participant's name to an identification number. It will no longer be possible to identify an individual's responses as the data will be anonymized. As a result, participants will no longer be able to withdraw their data after this time. We estimate that this will occur by June 30th, of 2022. Analyses presented in presentations or written publications will only contain group data, with no identification of individuals who participated in this study.

By completing the online survey, you are agreeing to participate in this study.

The research supervisor of this project is Dr. Deepthi Kamawar and she may be reached at deepthi.kamawar@carleton.ca. The primary researcher involved in this project is Emma Jameson and she may be reached at emma.jameson@carleton.ca.

This research has been cleared by Carleton University Research Ethics Board-B (CUREB-B Clearance #115877) and has been deemed minimal risk. Should you have any ethical concerns with the study, please contact the REB Chair, Carleton University Research Ethics Board-B (by email: ethics@carleton.ca). For all other questions about the study, please contact the researcher.

Thank you for your consideration.

Sincerely,

Deepthi Kamawar, PhD
Associate Professor
Psychology/Cognitive Science

Emma Jameson
MA Student
Psychology

Child's Representational Development Lab
Carleton University

Appendix E

Zoom Protocol Letter



**Children's Representational
Development Lab**

www.carleton.ca/crdl

Summer/Fall 2021

Zoom Protocol

Dear parent(s) or guardian(s),

Thank you for your interest in our study! We look forward to meeting you and your child!

The confidentiality of the participants in our study is our foremost concern. As we are using Zoom, an online conferencing tool, there are certain security measures we will implement during the session. This letter also contains information on steps we will be taking and some suggestions for you, should you like to use them.

What you need to do to prepare for the session:

1. Create a Zoom account and download the application to your computer or tablet if necessary.
2. At the time of the session, be prepared with internet access, a working webcam, and a working microphone.

To join the meeting:

1. We will email you a Zoom link and password before the scheduled meeting time.
2. When you click on the link, you will be asked to give the password.
3. To protect your identity and personal information, use a nickname or substitute name.
4. You will then be directed to the meeting's Waiting Room. At the scheduled time, the researcher will allow you into the meeting.
5. Once all parties are present, the researcher will lock the meeting. This ensures no new participants will join during the session.

The following are the steps we will take to create a secure and confidential Zoom connection:

1. The link sent to you will bring you to a meeting room created specifically for the session—i.e., no Personal Meetings ID will be used.
2. The meeting is password protected.
3. Screen sharing will be restricted to the researcher's computer.
4. The meeting will use a Waiting Room, a "VIRTUAL STAGING AREA" which allows the researcher to control who may enter the meeting.

5. Zoom has multiple servers around the world. To maintain a secure connection, we will only be using servers situated in the USA (required by Zoom) and Canada (where we are located).
6. We are using a purchased licensed version of Zoom.
7. You will be notified whenever recording is enabled.

We thank you for your cooperation during the session. If you have any further questions, please do not hesitate to contact the lab at crdl@carleton.ca.

Sincerely,

Deepthi Kamawar, PhD
Associate Professor
Psychology/Cognitive Science

Emma Jameeson
MA Students
Psychology

Children's Representational Development Lab
Carleton University

Appendix F

Debriefing Letter for Parents or Guardians



**Children's Representational
Development Lab**

www.carleton.ca/crdl

Summer/Fall/Winter 2021/22

Dear Parent(s) or Guardian(s),

Recently you and your child participated in our online study 'Understanding Intention'. Thank you for agreeing to allow your child to participate – we had a lot of fun!

The purpose of this study was to better understand children's understanding of intention and their ability to describe it with language. Specifically, we are interested in whether children understand that some words indirectly refer to something being on purpose (e.g., if someone says something untrue by accident, we are reluctant to call it a 'lie'). Further, we are interested in how this understanding of intention is related to children's understanding that people can have different beliefs or knowledge. To achieve this goal, your child was presented with a series of stories and asked questions about these stories. Your child's participation in this study will help us learn more about how these types of abilities are related to each other.

We are very excited to start investigating the results of our study. For more information about our findings, or for a summary of the project once it is complete, please contact Dr. Deepthi Kamawar by email at deepthi.kamawar@carleton.ca.

If you have any ethical concerns about this study, please contact: Bernadette Campbell, Chair, Carleton University Research Ethics Board-B (Bernadette.campbell@carleton.ca). You may also contact the Carleton University Research Compliance Office at ethics@carleton.ca. The ethics protocol number for this study is #115877.

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 recordings (audio and video) will be kept on a password-protected hard drive, accessible only to researchers, and will be destroyed after 2 years. The session recordings will also be kept on a password-protected hard drive, accessible only to researchers, and will be kept separate from the consent recordings in order to maintain participant confidentiality.

