Master of Thy Fate? The Role of Prior Success in Shaping Children's Illusory Control and Reliance on Informants in Novel Situations

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Abstract

With increased access to information, children are required to filter information more frequently than ever. Although previous research has examined how children use the characteristics of others (e.g., such as confidence) to selectively learn, little is known about the role of children's own characteristics in selective learning. My thesis examines individual differences in children's illusory control, or overconfidence in their abilities, and its influence on their decision to engage in social learning. The Pilot Study aimed to develop a task to manipulate children's illusory control and assess its subsequent impact on their help requests towards an accurate informant. Based on pilot results, methodological changes were made for the next two studies. In Study 1, 5-year-olds first experienced success or failure at locating objects to manipulate their illusory control. Next, they chose whether to answer novel questions by themselves or with the help of a knowledgeable informant. In Study 2, 7- and 8-year-olds experienced the same manipulation and then answered novel questions, endorsing or omitting a teacher and search engine answers. Afterward, more novel questions were presented where children chose to answer on their own or with the help of one of the informants. Results revealed that children's prior success influenced their decision to trust the informants but only in the same domain as when they experienced their success or failure. On average, younger and older children requested help for half the questions. Overall, children did not demonstrate a preference for the teacher or the search engine; however, their choice was influenced by the success manipulation, the types of questions asked, and their levels of confidence. Other measures such as children's level of confidence in their learning skills and a parental measure of children's confidence and leadership attributes correlated with children's trust towards informants, indicating that individual factors might play an important role in children's decision to trust others and should be further explored. Overall, these studies

emphasize the need for further investigation into individual differences, such as illusory control, in children's decisions to engage in social learning when presented with various types of informants.

Keywords: illusory control, social learning, selective learning, confidence, technological informant

Overview of Thesis

This thesis is the culmination of my doctoral research and is comprised of five chapters, as well as references and appendices. Chapter One establishes the foundational understanding of the research topic, including its purpose, objectives, and hypotheses. Chapters Two, Three, and Four delve into the three studies conducted for this research, including the Pilot Study. Chapter Five is a comprehensive summary of significant findings and emphasizes the implications of this research. The document concludes with the references and appendices.

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Chapter One: General Introduction

In today's rapidly evolving world, children have access to information from a multitude of sources, both digital and traditional. Whether it is through conversations with family and peers, educational materials at school, books, television programs, or online platforms, children are constantly receiving and processing information. This exposure to diverse content, whether consciously engaged with or absorbed passively, significantly influences their daily decisions, behaviours, and understanding of the world around them. While efforts are made to ensure the accuracy of information, especially in educational and media settings, inconsistencies and unreliable sources persist across various channels. As a result, children face the ongoing challenge of discerning trustworthy information from the vast array they encounter. Developing the ability to critically evaluate and appropriately use this information is essential for their growth and well-being.

Social and Asocial Learning

Multiple learning strategies enable children to acquire new information. Children may learn by observing or interacting with others or their outputs (social learning) or may acquire information independently (asocial learning; Heyes, 1994; Hoppit & Laland, 2008). Selecting the optimal learning strategy is crucial for children to avoid misinformation, which can negatively impact their cognitive, behavioural, and social development (Lewandowsky et al., 2017). When learning individually, children might engage in methods such as experiential learning (e.g., hands-on practice or trial and error), incidental learning (e.g., through exposure to environments), or reflective learning (e.g., processing information and causal relationships, Rawlings et al., 2017). While these approaches foster critical thinking and problem-solving, they are time-consuming and may not always lead to accurate conclusions. Indeed, they often require

a greater reliance on the individual's prior knowledge and skills and may demand higher levels of metacognitive monitoring (Brod, 2021).

In contrast, social learning allows children to benefit from the knowledge and experience of others, particularly when learning complex information. Social learning strategies include observational learning (e.g., Bandura's social learning theory), interactive or collaborative learning (e.g., group projects or schooling), and cultural learning (e.g., absorbing societal values, Vygotsky's sociocultural theory). However, relying on others for information can make children vulnerable to inaccuracies or unreliable sources, and it can also limit their opportunities to develop independent problem-solving skills. To effectively engage in social learning, children must assess the competence and intentions of information sources to judge the trustworthiness of the information shared (Rawlings et al., 2017). This evaluation can be challenging and often requires an understanding of the knowledge level of others. Research suggests that children engage in social learning more than adults, likely because they possess less task-relevant knowledge (Kendal et al., 2018).

Importantly, social and asocial learning are not mutually exclusive. Children have access to both strategies, and they may vary in their preference for one over the other (Rawlings et al., 2017). The key difference is the channel through which information is conveyed (Sterelny, 2009, as cited by Heyes, 2012). Social learning involves another individual providing information which the learner acquires (Heyes, 2012). Despite this distinction, it is unclear whether social and asocial learning rely on different cognitive mechanisms. Heyes (2012) has argued that both types of learning are rooted in associative learning mechanisms—processes that reinforce or inhibit connections between event representations. In this view, the underlying mechanisms of social learning are not inherently social but instead involve attentional and motivational input

processes specific to receiving information from others. For example, highly social animals tend to outperform less social animals in social learning tasks, but not in comparable asocial learning tasks (Lefebvre & Giraldeau, 1996; Munger et al., 2010; Shettleworth, 1993, as cited by Heyes, 2012). On the other hand, some researchers argue that while social and asocial learning abilities are highly correlated, they still vary independently, possibly due to evolved adaptive specializations for social learning (Kendal et al., 2018). Given the prevalence of social learning in humans, we likely have more practice in selecting effective social learning strategies, with opportunities for asocial learning arising as a secondary outcome (Kendal et al., 2018).

Selective Social Learning: A Brief Review

When engaging in social learning, children rely on a complex cognitive process known as *selective social learning* to evaluate and prioritize sources of information. This process is critical to discern the reliability of the information they receive. A crucial aspect of this evaluation involves the characteristics of the individual providing the information. Numerous studies have demonstrated that children use specific cues to gauge an individual's potential to possess relevant knowledge (Mills, 2013). Cues may be categorized as *epistemic*, indicative of an individual's level of knowledge, or *non-epistemic*, other cues which are unrelated to an individual's level of knowledge.

Research indicates that children are particularly attuned to the confidence of others when deciding whom to trust (Brosseau-Liard et al., 2014). Confidence is regarded as an epistemic cue because individuals who are more knowledgeable have been demonstrated to exhibit greater confidence (e.g., Sporer et al., 1995). This can be conveyed through body language, facial expressions, eye gaze, or tone of voice. In typical studies examining children's use of confidence as a cue, children are presented with two informants making contradictory claims. One informant

delivers their claim confidently, while the other appears hesitant. After each informant states their claim, children are asked which answer they believe is correct. Overall, children tend to prefer learning from individuals who display confidence rather than those who exhibit hesitation (Brosseau-Liard et al., 2014; Juteau et al., 2019).