As soon as we have finished talking with all of the children that will be participating in the study, we will destroy the file linking 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 estimate that this will occur by June 30th, 2022.

Analyses presented in presentations or written publications will only contain group data, with no identification of individuals who participated in this study. If you are interested in finding out the results of the study, please email us at crdl@carleton.ca and we will send you a copy of the summary once it is available. Please note that we cannot provide any information about an individual child, only about the study as a whole. If you have any concerns about any aspect of your child's development, we suggest that you consult with your family doctor or pediatrician.

If you would like to participate in future projects in our lab at Carleton University, please contact us at the Children's Representational Development Lab by email at crdl@carleton.ca or by phone at 613-520-2600 ext. 2885.

Thank you,

Deepthi Kamawar, PhD
Associate Professor
Psychology/Cognitive Science

Emma Jameson
MA Student
Psychology

Appendix G: Scripts

1a. Welcome Script

1. Introduction

Researcher will begin with a friendly hello and will introduce themselves to the parent and child.

“Hello, my name is Emma and I am a Master’s Student in the Department of Psychology at Carleton University. I am working under the supervision of Prof. Kamawar. I am here to read some stories with you today.”

“What are your names?”

“How are you today [child’s name]?”

2. Video Check

Screenshare “Welcome Presentation” PowerPoint with parent.

“Are you able to see the screen I just shared with you? Can you please tell me what colour the teddy bear on the screen is?”

3. Session Overview

“I will give you a bit more information about the stories [child’s name] will be reading today.”

“The activities will take about 35 minutes.”

“These activities will be looking at how your child understands purposeful behaviours. Remember, there are no right or wrong answers in these activities. We just want to know more about how [child’s name] understands purposeful behaviour.”

3. Ask parents not to participate

“[Parent’s name], you are welcome to stay with [child’s name] if you would like, but you don’t have to. We just ask that you don’t participate. Please don’t respond to anything on the screen or to any of the questions. At the end of the session I will be glad to answer any questions that you have.”

1b. Configuration

1. Audio Check – only if there are any problems with audio

“Before we begin, I want to make sure you can hear me clearly. Could you please confirm that your sound is working, and that you are able to hear what I am saying?”

If confirm, move on to Video Check.

2. Screen Configuration

“Okay, perfect! Is your window in full screen? Can you drag your video around the screen?”

“I would like to ask you to turn off the video of yourself—you can do this by clicking the options at the top right corner of your video. Please leave my video turned on.

“Next, do you see the grey box on the right side of your screen? Perfect. Please drag the video of myself right into the centre of that grey box.

1c. Verbal Consent

1. Give parents an overview of the verbal consent procedure

“We need your informed consent for your child to participate in this study. In a minute we will ask you to read a script to give us your consent “

“With your permission we will also video and audio record this session with your child. Your permission to record is voluntary. If you do not want your child to be recorded, we will write down their answers instead.”

3. Confirm that parents received and read the informed consent letter.

“Did you receive the informed consent letter that we emailed to you? “

“Do you have any question for us about it?”

If the parent answers that they did not get the letter or did not read the letter – we will display the letter on our screen so they can read it and ask us questions.

4. Restate that consent is voluntary and can be withdrawn

“Your child’s participation in this study is voluntary, and your child may choose not to take part, or not to answer any of the questions. Furthermore, if you decide to withdraw your consent after the session, your child’s responses will be removed if you notify the researcher by June 30th, 2022.

5. Record the parent’s consent

“We need to record your consent for our records.” “Do we have your permission to do so?”

Only proceed if the parent says yes.

“I will now begin recording.”

Begin the recording. Present the text which parents may choose to read aloud.

Consent to Participate:

“If you consent to participating in this study, please read aloud the text on your screen.”

I consent to my child [child’s full name] participation in the *Understanding Intention* study.

I [*do / do not*] grant the researcher from Carleton University permission to video-record my child [*child’s full name*] as part of the *Understanding Intention* study.

Audio and Video Release Consent:

1. Ask the parent for some additional information (only if they have given us consent)

“If you have consented to your child participating in this study please provide us with the following information about your child.”

“What is your child’s Date of Birth: year? _____ month? _____ day? _____”

“Which language(s) are spoken at home?”

“Which language(s) is your child is fluent in?”

“What is your child’s gender? What are your child’s pronouns?”

“How many siblings does your child have?”

“What are their birthyears?”

The following disclaimer will be displayed on the parent’s screen:

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.

Researcher stops recording

“I have stopped the consent recording”

Researcher closes the “Welcome Presentation” PowerPoint.

If the parent has agreed to let their child be video-recorded then the researcher says:

“I will begin a new recording now for this session with [child’s name].”