Furthermore, children consider cues pertaining to an individual's history of accuracy when deciding from whom to learn. This epistemic cue has typically been studied in two phases. First, children encounter one informant who provides accurate information (e.g., correctly labelling a common object) and another who provides inaccurate information (e.g., mislabeling a brush as a watch). Subsequently, children are presented with an unfamiliar object in a learning situation and are asked to endorse a label from one of the informants. Some studies also employ a single-informant paradigm, where children decide whether or not to endorse the informant's claim (e.g., Ronfard & Lane, 2018; Yow & Li, 2018). Numerous findings indicate that children generally prefer informants who demonstrate prior accuracy over those who demonstrate inaccuracy (e.g., Koenig et al., 2004; Birch et al., 2008). Children also differentiate between types of inaccuracies, such as distinguishing between inaccurate informants, and those who are ignorant (Kushnir & Koenig, 2017).

Other cues have also been studied through selective learning tasks. Studies show that children are more likely to endorse individuals who have perceptual access to information (e.g., Brosseau-Liard & Birch, 2011) and those who are recognized experts in a relevant domain (e.g., Lane & Harris, 2015). Additionally, children are inclined to rely on word labels provided by adults as opposed to their peers (Jaswal & Neely, 2006), and toddlers exhibit this preference when imitating novel actions (Zmyj et al., 2012). Thus, children consider a variety of knowledge indicators when deciding if new information is trustworthy.

Emergence of Selective Social Learning Strategies

Remarkably, young infants are capable of distinguishing characteristics in others and show a preference for certain individuals. For instance, a study found that 14-month-olds prefer to imitate an in-group model rather than an out-group model (Buttelmann et al., 2012). In another study, 6- and 18-month-olds identified plants as food sources after observing an informant eat one consistently (Wertz & Wynn, 2014). Moreover, 13- to 16-month-olds have shown a preference for imitating reliable rather than unreliable sources of information (Poulin-Dubois et al., 2011), and 18-month-olds can detect a speaker's verbal inaccuracy, making them less likely to imitate and learn words from them (Brooker & Poulin-Dubois, 2013). Another study demonstrated that 5-month-olds can apply information about an individual's use of infant-directed and adult-directed speech to guide their preferences for an individual even after the speech behaviour has ended (Schachner & Hannon, 2011).

Knowing that children filter information from a young age, studies have delved into the developmental progression of selective learning skills. One study found that 24-month-olds were more likely to imitate the actions of a confident individual than a hesitant one, whereas 18-month-olds did not show this preference (Brosseau-Liard & Poulin-Dubois, 2014). Additionally, it has been argued that until the age of 4, children tend to judge informants as either "good" or "bad" and base their trust decision on these simplistic evaluations (Mills, 2013). For example, 3-year-olds may show a preference to learn from an accurate informant but dismiss the informant if they perceive even slight inaccuracies (Pasquini et al., 2007).

As children grow, their ability to discern the reliability of informants improves. While 4-year-olds become more successful at distinguishing subtle differences between informants, they still struggle to correctly weigh varying degrees of inaccuracy (Mills, 2013). For example, a

study found that 4-year-olds did not consider mis-labelling a tiger as a mouse to be "more inaccurate" than calling it a lion, whereas 6- and 7-year-olds could clearly distinguish these degrees of inaccuracy (Einav & Robinson, 2010). Furthermore, older children develop the ability to establish preferences between informants who exhibit contradictory characteristics. For instance, 5-year-olds prefer past accuracy to confidence cues when these indicators conflict (Brosseau-Liard et al., 2014). This demonstrates that children employ a type of ranking process when evaluating sources of information, and the process becomes more sophisticated as they develop.

Individual Differences in Selective Social Learning

For many years, researchers mainly focused on group performances in selective learning tasks to study which type of cues children rely on when evaluating sources of information. Recently, more interest has emerged to examine individual characteristics that could predict children's selective learning performance. This allows better understanding of which personal factors a child considers when evaluating a new informant. Some studies have shown that children with higher theory of mind skills have a better understanding of knowledge and demonstrate greater preference to learn from someone who is reliable (Brosseau-Liard et al., 2015; Crivello et al., 2018). Furthermore, children who have better inhibitory control skills respond more skeptically to new information (Jaswal et al., 2014). Other characteristics, such as children's general intelligence (Mills & Elashi, 2014), extraversion (Canfield et al., 2015), native language (Lucas et al., 2013), and socioeconomic status (Corriveau et al., 2016) have also been shown to have an impact on selective learning strategies.

Learning Strategy Preferences

Children's inclination to use social or asocial learning strategies varies across their development. For instance, children under the age of 8 often prefer to learn socially, as their ability to learn by observation may significantly exceed their ability to innovate (Beck et al., 2011). Indeed, 3- to 5-year-olds prefer using social information instead of attempting to solve a task independently (Wood et al., 2013), with the difficulty of the task having no influence on their choice (Flynn et al., 2016). Morgan et al. (2011) found children were more likely to use social information depending on task difficulty and another study found that associating a cost with access to an accurate informant reduced 4- to 7-year-olds' use of this source (Brosseau-Liard, 2014). Additionally, 3- and 4-year-olds were more vigilant when they witnessed semantic inaccuracies (e.g., incorrect object labels) compared to episodic inaccuracies (e.g., incorrect object locations; Stephens & Koenig, 2015).

Other hypotheses predict that children prefer social information when they are uncertain. High rates of copying have been observed in children who lack relevant personal information (e.g., Wood et al., 2013). They may even copy irrelevant actions if they face a difficult task they do not know how to solve (Kendal et al., 2018). However, if children observe a method that is unreliable in providing a reward, they are more likely to innovate a novel method than when a reliable method is observed (Kendal et al., 2018).

Similar to children, adults also differ in their tendency to solve problems socially or asocially, with several factors influencing these preferences. Rawlings et al. (2017) provide evidence that personality traits play a significant role in shaping these learning styles. For instance, individuals who are more creative and maintain brief social interactions are more likely to engage in asocial learning. Moreover, individuals with lower IQs are generally less likely to

learn socially (Mesoudi et al., 2015). In contrast, those with higher tendencies toward social dominance and individuals from collectivist cultures are more inclined to rely on social information (Mesoudi et al., 2015). Additionally, Fishman, Ng, and Bellugi (2011) showed that extroverted individuals process social stimuli differently, increasing their likelihood of using social information. Kendal et al. (2018) further suggest that diverse strategies across different populations may stem from subtle variations in context, developmental background, or individual traits, helping to explain the range of observed behaviours.

Illusory Control

Various fields of psychology have long examined how individual factors influence learning across the lifespan. One phenomenon that has gained attention over the past decades is illusory control, which refers to an exaggerated belief that one's actions can influence an outcome that is, in reality, determined by chance (Langer, 1975; van Elk, Rutjens, & van der Pligt, 2015; Palmquist et al., 2016). A common day-to-day example is gambling, where individuals, despite conceptualizing the randomness of a lottery, often believe their actions (e.g., choosing specific numbers) can improve their odds of winning. This belief persists even after multiple losses, as the gambler convinces themselves that the next attempt will be "the one." Despite the obvious randomness, many people believe factors like strategy, timing, or luck can influence their success.

Another way to understand illusory control is through locus of control, which refers to whether an individual attributes an outcome to internal factors (e.g., personal effort or skill) or external factors (e.g., luck or chance) (Rotter et al., 1962, as cited by Hallahan et al., 1978). For example, individuals with an internal locus of control may believe that good things happen to them because they worked hard or had the skills to make them happen. They may also believe

they are responsible for undesired events because they didn't try hard enough or did not have the necessary skills. Individuals with an external locus of control may believe that positive and negative events which happen to them are unrelated to their actions. They would posit that these events happen because of other people, luck, or fate. In the context of illusory control, individuals with an internal locus of control may mistakenly believe they control outcomes that are governed by external factors, such as chance.

Having an internal locus of control, when someone has suitable agency, is generally beneficial. Research shows that adults with a stronger internal locus of control tend to achieve greater success (Bialer, 1961), particularly within middle-class environments compared to those in lower socioeconomic brackets (Battle & Rotter, 1963). People who perceive themselves as being in control often expect success and are more motivated to strive for intellectual achievements (Crandall et al., 1962). In children, this is also reflected in academic outcomes. Studies have shown that children with an internal locus of control tend to perform better in school (Crandall & McGhee, 1968; Shaw & Uhl, 1971), and enhancing their sense of personal control can lead to improved academic performance (Dweck, 1975, Cooper et al., 1981). Furthermore, Cooper and colleagues (1981) demonstrated that a child's locus of control influences their academic performance more than their performance influences their locus of control. It has been hypothesized that children with an internal locus of control are more likely to have emotional reactions to feedback, which may motivate them to achieve more, whereas children with an external locus of control may not react emotionally because they attribute outcomes to external factors beyond their control (Phares, 1976, as cited in Cooper et al., 1981). Consequently, children with an external locus of control often experience less success and display behaviours associated with "learned helplessness" (Pearl et al., 1980; Dweck, 2017).

However, in situations where individuals lack true agency, having an internal locus of control—or more specifically, illusory control—can lead to illogical behaviours. This is evident when people apply skill-based behaviours to situations where the outcome is entirely random, such as blowing on dice before a roll. Studies suggest that most people, including adults, hold some level of superstitious beliefs, which involve implausible connections between behaviour and outcome (Irwin, 1993, as cited by Griffiths et al., 2019). These beliefs can manifest as spiritual practices, beliefs in invisible forces like fate or karma, or other forms of magical thinking. Skinner (1948) proposed that superstitions arise when individuals associate a behaviour with a random positive outcome, increasing the likelihood that they will repeat the behaviour—even when no real causal link exists. An example would be hockey players who avoid shaving during playoff seasons, believing it will improve their team's chances of winning. It has been found that individuals with higher levels of superstitious beliefs are more prone to illusory control (Griffiths et al., 2019).

In parallel, studies have explored the self-serving bias in children, a tendency to attribute successes to oneself and failures to external factors (Miller & Ross, 1975). Research shows that this bias is present in school-age children (Snow, 1993; Weisz, 1980) and persists into adolescence (Weisz, 1981), particularly in situations where children lack control. For instance, Weisz (1981) conducted a study with children aged 6 to 14 years old at a local fair, where they participated in games of chance. Of the children who participated, one-third won their desired prize while two-thirds did not. When asked why they thought they won or lost, those who won attributed the outcome to their own effort, whereas those who lost did not.

The above examples demonstrate how children's locus of control interacts with their true control, which can significantly impact their daily functioning. Facing a situation where children

have no (or very little) control is challenging. In some cases, illusory control may serve adaptive functions. While it is possible that children's overestimation of their control could stem from a poor understanding of luck and their own limitations, overconfidence in their control over outcomes may be necessary for children to explore their environment and take more risk and expand their knowledge (Heckhausen & Schulz, 1995). Indeed, there is some indication that children remain overly optimistic even after receiving feedback (Lipko et al., 2009) which might prevent a loss of motivation (Finn & Metcalfe, 2014). For example, a child who finishes last in a race due to slipping on a wet track decides to participate in the next race, even though it is still raining.

On the other hand, illusory control can lead to harmful consequences. For example, children may make poor decisions such as avoiding help when they need it, misattribute failures to themselves (Abramson & Allow, 1981), or develop mental health issues such as obsessive-compulsive symptoms (APA, 2013; Reuven-Magril, Dar, Liberman, 2008) or delusional thinking (e.g., Na et al., 2023). Or, as discussed previously, it can lead to illogical thinking and behaviours. It is crucial to recognize that, in everyday life, children frequently encounter situations where both internal and external factors contribute to outcomes, making it challenging to distinguish between the two.

Studies have found that the understanding of the distinction between skill and chance is an ability that evolves during development (van Elk et al., 2015; Nicholls & Miller, 1985; Weisz et al., 1982). One study revealed that kindergarteners perceived the outcomes of a card game as caused by their own competence even though it was obvious (to an adult) that it was caused by chance (Weisz, 1980). Conversely, fourth graders attributed the card game outcomes to luck but failed to dismiss the role of competence completely. Other findings demonstrated that with age

children tend to believe more frequently that their failures are due to a lack of ability or effort; however, no age differences were found for attributions of their success (Pearl et al., 1980). Furthermore, older children were inclined to perceive task difficulty as having a bigger impact on their successes and failures than younger children, whereas younger children believed that luck played a larger role. Specific factors such as participating in tasks involving competition, choice, and personal involvement have been demonstrated to foster illusory control (Langer, 1975), which helps explain why this phenomenon persists into adulthood (Weisz, 1981).

Despite numerous research finding task-related factors influencing illusory control (e.g., Langer et al., 1975; Weisz et al., 1982) and examining the impacts of illusory control on children's everyday functioning (e.g., superstitious belief, maladaptive behaviours), little is known about individual differences in illusory control in children. Endorsement of more superstitious belief has been associated with the degree of illusory control in a study conducted with adults (Griffiths et al., 2019). Some researchers have suggested that confidence and self-efficacy could be related to the concept of illusory control (Palmquist et al., 2016). Indeed, research has shown a similar developmental trend regarding confidence. Young children tend to be overconfident in their own abilities (Boseovski, 2010), but people tend to continue to overestimate their performance on a given task (Roebers et al., 2007). One can assume that it is likely that individuals display tendencies to exhibit higher or lower levels of illusory control and that internal (e.g., confidence) and external factors (e.g., task-related) play an important role.