Researcher hits the record button to begin a new recording.

1d. Asking for Child’s Assent

1. Ask the child if they want to read some stories today

“Hi [child’s name], my name is [researcher’s name]! And guess what my job is? I make stories so that I can learn about how kids think and play. Today I have some of my favourite stories to show you. Your parents said it was ok for you to read it with me. Would you like to read these stories with me right now?”

(If child says, ‘No’, we say, “That’s okay.” If the child declines to participate, we do not ask again so as to not coerce the children into participating. If the child does not give assent we will not proceed to step 2. Instead we thank the parents for their time, remind them that we will still give a \$10 Amazon gift card, and end the session.)

“Okay, let’s get started!”

1e. Debrief

If the session is being recorded: “I will end the recording now” Researcher hits the stop button to end the recording.

Verbal Debriefing for Child Participants

We say, “That was our last story. Thank you for reading with me – that was fun. I wanted to learn more about how kids understand purposeful behaviour. Do you have any questions about any of the stories we read today? Thanks again for your help and have a great day.

Once session has finished, prepare to debrief. If parent is not in the room, ask the child to call their parent back into the room.

1. Debrief Script

“[Child’s name] and I read some fun stories today. [Child’s name]’s answers to these questions will help us learn more about how children understand purposeful behaviour and their ability to think about what other people are thinking about. If you want to know more about the purpose of the stories that we read to your child today, please read the letter that we will send you in our follow-up email.”

2. Restate consent level

If the parent gave consent to record the session: “At the beginning of this session you gave us permission to video and audio record the session. Are you still ok with that?”

3. Describe the permission levels for the use of the child’s recordings.

“There are two options for the use of your child’s recordings: solely as data, or for teaching or educational purposes.

“By default, this recording will be only be accessible to the researchers associated with this study. If you choose to allow us to use this video for teaching or educational purposes, we will need your consent and we need to record your consent for our records. *Present the text below on the screen.* First, do you have any questions?”

“Would you like to give us your consent to use your child’s recording for teaching or educational purposes?” *If yes.* “Do we have your permission to record your consent?”

Only proceed if the parent says yes to both questions.

“I will now begin recording.”

Begin the recording. “Please read the aloud the statement on the screen.”

I [give/do not give] permission for the researcher to distribute and/or use any videotape(s) of my child, [child’s name], made as part of this research project in research presentations publications, or for educational uses.

Hit stop button to end recording. “We have now ended the consent recording”

4. Concluding remarks

“Thank you [parent’s name] and [child’s name] for participating in our study – you were really helpful! I will end the session now. Goodbye!”

Appendix H

Administration of Measures

Children received the following measures (see appendices below) in one testing session. The sessions lasted approximately 35 minutes. The tasks were distributed as follows (same for all children):

1. Intention-Verb Task
2. Theory of Mind Tasks
3. Morally Relevant Theory of Mind Tasks
4. Receptive Vocabulary Test (control measure)

Children will complete all four Intention-Verb stories, followed by Theory of Mind tasks, then the Morally relevant Theory of Mind task, and finally the Receptive Vocabulary measure.

Adults only completed the Intention-Verb task.

Appendix I**Intention-Verb Task**

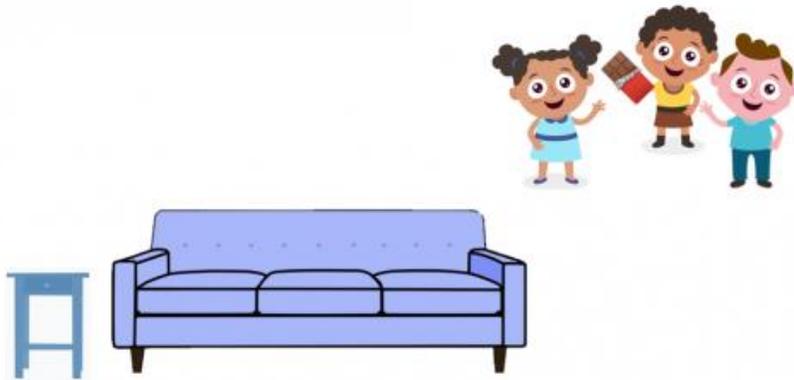
(each bullet corresponds with a new picture)

“Lie”

- This is Zoe, this is Jimmy, and this is Tanya. They are all in the same family.



- Zoe, Jimmy, and Tanya are sharing a chocolate bar.



- There's a little bit leftover, so they put it on the table next to the couch to eat later.



- When Zoe and Jimmy aren't looking, their cat jumps on the table and knocks the rest of the chocolate under the couch. Tanya sees the cat knock the chocolate under the couch but wants to eat the rest of it by herself, so she doesn't tell her family what she saw. Nobody else saw this happen.