The Impact of Illusory Control on Selective Learning

Studies have investigated how children's own learning is integrated with their learning from others (e.g., Harris, 2012; Sobel & Kushnir, 2013), yet few studies have examined if children's perception of control impacts their reliance on others when learning. Palmquist and

her colleagues (2016) were the first researchers to explore the impact of children's illusory control on their selective learning performance in a series of four studies. All four studies had a similar methodology. Children (4- and 5-year-olds) first played a hidden object game with a helpful informant (four trials) and an unhelpful informant (four trials). The helpful informant always pointed to the cup containing the object, and the unhelpful informant would point to a picture which was unhelpful in getting information about the location of the object. In trials with the unhelpful informant, children were divided randomly in two groups: children could either succeed at finding the object at chance level (aiming for an average of two out of four trials) or they would be successful for all four trials. Following these eight trials, children did four testing trials: for each trial they needed to ask for help from either the helpful informant or the unhelpful informant to find the hidden object under one of two cups. Children did not see the hidden object locations during the test trial.

Their findings revealed that children did not monitor the helpfulness of the informants when they experienced success for all trials in the familiarization phase (Studies 1-3). Thus, children in the always successful condition did not show a preference for an informant during test trials. The authors suggest that when children consistently experience success at a game of chance, their illusory control increases. This may have led them to discount the role of others, or of luck, in their success. Notably, children who identified the helpful informant as being helpful were more likely to prefer them over the unhelpful informant. Additionally, children in the always successful condition did not identify luck as being the cause for their success. Interestingly, one single failure seemed to eliminate children's sense of illusory control (Study 4). Children then tended to prefer the informant who was helpful previously. However, the authors suggest that the failure probably had a greater impact because it was on the last trial.

These studies demonstrate that children's illusory control could have detrimental effects in novel learning situations. Children were unable to evaluate and seek the help needed to be successful in the task.

The studies from Palmquist and their colleagues (2016) highlight the importance of further investigating children's illusory control influence on their performance in selective learning tasks. Their findings revealed that children's prior success may impact their evaluation of sources of information. However, their studies had some limitations, and many questions are left unexplored.

In all studies, children's experience of success and failure was coupled with witnessing the informants' level of usefulness. Because of this, it was difficult to discern whether children tracked their success with each informant rather than attributing their success to their own skills. Even if the unhelpful informant did not provide information pertaining to the location of the hidden object, children could have evaluated the usefulness of the informant based on the past success they had experienced with them. It is logical that children who experienced success with both informants would not demonstrate a preference between informants, whereas children who experienced failure with the unhelpful informant would prefer the helpful informant; not necessarily because they were more helpful but because they experienced complete success with them. Therefore, for both options, one would expect that children's success levels with the unhelpful informant would dictate their informant preference. However, both explanations still indicate that children often discount the role of luck.

Palmquist et al. (2016) attempted to discern these two explanations by having participants experience half the familiarization trials on their own for Study 2. For the testing trials, the helpful informant was available as well as an individual they had never seen before. As

mentioned above, they obtained similar results to the other studies as children in the always successful condition showed no preference between the helpful informant and the stranger. However, it is again difficult to know whether children's increase in confidence in their ability to win led them to be ambivalent towards the helpful informant, or if they believed that anyone could win this game because they had experienced success both on their own and with the helpful informant. To some extent, they were still more willing to take a risk, and not always choose the helpful informant.

With this in mind, it would be valuable to evaluate the impact of children's independent success on their preferential learning and then introduce the informants after they experience success. This way, children would attribute their success to their own skill or to luck/chance; they could not attribute their success to an informant. By experiencing independent success, we could better examine the hypothesis that success impacts children's preferential learning by increasing their illusory control.

After the completion of the Pilot Study (Chapter 2) and following the start of my data collection for Study 1 (Chapter 3) and Study 2 (Chapter 4), Kim and colleagues (2020) published a study investigating the influence of prior success on 4-year-olds' decision to make independent judgments. Children were assigned to one of four conditions: either children experienced prior success (or failure) or no experience at all, and they had access to either a knowledgeable or ignorant informant during testing trials. Those partaking in the prior experience phase had to guess the location of a sticker between two boxes (total of 4 trials). Success rates were not manipulated, as the authors expected some variation based on children's guesses. In the testing phase, the same format was used but an informant was included, either knowledgeable or ignorant. The knowledgeable informant would watch the sticker being put in place whereas the

ignorant informant would step out of the room when the sticker was placed. Children had to again guess the sticker location between one of two boxes, aligning their belief with or against the informant.

Interestingly, the authors found that children with prior experience and who had access to the knowledgeable informant aligned their beliefs with the informant more than chance level, suggesting that children consider their own experiences and those of trustworthy informants to make their decisions in a chance game. Researchers suggest that this could be explained by the fact that overall guessing success in the prior experience phase happened, by chance, to be extremely low. Indeed, just like the Palmquist et al. (2016) studies, low success would have increased the likelihood of children relying on a knowledgeable informant, even in a single informant paradigm. Exploratory analyses indicated that only the group of children who experienced very low rates of success showed a consistent preference to align their beliefs with the knowledgeable informant compared to the group without any prior experience; children who experienced complete success did not differ from the other groups. However, the “high success” group included children who had success rates lower than chance, which questions whether we can interpret the results for this group. Another interesting finding that contradicted the past literature is that children who had no prior experience did not endorse the knowledgeable informant more than chance level. The authors posited that it is possible that children perceived the task as being easy and were overconfident, and the intentions of the informant might not have been clear. Notably, the informants always gave the same answer, a fact which might have thrown off some participants.

The authors conclude that future studies should manipulate children’s guess rate, add measures of confidence level, and explore the role of informants and knowledge types. While the

studies in this dissertation were created prior to the publication of Kim and colleagues (2020), the present studies do address some of that article's limitations.

Individual Differences and Selective Learning Methodologies

For the past couple decades, experiments assessing children's selective learning patterns have often used a methodology with a forced choice between two informants. Children are typically presented two informants differing by one or two characteristics. Children are first familiarized with the informants and witness their differentiating characteristic(s), then they face a learning situation that they have not encountered before. Children are required to endorse one of the two informants' answers, or in other scenarios, they must request help from one of them (without knowing their answer).

Although this 50/50 format has been widely used and is effective at examining group differences, children's performance on selective learning tasks using this kind of forced-choice paradigm can greatly vary across administrations. Indeed, in two series of studies, children were administered two selective learning tasks, either an identical task one week apart or two parallel tasks completed one after another (Cossette et al., 2020; Juteau et al., 2019). These studies demonstrated some stability in performances over time and across task versions, where performance on the first task weakly predicted performance on the second task. Notably, task performance was easily disrupted by superficial aspects, such as the presentation order of informants. Authors note that a force-choice measure with a 50% probability of success by chance can perhaps investigate group-level effects but is less than ideal to examine and understand individual differences (Cossette et al., 2020; Juteau et al., 2019). Therefore, alternative methodologies, such as having the choice to engage in social learning or not, should be considered to study individual differences in selective learning.

Other studies have investigated children's choice to engage in social learning when performing selective learning tasks. These tasks differ from traditional selective learning tasks by allowing children the choice of relying on themselves rather than having to accept new information from one informant or another. Thus, rather than choosing between two informants, the child chooses between social learning and guessing. A study conducted by Rowles and Mills (2018) showed that preschool children prefer to seek help from a socially engaged yet incompetent helper (unsuccessfully completing a task but making good eye contact with the child and task, smiling, good posture) in contrast to an unsocial competent helper (successfully completing a task but making poor eye contact, not smiling, poor posture, monotone voice). Of note, about 26% of children did not seek any help throughout the experiment, and the number of times children sought help varied significantly between individuals.

Presenting this additional choice offers the opportunity to explore children's preference to engage in social learning in addition to assessing their trust towards certain informants. It also reflects children's typical environment, where they are often not forced to learn from someone but instead can choose to improvise or otherwise seek help in certain learning situations. Using this format is essential to assess the impact of children's illusory control on their learning selectivity. One would expect that children with high illusory control would rely on themselves to succeed and not engage in social learning. Offering children the opportunity to rely on themselves allows us to evaluate whether children choose to engage in social learning, and how this affects their preferences and endorsements of new information.

Screen-Mediated Learning

Markedly, children are no longer learning solely from direct exposure to human informants; they are increasingly using a variety of information sources. In recent decades,

children have been exposed to technology and the internet for learning purposes at an accelerating rate. With nearly 60% of the world's population having access to the internet (Miniwatts Marketing Group, 2020) and about one in three internet users being under 18 years of age (Keeley & Little, 2017), there is a growing need to understand how children interact with technological informants. In 2019, 48% of students globally were reported to use desktop computers in classrooms, 42% used smartphones, 33% used interactive whiteboards, and 20% used tablets (Berstein, 2019). Children also have access to smart toys (10%) and smart speakers (9%), such as Amazon Alexa or Google Home (Rideout, 2017). Note that all these sources are at least 5 years old; given the rapid societal change in this domain, it is quite possible that these percentages are even higher in 2024, when this dissertation is being written.

It has been long debated how television viewing or any interaction with a screen impacts children's development and learning. The Canadian Paediatric Society (CPS) frequently publish their updated guidelines regarding digital media and screen time as too much screen time may put children at risk of negative health and developmental outcomes (e.g., less physical activity, poor sleep, nearsightedness, attention difficulties, aggressiveness; Canadian Paediatric Society, 2022). Conversely, we know that screens can allow alternative ways to access learning which was proven to be essential during the COVID-19 pandemic. It has been suggested that the use of screens is not the problem but rather how they are used (Guernsey & Levine, 2016). For instance, many studies have demonstrated the positive outcomes of watching Sesame Street on learning and academic outcomes (e.g., Kearney & Levine, 2019; Mares & Pan, 2013). Conversely, other studies have found that a mobile device can easily disrupt teaching, for example between a toddler and their caregiver, altering their interaction (Reed et al., 2017). When using a virtual reality (VR) headset, children have reported higher levels of "realness"

than adults when using it as a distraction tool during a painful medical treatment (Bailey & Bailenson, 2017). Interestingly, children who played Simon Says with Grover from Sesame Street in VR were less likely to inhibit their motor responses but were more likely to comply to Grover's requests and to share stickers with them than children who participated using a TV screen (Bailey et al., 2019).

Non-Human and Technological Informants

Although the use of screens has increased significantly, with 98% of American children under the age of 8 years having access to devices with internet (Rideout, 2017), few studies have investigated children's information seeking preferences towards technological informants. A technological informant has been previously defined as a device, such as a computer or a smartphone, which allows access to information via the internet (Danovitch & Alzahabi, 2013). Technological informants, as non-human, can be considered to have both social and asocial characteristics. They present varying levels of animacy (e.g., books vs. robots; Danovitch & Alzahabi, 2013), interactivity (e.g., search engine vs. Artificial Intelligence), and personification (e.g., cartoon character vs. search engine). Therefore, it can be difficult to determine whether a particular technological informant would be perceived as a social being or as a channel to relay information. As discussed previously, we have a lot of information about children's preferences to learn from social sources. The question is, do children use similar selective learning strategies when considering technological sources of information?

Recent studies have investigated children's preference for non-human or technological informants in comparison to human informants. A study by Eisen and Lillard (2016) found that preschool children showed no preference between a book and a touchscreen across different learning tasks, while six-year-olds preferred the touchscreen device. Other research found that

when children were forced to choose between human and technological informants, both of whom were accurate in three of four trials, 4-year-olds preferred to seek information from the human informant but endorsed both informants equally (Noles et al., 2015). By age 5, they increasingly preferred to both seek and endorse information from technological informants, a trend that becomes even more pronounced in adults (Noles et al., 2015).

The differences in children's trust towards technological informants across development could be influenced by several factors. One hypothesis is that children's understanding and perception of these informants evolve over time. Research on this topic is currently limited. Preschoolers appear to grasp the distinctions between humans and computers (Mikropoulos et al., 2003), yet they still anthropomorphize an internet search program (Danovitch et al., 2015). Notably, studies have shown that children aged 3 to 5 use similar learning strategies with computers as they do with humans, such as relying on a computer's history of accuracy to guide their learning (Danovitch & Alzahabi, 2013).

Interestingly, despite most parents reporting that their 4-year-olds observed adults using technological devices for information seeking or had otherwise been exposed to technology before the age of 2, these children often still trust a person over a search engine (Noles et al., 2015). Noles et al. (2015) suggest that the shift in trust towards technological informants observed in 5-year-olds may be due to the increased value they placed on written information as they begin to read (Eyden et al., 2013; Robinson et al., 2013). Additionally, they posit that 5-year-olds might better understand the range of feedback technological informants offer and believe that technology does not typically aim to deceive, making it seem more reliable.

A recent study examined 4- to 12-year-old children's beliefs about whether three types of technological informants (the internet, Google search, and Amazon's Alexa) could answer

questions about famous or non-famous people and near-future or far-future events (Girouard-Hallam & Danovitch, 2024). The results indicated that as children aged, they were more likely to believe these sources could answer questions about famous people or near-future events but not about typical people or far-future events. The oldest children reported that the internet could provide more information about non-celebrities than Google or Alexa. The authors suggest that children's online experiences continuously shape their understanding of technology's capabilities.

More studies are needed to examine children's assessment of technological informants and their use of learning strategies. It remains unclear whether the same learning mechanisms are at play when children learn from technology as when they learn directly from people, mainly how the presence or lack of social cues impact this process. This area warrants further investigation. Including technological informants in future studies will be essential to accurately reflect the new reality of children's interactions with information.