[this image is shown with each of the story questions for memory purposes]



- Later on, Zoe asks, "Jimmy and Tanya, do you know where the rest of the chocolate is?"



- Jimmy had not seen the cat knock the chocolate bar down, so he says, “It’s on the table by the couch.” Tanya had seen the cat jump on the table, but she also tells Zoe “It’s on the table by the couch”.



- Zoe and Jimmy could not find the rest of the chocolate bar.



- Now, I’m going to ask you some questions! Remember, this is Zoe, this is Jimmy, and this is Tanya. If you can’t remember their names, just tell me what colour they are wearing!



Comprehension questions (if not all correct, repeat story and ask again):

1. Where was the chocolate bar really? [on table] [✓under couch]
- 2b. Who saw where the chocolate bar really was? [Jimmy] [Zoe] [✓Tanya]
- 2a. Who didn't see where the chocolate bar really was? [✓Jimmy] [✓Zoe] [Tanya]
- (If not Zoe) Who else didn't see? [Jimmy] [✓Zoe] [Tanya]
- (If not Zoe again) What about Zoe, did she see where the chocolate was? [yes] [✓no]

Test questions:

- 3a. Did Tanya say something that wasn't true on purpose or by accident? [✓P] [A]
- 3b. Did Jimmy say something that wasn't true on purpose or by accident? [P] [✓A]
- 4a. Did Tanya tell a lie? [✓yes] [no]
- 4b. Did Jimmy tell a lie? [yes] [✓no]

Moral Judgement

- 5a. Think about what Tanya did. Was what Tanya did good? [yes] [no]
- 5b. [if yes] – How good was it? A little bit good, or a lot? [a little] [a lot]
- 5c. Was what Tanya did bad? [yes] [no]
- 5d. [if yes] – How bad was it? A little bit bad, or a lot? [a little] [a lot]
- 5e. Think about what Jimmy did. Was what Jimmy did good?
- 5f. [if yes] – How good was it? A little bit good, or a lot?
- 5g. Was what Jimmy did bad?
- 5h. [if yes] – How bad was it? A little bit bad, or a lot?
- 5i. Think about what Tanya did. Should Tanya get in trouble?
- 5j. [if yes] – How much trouble? A little bit or a lot?
- 5k. Think about what Jimmy did. Should Jimmy get in trouble?
- 5l. [if yes] – How much trouble? A little bit or a lot?

Resolution for AFTER the story questions are complete:

- Tanya realizes that she should share the chocolate bar with her family, so she says ‘sorry’ and gets the chocolate bar and they finish it together.



“Steal”

- This is Jenny, this is Dan, and this is Sara. They are good friends.



- Jenny and Dan are playing video games at Sara’s house after school.



- They finish playing video games, and Sara puts the games on the table near Dan and Jenny’s school bags.



- It's time for Dan and Jenny to go home. Sara bumps into the table, and the video games fall. One game falls into Jenny's bag, and the other game falls into Dan's bag. Sara does not see that she made the video games fall into Jenny and Dan's bags.



- Dan is not looking and does not see the games fall into the bags. Jenny is looking and sees the games fall into the bags. Jenny doesn't say anything about what she saw, because she wants to keep the game.

[this image is shown with each of the story questions for memory purposes]



- Dan and Jenny both left Sara’s house with the video games in their bags.



- Now I’m going to ask you some questions! Remember, this is Jenny, this is Dan, and this is Sara. If you can’t remember their names, just tell me what colour they are wearing!



Comprehension questions (if not all correct, repeat story and ask again):

1. Who knocked the games into the bags? [Dan] [Jenny] [√Sara]
- 2a. Who saw that a video game fell into the bags? [Dan] [√Jenny] [Sara]
- 2b. Who didn’t see that a video game fell into the bags? [√Dan] [Jenny] [√Sara]
- (If not Dan) Who else didn’t see? [√Dan] [Jen] [Sara]
- (If not Dan again) What about Dan, did he see that it fell into the bag? [yes] [no]

Test questions:

- 3a. Did Jenny take a video game home on purpose or by accident? [√P] [A]
- 3b. Did Dan take a video game home on purpose or by accident? [P] [√A]

- 4a. Did Jenny steal a video game? [yes] [no]
 4b. Did Dan steal a video game? [yes] [no]