Objectives and Contribution of This Thesis

My Ph.D. thesis focuses on understanding children's sense of illusory control and its potential impact on their learning. In this context, illusory control refers to children's overconfidence in their own skills, knowledge, or intellect. This research aims to determine whether illusory control influences children's choice of learning strategies in novel contexts. Specifically, I will investigate whether children prefer to rely on an informant or themselves when encountering situations involving unfamiliar knowledge, and I will explore children's preferences for different types of informants. By examining the relationship between illusory control and children's tendencies to seek information from external sources, this research is

intended to provide insights into how children perceive their abilities and how this perception influences their responses to new learning situations.

To better understand how children's illusory control affects their learning strategies, children's success in a game of chance was manipulated allowing children to directly experience success or failure before interacting with potential sources of information. This approach has been used in prior research to induce a sense of illusory control (Langer et al., 1975; van Elk et al., 2015; Weisz et al., 1980). As previously mentioned, children naturally exhibit varying levels of illusory control when faced with situations they cannot influence, likely shaped by a combination of internal and external factors. The aim of this manipulation was to simulate the heightened or diminished levels of illusory control they might display in different contexts. For example, a child's success or failure during a classroom activity may influence their subsequent learning behaviour.

It was hypothesized that children who experienced greater success would subsequently exhibit higher levels of illusory control, while those with less success would have lower levels of illusory control. This allowed us to address the following research questions: (a) Are children's help-seeking behaviours influenced by their prior success? (b) Are children's confidence levels in their responses affected by their prior success? (c) Does prior success influence children's preference between technological or human informants?

Previous research has demonstrated that as children's illusory control increases, they tend to be less particular in their preference for helpful or unhelpful sources of information (Palmquist et al., 2016). More recently, a study found that 4-year-old children who experienced low success were more likely to align their beliefs with those of a knowledgeable informant, whereas their high-success counterparts did not (Kim et al., 2020). Based on these findings, we hypothesized

that children with higher levels of illusory control would be less dependent on external sources of information, preferring to rely on their own perceived ability in situations where they lack the necessary information. Although our investigation of children's preferences when contrasting human and technological informants was exploratory, we predicted that these preferences would vary based on the types of inferences children were asked to make.

These studies aim to build on previous research by 1) examining a broader age range to better understand the development of illusory control and its impacts as children gain more knowledge and hone their learning skills, 2) incorporating additional measures to assess children's illusory control, 3) allowing children to directly and independently experience success and failure, and 4) exploring the relationship between illusory control and social learning behaviours across different domains of learning.

Together, these studies seek to improve our understanding of selective learning processes by identifying individual differences that may affect children's learning in each domain. By allowing children to choose to engage in social learning or not, we aim to better comprehend how children's illusory control can undermine their learning. The results will reveal whether illusory control influences children's decision to seek information from a knowledgeable informant (Study 1), and if it affects their perceptions of a teacher and technological informant (Study 2) – in both instances, when children have the opportunity to answer questions themselves. These are the third series of studies examining the impacts of illusory control on selective learning, and the first to manipulate children's prior success and failure (and to do it independently from informant interaction) to induce illusory control. This research will deepen our understanding of the role illusory control plays in the cognitive mechanisms underlying selective learning processes. Additionally, exploring children's attitudes towards technological

informants will provide insights into how they interact with these sources compared to human informants. This investigation will enhance our understanding of children's learning decisions and will shed light on how individual differences contribute to social selective learning behaviours. Critically, this understanding will help us present children with information sources they find compelling and identify the allure of sources that may be detrimental.

Chapter Two: Pilot Study

Purpose and Hypotheses

The objective of the Pilot Study was to test a new study procedure involving the manipulation of children's illusory control. This study allowed us to observe whether children were comfortable answering questions on a computer screen with the help of an experimenter and to examine whether the items created for the study were suitable for 3 to 8-year-old children. Although previous studies on the impact of illusory control on selective learning targeted 4- to 5-year-olds, other studies have shown that younger children generally present higher levels of illusory control than older children, although older children still present with higher levels of illusory control than adults when presented with a game of chance (van Elk et al., 2015; Weisz et al., 1982). Other research has also shown that by 8 years of age, children begin to report confidence levels reflective of their true performance (Roebers et al., 2007). Therefore, studying the impacts of illusory control in 3- to 8-year-olds will allow better understanding of a possible developmental progression on children's choice to engage in social learning.

To isolate the impacts of illusory control, children's experience of success or failure was manipulated prior to the introduction of the informant, which allowed us to address some of the limitations from the Palmquist et al. (2016) studies. Previous studies have demonstrated the effectiveness of participation in a rigged game of chance to manipulate both adults and children's belief in control over an outcome (e.g., Langer, 1975; van Elk et al., 2015). By controlling the magnitude of success and failure, we were in a better position to detect the impacts of prior success on selective learning via illusory control.

We assessed the manipulation's impact on children's help request behaviour towards a knowledgeable informant while answering novel questions (those which required knowledge the

children did not possess). A cartoon owl named Ezra served as the knowledgeable informant, presented on a computer screen. Presenting the task via computer with access to a knowledgeable character should be a familiar scenario for children. By having access to a knowledgeable informant, it was apparent that the optimal strategy to increase the child's likelihood of success in answering novel questions was to request help from the informant.

We hypothesized that children who experienced no success during the manipulation would have lower levels of illusory control and thus would seek help from the knowledgeable informant more often when answering novel questions, and across all question types.

Methodology

Participants

In all, 48 typically developing children (31 females, 17 males) 3 to 8 years of age (*M*= 72.7 months; Range 42-107 months) were kept for analyses in this study. Six additional participants took part in the study but had to be excluded from analyses due to major changes in script (4) and experimenter errors (2). All participants resided within a large Canadian metropolitan area and were tested at a university child development laboratory. Forty-one participants completed the study in English and seven completed the study in French. Participants were recruited through a laboratory database in Ottawa. Numerous parents were approached at local family expositions and were added to the database if they expressed interest in future study participation with their child at the University of Ottawa. To be eligible for this study, children needed to be considered "typically developing" by their parents. This research was approved by the University of Ottawa Research Ethics Board.

Material and Procedures

The Pilot Study included a single task, created specifically for this study to manipulate children's levels of illusory control and assess their help-seeking behaviour using novel questions for which children did not have the requisite knowledge. The task required a laptop running *MS PowerPoint* software to present questions to children with images and audio clips. A demographic questionnaire was administered to the participants' parent/guardian. This questionnaire consisted of questions regarding languages spoken at home by or to the child, the child's ethnicity, annual household income, parents' education level and occupation, and sibling information. The information gathered was only used to describe the sample.

The study required a one-time visit to the laboratory at the University of Ottawa and the study duration was approximately 10 minutes per child. All children were tested individually, seated at a table beside the experimenter. Parents were welcome to sit in the room behind their child during the study, or to stay in a waiting area. The parents were asked to fill out the demographic questionnaire during or after the study. All sessions were recorded to allow verification of the children's answers by another experimenter. There were two parts to the task: the manipulation phase and the asking phase (see Appendix A for an illustration of the Pilot Study).

Manipulation Phase. First, children were told that they were going to play a game on the computer and that it was important that they try their best. The manipulation was comprised of three trials where children played a game of chance. For each of three trials, four boxes were shown on the screen. Children were asked to point or indicate verbally in which of the four boxes a certain object was hidden. After choosing the box where they believed the object was hidden, the experimenter clicked on that box to reveal whether the object was present. When the object

was found, the experimenter would say “That’s right, the [object] is inside this box”. If the box was empty, the experimenter would say “That’s not quite right, the [object] is inside this box” and would click on any other box to reveal the object. Importantly, the manipulation component of this task rigged the trials to allow children to either get the answer on a given trial correct or not. Children were randomly assigned to one of three conditions: always successful, partially successful, and never successful. Children in the always successful condition were successful for all three trials, in the partially successful condition they were successful for the first two of three trials, and for the not successful condition, children were successful for none of the trials. For children who failed on a trial, the game required the experimenter to choose any other box to reveal the object to the child.

Asking Phase. Children were introduced to a cartoon owl named Ezra, a knowledgeable character, whom they may ask for help. He was described as follows: “See this picture? This is Ezra. He knows all the answers to all the questions in the game. He always gives the correct answer. For every question, you can either try to answer by yourself, or you can get help from Ezra. If you want to hear Ezra’s answer, I will click on his picture, like this (*experimenter clicked on the picture and Ezra said “It’s this one”*). It’s your choice, you can try to answer by yourself, or you can get help from Ezra”. Children were then told that they would not know which questions they got right or wrong, but that they must try to do their best.

Children were presented with 12 novel questions. These questions fell into two domains of learning, to understand the impact of illusory control across different learning contexts. The first domain involved episodic information, where questions were situation-specific and could be verified independently (Stephens & Koenig, 2015). Two types of questions were created for this domain. The first were hidden object location questions (e.g., *Which box contains the*

blueberry?) that were based on chance, the same type used for the manipulation questions. The second, questions were about other individuals' preferences (e.g., *Which of these meals is Dariel's favourite meal?*), which can be described as idiosyncratic and requires access to personal information about the individual. Therefore, questions in this domain require information that children do not have access to. The second domain involved semantic information; knowledge that can be generalized that can be difficult to verify independently (Stephens & Koenig, 2015). The two types of questions involved labelling unknown objects/living things (e.g., *Which of these plants is named a "driss"?*) and general facts (*How many stars are there in the Pegasus constellation?*). Novel object labels were software generated and consisted of one or two syllables. The idea was that children would not have the required prior knowledge to answer these questions. The questions were specifically created for this study, with answers either made up or based on factual information that is typically unknown to children. Having these different domains of learning allowed better understanding of the impacts of children's illusory control across situations and whether the manipulation would have domain-specific or domain-general impacts on children's learning.

After the experimenter stated a question and four possible answers, children were asked whether they wanted to answer by themselves or first receive Ezra's answer to each question. This reminder was important to ensure that all children remembered they could ask for help, as some of them may forget or be impulsive. If they requested Ezra's answer, the experimenter would click on his picture at the top right of the screen. Ezra would state his answer verbally and a green circle with a blue arrow would show his answer on the screen. The children would then indicate what they thought was the correct answer to the question. If children preferred to answer by themselves, the experimenter would ask for their answer right away without clicking on Ezra.

These steps were repeated for all twelve questions. If children asked if they got the right answer, they were reminded that no feedback could be provided for their answers. At the end of the task, we thanked them for their participation, and they received a small token of appreciation.

Results

Children's requests for help were tabulated. Children were attributed a score of 1 when they chose to get Ezra's answer, and a score of 0 when they chose to answer by themselves. For each question type, the sub-scores ranged between 0 and 3. A total score was computed by adding sub-scores together, providing a range of 0 to 12. Children were approximately equally distributed across the conditions based on age (seven 3-year-olds, seven 4-year-olds, ten 5-year-olds, seven 6-year-olds, nine 7-year-olds, eight 8-year-olds).

A one-way between-subjects ANOVA was conducted to compare the effect of the manipulation of illusory control on children's mean request for help for the always successful, partially successful, and not successful condition. Findings revealed no significant effect of illusory control on children's mean total scores of requests for help ($F(2,45) = .77$, $p = .470$). Therefore, children's mean scores of requests for help (on a total of 12) were similar across conditions (*Always Successful*: $M = 5.12$, $SD = 3.19$; *Partially Successful*: $M = 4.00$, $SD = 2.83$; *Not Successful*: $M = 5.27$, $SD = 3.75$).

Additionally, paired samples t-tests revealed that all children asked for significantly more help for questions related to novel labels ($M = 1.56$, $SD = 1.11$) and facts ($M = 1.38$, $SD = 1.17$) compared to object location ($M = 0.83$, $SD = 1.00$) and individuals' preference questions ($M = 1.00$, $SD = .97$; novel labels = facts > object location = preferences). A mixed model ANOVA was conducted to examine the effects of children's prior success and age (by year) on the number of times children requested help for different types of questions (object location, individuals'

preferences, labels, facts). The analysis revealed no significant main effects or interaction between these factors on help-seeking behaviour (all ps> .05; see Table 1).

Table 1

Children's mean frequency of request for help per question type by their levels of success

		Not Successful (*N = 15)*	Partially Successful (*N = 17*)	Always Successful (*N = 16*)	Mixed Model ANOVA	
Question type	*Range*	*Mean (SD)*	*Mean (SD)*	*Mean (SD)*	*Illusory Control Condition*	*Age*
Object Location	0-3	1.00 (1.13)	.71 (.92)	.81 (.98)	.39 (p>.05)	.32 (p>.05)
Individuals' preferences	0-3	1.00 (1.07)	.88 (.93)	1.13 (.96)	.19 (p>.05)	1.63 (p>.05)
Labels	0-3	1.73 (1.28)	1.29 (1.11)	1.69 (.95)	.71 (p>.05)	.87 (p>.05)
Facts	0-3	1.53 (1.30)	1.12 (1.05)	1.50 (1.16)	.58 (p>.05)	2.21 (p>.05)

Discussion

The goal of this Pilot Study was to test a new task designed to manipulate children's illusory control and assess its impact on their help-seeking behaviour in learning situations. Overall, the items created for this study were well understood by participants, and the short duration of the study allowed children of all ages stay focused on the task. However, the results did not show a significant impact of illusory control on help-seeking behaviour. The absence of a manipulation check (such as a measure of their confidence/overconfidence following the manipulation) made it difficult to determine whether children's success (or lack thereof) influenced their sense of illusory control. Although 48 participants were recruited to explore the method's feasibility and potential effect sizes, the study's power to detect significant findings

was limited due to the number of between-subject factors (age and three levels of illusory control) and the wide age range of the participants.