Moral Judgement

- 5a. Think about what Jenny did. Was what Jenny did good? [yes] [no]
 5b. [if yes] – How good was it? A little bit good, or a lot? [a little] [a lot]
 5c. Was what Jenny did bad? [yes] [no]
 5d. [if yes] – How bad was it? A little bit bad, or a lot? [a little] [a lot]
 5e. Think about what Dan did. Was what Dan did good? [yes] [no]
 5f. [if yes] – How good was it? A little bit good, or a lot? [a little] [a lot]
 5g. Was what Dan did bad? [yes] [no]
 5h. [if yes] – How bad was it? A little bit bad, or a lot? [a little] [a lot]
 5i. Think about what Jenny did. Should Jenny get in trouble? [yes] [no]
 5j. [if yes] – How much trouble? A little bit or a lot? [a little] [a lot]
 5k. Think about what Dan did. Should Dan get in trouble? [yes] [no]
 5l. [if yes] – How much trouble? A little bit or a lot? [a little] [a lot]

Resolution for AFTER the story questions are complete:

- Later that day, Dan and Jenny both returned the video games to Sara because they belonged to her. Sara was happy to have them back.



“Copy”

- This is Claire, this is Martin, and this is Anna. They are in art class.



- Claire sees a pretty flower outside the window and draws it. Martin’s desk is far away from Claire’s and he cannot see her drawing.



- Martin looks out the window and sees the same flower that Claire saw. Martin also draws that flower. Martin cannot see that Claire is already drawing this flower.



- Claire's friend Anna comes and shares a table with Claire. Anna can't see out the window. She sees Claire's flower drawing and really likes it. Anna draws the flower she sees in Claire's picture.

[this image is shown with each of the story questions for memory purposes]



- At the end of art class, Claire, Martin, and Anna all take their pictures home.



- Now I’m going to ask you some questions! Remember, this is Claire, this is Martin, and this is Anna. If you can’t remember their names, just tell me what colour they are wearing!



Comprehension questions (if not all correct, repeat story and ask again):

- | | | | |
|--|-----------|---------|-----------|
| 1a. Who saw the flower outside the window? | [Martin] | [Anna] | [√Claire] |
| 1b. (Both Martin/Claire) Who else saw the flower outside the window? | [√Martin] | [Anna] | [Claire] |
| 1c. Who didn’t see the flower outside the window? | [Martin] | [√Anna] | [Claire] |
| 2a. Who saw Claire’s flower drawing? | [Martin] | [√Anna] | |
| 2b. Who didn’t see Claire’s flower drawing? | [√Martin] | [Anna] | |

Target questions:

- | | | | |
|--|--------|-------|--|
| 3a. Did Martin copy Claire’s flower drawing? | [yes] | [√no] | |
| 3b. Did Anna copy Claire’s flower drawing? | [√yes] | [no] | |
| 3b. Did Martin draw the same flower as Claire on purpose or by accident? | [P] | [A√] | |
| 3a. Did Anna draw the same flower as Claire on purpose or by accident? | [P√] | [A] | |

Moral Judgement

- 5a. Think about what Anna did. Was what Anna did good? [yes] [no]
 5b. [if yes] – How good was it? A little bit good, or a lot? [a little] [a lot]
- 5c. Was what Anna did bad? [yes] [no]
 5d. [if yes] – How bad was it? A little bit bad, or a lot? [a little] [a lot]
- 5e. Think about what Martin did. Was what Martin did good? [yes] [no]
 5f. [if yes] – How good was it? A little bit good, or a lot? [a little] [a lot]
- 5g. Was what Martin did bad? [yes] [no]
 5h. [if yes] – How bad was it? A little bit bad, or a lot? [a little] [a lot]
- 5i. Think about what Anna did. Should Anna get in trouble? [yes] [no]
 5j. [if yes] – How much trouble? A little bit or a lot? [a little] [a lot]
- 5k. Think about what Martin did. Should Martin get in trouble? [yes] [no]
 5l. [if yes] – How much trouble? A little bit or a lot? [a little] [a lot]

Resolution for AFTER the story questions are complete:

- Later that day, Anna added extra colours and flowers to her picture to make it different than Claire’s. Claire was happy about this.

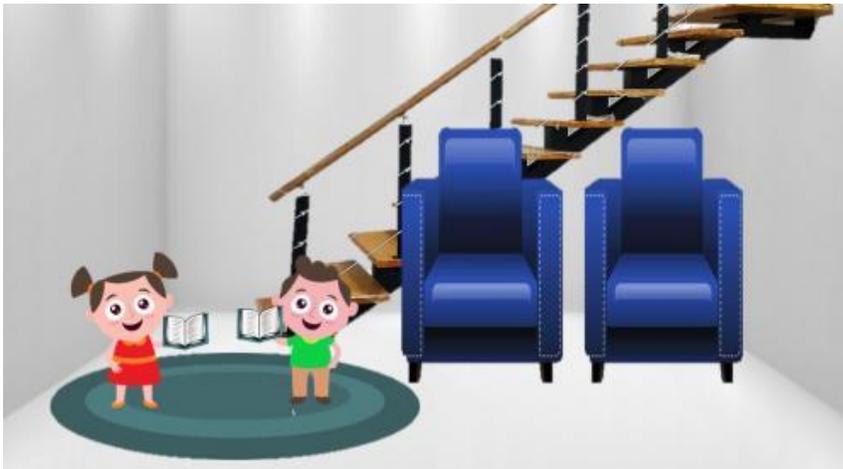


“Hide”

- This is Angela, and this is Sam. They are sister and brother. This is their Dad.



- Angela and Sam are reading books in the living room. There are two big chairs in the living room. If Angela and Sam sat in them, no one would be able to see them from behind.



- Angela can hear Dad coming down the stairs to tell them it’s time for bed. Angela doesn’t want to go to bed.



- She doesn't want her dad to see her, so she jumps into one of the chairs and sits there reading her book.



- Sam does not hear his dad coming, but he also jumps into a chair with his book.

[this image is shown with each of the story questions for memory purposes]



- Dad does not see them and goes back upstairs.



Comprehension questions (if not all correct, repeat story and ask again):

- 1a. Did Dad see Angela? [yes] [✓no]
- 1b. Did Dad see Sam? [yes] [✓no]
- 2b. Who heard that Dad was coming to say it was time for bed? [✓Angela] [Sam]
- 2a. Who didn't hear that Dad was coming to say it was time for bed? [Angela] [✓Sam]

Test questions:

- 4b. Did Angela hide from Dad? [✓yes] [no]
- 4a. Did Sam hide from Dad? [yes] [✓no]

- 3b. Did Angela sit where Dad couldn't see her on purpose or by accident? [√P] [A]
 3a. Did Sam sit where Dad couldn't see him on purpose or by accident? [P] [√A]

Moral Judgement:

- 5a. Think about what Angela did. Was what Angela did good? [yes] [no]
 5b. [if yes] – How good was it? A little bit good, or a lot? [a little] [a lot]
 5c. Was what Angela did bad? [yes] [no]
 5d. [if yes] – How bad was it? A little bit bad, or a lot? [a little] [a lot]

 5e. Think about what Sam did. Was what Sam did good? [yes] [no]
 5f. [if yes] – How good was it? A little bit good, or a lot? [a little] [a lot]
 5g. Was what Sam did bad? [yes] [no]
 5h. [if yes] – How bad was it? A little bit bad, or a lot? [a little] [a lot]

 5i. Think about what Angela did. Should Angela get in trouble? [yes] [no]
 5j. [if yes] – How much trouble? A little bit or a lot? [a little] [a lot]

 5k. Think about what Sam did. Should Sam get in trouble? [yes] [no]
 5l. [if yes] – How much trouble? A little bit or a lot? [a little] [a lot]

Resolution for AFTER the story questions are complete:

- Angela and Sam realize it is time for bed and go upstairs. They find their dad and then get ready for bed.



Appendix J

Theory of Mind Protocol

Modified from Wellman and Liu (2004)

3. Knowledge Access

Step 1: E presents child with a photo of a nondescript cupboard containing a cartoon dog inside the closed cupboard. “Here’s a cupboard. What do you think is inside the cupboard?” The child can give any answer he or she likes or indicate that he or she does not know.



Child’s answer: _____

Step 2: “Let’s see what’s inside!” E shows photo of the open cupboard and the child is shown the contents. “Okay, what is in the cupboard?”



Correct Incorrect _____

Step 3: E present child with a photo of a girl.

Target Question: “Polly has never ever seen inside this cupboard. Now here comes Polly. So, does Polly know what is in this cupboard?”



Yes (Incorrect)

No (Correct)

Memory Question: “Did Polly see inside this cupboard?”

Yes (Incorrect)

No (Correct)

Must get Target and Memory Question correct to be counted as correct.

4. Contents False Belief

Step 1: E presents child with a photo of a clearly identifiable Band-Aid box with a plastic toy frog concealed inside the closed Band-Aid box. “Here’s a Band-Aid box. What do you think is inside the box?” Child gives answer.



child’s answer: _____

Step 2: “Let’s see what’s inside!” E shows a photo of the open Band-Aid box to reveal the frog. “Okay, what is in the box?” Child gives answer.



frog *other answer* _____

Step 3: E presents the child with a toy figure of a boy.

Target Question: “Peter has never ever seen inside this box. Now here comes Peter. So, what does Peter think is in the box? Band-Aids or a frog?”



Band-Aids (Correct) frog (Incorrect)

Memory Question: “Did Peter see inside this box?”

Yes (Incorrect) No (Correct)

Must get Target and Memory Question correct to be counted as correct.

5. Explicit False Belief

E presents child with a photo of a boy. “Here’s Scott. Scott wants to find his mittens.” E presents a photo of the boy with a backpack and a closet in it. “His mittens might be in his backpack or they might be in the closet. Really, Scott’s mittens are in his backpack. But Scott thinks his mittens are in the closet.”



Target Question: “So, where will Scott look for his mittens? In his backpack or in the closet?”



Backpack (Incorrect)

Closet (Correct)

Reality Question: “Where are Scott’s mittens really? In his backpack or in the closet?”

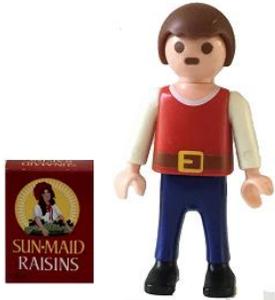
Backpack (Correct)

Closet (Incorrect)

Must get Target and Reality Question correct to be counted as correct.

6. Belief–Emotion

Step 1: E presents child with a photo of a toy figure boy and a clearly identifiable individual-size raisin box with rocks concealed inside the closed box. “Here is a raisin box and here is Teddy. What do you think is inside the box?” (child says ‘raisins’)

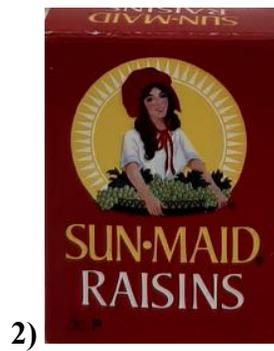


child’s answer: _____

E makes Teddy speak. Teddy says, “Oh good, because I love _____ [child’s answer]. _____ [child’s answer] are my favorite snack. Now I’ll go play.” E removes Teddy from the screen.



Step 2: Next, the raisin box is opened and the contents are shown to the child. “Let’s see what’s inside! There’s nothing but rocks.” E closes the raisin box. “Okay, what is Teddy’s favorite snack?”



child’s answer: _____

Then Teddy comes back. Target Question: “Teddy has never ever seen inside this box. Now here comes Teddy. Teddy’s back and it’s snack time. Let’s give Teddy this box. Before Teddy opens the box, how does Teddy feel when he gets this box? Happy or sad?”

_____ Happy (Correct) _____ Sad (Incorrect)



Step 3: E opens the raisin box again.

Emotion-Control Question: “How does Teddy feel after he looks inside the box? Happy or sad?”

_____ Happy (Incorrect) _____ Sad (Correct)



Must get Target Question and Emotion-Control Question correct to be counted as correct.

7. Real-Apparent Emotion

Step 1: E presents child with a photo of three faces (happy, just ok and sad). E introduces them to check that the child knows these emotional expressions.



Then that image is removed from the screen, and the task begins with the child being shown a photo of a boy from the back so that the boy’s facial expression cannot be seen. “This story is about a boy. I’m going to ask you about how the boy really feels inside and how he looks on his face. He might really feel one way inside but look a different way on his face. Or, he might really feel the same way inside as he looks on his face. I want you to tell me how he really feels inside and how he looks on his face. This story is about Matt. For his birthday, Matt had asked for a cool red shirt from his favourite store. On his birthday, Aunt Rosie gives Matt the last gift. When he opens it, he finds an ugly green shirt. All of Matt’s family thought it was a great gift, but not Matt. Matt didn’t like the gift. Matt didn’t want his Aunt Rosie to see how he felt about the gift, because it would make her sad. So Matt tried to hide how he felt.”

*Step 2: E gives the child memory check. “What did Matt want for his birthday?”
(a red shirt) Other answer: _____*



“In the story, what would happen if Matt showed his true feelings about the gift?” E points to the three emotion pictures.

(He would make his Aunt sad) Other answer: _____



The Target-Feel Question: “So, how did Matt really feel, when he opened the gift? Did he feel happy, sad, or okay?”

Answer (circle one): happy, sad, or okay



The Target-Look Question: “How did Matt try to look on his face, when he opened the gift? Did he look happy, sad, or okay?”

Answer (circle one): happy, sad, or okay



To be correct the child’s answer to the target-feel question must be more negative than his or her answer to the target-look question

Appendix K

Morally Relevant Theory of Mind Protocol

Andrews et al., 2017 (modified from Killen et al., 2011)

MoToM Protocol: CRAFT

- Zach and his brother Adrian are having popsicles together at a birthday party.



- After they're done eating them, they decide to make a craft. Zach and Adrian wrap their popsicle sticks into a napkin to throw in the garbage later.



- Adrian gets up to go to the bathroom.



- While Adrian is gone, Zach finishes his craft and decides to use his napkin to keep it safe. So, he takes out the popsicle stick and wraps his craft inside.



- Then Zach leaves to put his popsicle stick in the garbage. While he's gone, Adrian comes back and goes back to the craft table.



- Adrian gets his wrapped popsicle stick to throw it in the garbage. Adrian sees Zach's napkin on the table, and wants to help tidy up, so



- Adrian throws it in the garbage too.



Comprehension question:

- 1) Did Adrian see Zach put his craft in his napkin?

Target questions:

- 1) What did Adrian think was in the napkin? **Popsicle stick/garbage** Craft Other _____
- 2) What was really in the napkin? **Craft** Popsicle stick/Garbage Other _____
- 3) Where will Zach first look for his craft when he comes back? **Craft table** Garbage Other _____
- 4) Where is his craft? **Garbage** Craft table Other _____

MoToM Protocol: COOKIE

- Shalini and Jennifer are having lunch together at school.



- Shalini finished her lunch and put her water bottle in her lunch bag. When Jennifer finished her lunch, she put her banana peel inside her empty chip bag.



- Then, the teacher gave everyone a cookie. Shalini finishes her cookie and tidies her desk. She puts her garbage away and goes wash her hands.



- While Shalini is gone, Jennifer decides to save her cookie, so she takes the banana peel out of her chip bag and puts the cookie inside to save it.



- Jennifer throws the banana peel away and goes outside to play. While she's gone, Shalini comes back.



- Shalini sees Jennifer's chip bag on the table and wants to help tidy up.



- Shalini throws the bag in the garbage.



Comprehension question:

- 1) Did Shalini see Jennifer put her cookie in the chip bag?

Target questions:

- 1) What did Shalini think was in the chip bag? **Peel/Garbage** Cookie Other _____
- 2) What was really in the chip bag? **Cookie** Peel/Garbage Other _____
- 3) Where will Jennifer first look for her cookie when she comes back inside? **Table** Garbage Other _____
- 4) Where is her cookie? **Garbage** Table Other _____

Appendix L

Digital Certificate of Thanks



Appendix M



Office of Research Ethics
 4500 ARISE Building | 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 # 115877

Principal Investigator: Emma Jameson

Co-Investigator(s) (If applicable): **Emma Jameson (Primary Investigator)**

- Dr. Deepthi Kamawar (Research Supervisor)
- Ellen Doucet (Research Assistant)
- Hana Ziani-Bey (Research Assistant)
- Kendra Parsons (Research Assistant)
- Vivian Rigg (Research Assistant)
- Adrianna Spoerel Connelly (Research Assistant)
- Georgina Adams (Student Researcher: Undergraduate)

Project Title: Children's Understanding of Intention and its Expression in Language

Funding Source:

Awards File No	Title	Status	
109840	Preschoolers' Future Oriented Cognition: Developing the Ability to Save	Active	A. OVPRI Approval Form

Effective: **October 21, 2021**

Expires: **July 31, 2022.**

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.
3. An Annual Status Report for the renewal or closure of ethics clearance must be submitted and cleared by the renewal date listed above. Failure to submit the Annual Status Report will result in the closure of the file. If funding is associated, funds will be frozen.
4. During the course of the study, if you encounter an adverse event, material incidental finding, protocol deviation or other unanticipated problem, you must complete and submit a Report of Adverse Events and Unanticipated Problems Form.
5. It is the responsibility of the student to notify their supervisor of any adverse events, changes to their application, or requests to renew/close the protocol.
6. Failure to conduct the research in accordance with the principles of the *Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans 2nd edition* and the *Carleton University Policies and Procedures for the Ethical Conduct of Research* may result in the suspension or termination of the research project.

Special requirements for COVID-19:

If this study involves in-person research interactions with human participants, whether on- or off-campus, the following rules apply:

1. Upon receiving clearance from CUREB, please seek the approval of the relevant Dean for your research. Provide a copy of your CUREB clearance to the Dean for their records. See [Principles and Procedures for On-campus Research at Carleton University](#) and note that this document applies both to on- and off-campus research that involves human participants. Please contact your Dean's Office for more information about obtaining their approval.
2. Provide a copy of the Dean's approval to the Office of Research Ethics prior to starting any in-person research activities.
3. If the Dean's approval requires any significant change(s) to any element of the study, you must notify the Office of Research Ethics of such change(s).

Upon reasonable request, it is the policy of CUREB, for cleared protocols, to release the name of the PI, the title of the project, and the date of clearance and any renewal(s).

Please email the Research Compliance Coordinators at ethics@carleton.ca if you have any questions.

CLEARED BY:**Date: October 21, 2021**

Bernadette Campbell, PhD, Chair, CUREB-B

Kathryne Dupre, PhD, Co-Chair, CUREB-B