As a result, a new version of the task was created for Study 1. To increase the power to detect an effect of illusory control, the age range was narrowed, and the number of conditions was reduced to two, so children experienced either complete success or no success. To increase the effect of the manipulation on children's belief that they had control over their success and to increase their desire to perform well, children were provided more salient feedback during the manipulation using positive or negative working intonation. Additional measures were included as a manipulation check, including measures of confidence prior to and while answering novel questions. Other improvements were added in response to difficulties that arose with pilot study participants. Information was repeated when introducing the knowledgeable informant to ensure comprehension of his capabilities. Additionally, the wording of the script was improved to prevent children from answering questions before choosing to request help or answer by themselves.

Chapter Three: Study 1

Purpose and Hypotheses

Study 1 aimed to administer the improved Illusory Control Task to five-year-old children. Previous studies indicate that prior success can influence four- and five-year-old children's learning processes and informant preferences (Palmquist et al., 2016). Additionally, previous research has shown that by age 5, children can perform more complex cognitive tasks, such as considering multiple informant characteristics through a ranking process when selectively learning from others (e.g., using contradicting accuracy and confidence cues to decide from whom to learn; Brosseau-Liard et al., 2014). Given the variables assessed in this study, targeting five-year-old children seemed most appropriate, and the demands of the Illusory Control Task were designed with this age group in mind.

The Study 1 Illusory Control Task was administered similarly to the Pilot Study, but with a smaller age range, a reduced number of conditions, and an increase in the salience of children's successes or failures. During the manipulation phase, children guessed the location of objects, but only two outcomes were available; children were assigned to either succeed or fail on all three trials. Additional feedback was provided at the end of the three trials to emphasize children's success or failure. With these modifications, we hypothesized that we would be better able to detect the impact of the manipulation on children's help-seeking behaviour.

To bolster children's motivation to obtain the correct answer, a reward system involving virtual coins was added. To assess the impact of the manipulation, children were asked to estimate their success prior to and after participating in the task by predicting how many coins they will win (or have won). This was intended to provide an indication of their belief in their ability to perform and control outcomes in the task. Additionally, children's confidence levels in

knowing the correct answer were recorded throughout the study. This improved our ability to examine the role of children's confidence in the relationship between children's prior success and help-seeking behaviour.

For this study we hypothesized that children experiencing no success in the manipulation phase would predict lower coin winnings, have lower levels of confidence, and ask the accurate informant for help more often across all question types in the study. Although there are no prior studies that investigated the impacts of illusory control on their selective learning across different types of questions, we predicted a domain-general impact of illusory control given the context of the presenting task. In other words, following the manipulation, we predicted that children would interpret their success in the first phase as a general indication of their likelihood of success throughout the game.

Methodology

Participants

Participants were recruited through a laboratory database in Ottawa to participate in the study in-person or online. Parents were approached at local family expositions and were added to the database if they expressed interest in future study participation with their child at the University of Ottawa. To be eligible for this study children needed to be considered "typically developing" by their parents. This research was approved by the University of Ottawa Research Ethics Board.

This study aimed to include 80 5-year-olds, a sample size determined by a power analysis for an independent sample t-test, as those are the essential analyses of this study. The analysis targeted a power of 0.80, with an estimated effect size of $d = 0.65$ (Cohen's d), informed by findings from Palmquist et al. (2016), where effect sizes exceeded 0.79. This would correspond

to a medium effect size. In all, 81 typically developing children (44 females, 37 males) 5 years of age (M= 65.6 months; Range 60-73 months) were retained for analyses in this study. Fifteen participants took part in the study but were excluded from analyses due to major changes to the task (e.g., changes in content and order of questions, measures added). Eight other participants were eliminated due to experimenter errors and technical difficulties. Sixty-two participants participated in English and 19 participated in French. Fourteen participants were tested in our university child development laboratory. Sixty-seven completed the study on Zoom from their homes of which all but one participant resided in Canada, and 60 participants resided in the province of Ontario.

Parents' responses on the demographic questionnaire indicated that 47 participants had European origins, 18 had a mixed cultural background, and 10 had other origins (2: Asian; 6: Middle Eastern; 1: African; 1: Caribbean), while six participants preferred not to answer. Seven participants declared a household annual income lower than 70,000$, 18 between 70,000 – 105,000$, and 49 higher than 105,000$; seven participants preferred not to answer. From the 81 participants, information about 155 parents was obtained. It was reported that three of them obtained a high school diploma, seven completed partial post-secondary studies, 22 obtained a cégep/college degree, 58 obtained a bachelor's degree and 63 reached graduate studies; one of them preferred not to answer.

Materials and Procedure

To conduct testing, experimenters were required to have access to a laptop or desktop computer. The Illusory Control Task was administered using *MS PowerPoint* software to present questions to children with images and audio clips. For in-person participants, a cardboard poster displaying a three-point scale of children's confidence levels was used. For online participants,

families were required to have access to a laptop or tablet with audio input/output, a camera, and reliable internet access.

Initially the study required a one-time visit to the laboratory at the University of Ottawa. Fourteen participants took part in the study prior to the global COVID-19 pandemic when data collection was suspended. The task was then modified for online administration using the Zoom online video platform. The study duration was approximately 15 minutes per child. In person, children were tested individually, seated at a table beside the experimenter. Parents were offered to sit in the room behind their child during the study, or to stay in a waiting area. The parents were asked to fill out the demographic questionnaire during or after the study. All sessions were recorded to allow verification of the children's answers. When the study was conducted remotely, participants were asked to join an online meeting while seated in a quiet room. Parents were welcome to sit in the room behind their child and asked to refrain from interacting with their children during the study except to help them express their answer if needed. Again, sessions were recorded using Zoom for verification purposes.

The Study 1 task was comprised of six phases: the manipulation phase, the initial success prediction, the familiarization phase, the informant introduction, the asking phase, and the final success prediction (see Appendix B for an illustration of Study 1).

Manipulation Phase. Children played a chance game where they were asked to find a hidden object located in one of four boxes shown on the screen. Like the Pilot Study manipulation phase, this task was rigged for children to either get the answer correct or incorrect on a given trial. However, this time children were randomly assigned to one of two conditions. The "always successful" condition resulted in success on all three trials, and the "not successful" condition was marked by failure on all trials. For each trial, four boxes were shown on the screen

and children were asked to point or indicate verbally in which of the four boxes a certain object was hidden. After choosing the box where they believed the object was hidden, the experimenter clicked on that box to reveal whether the object was present. When the child was successful and the object was found, the experimenter would say “That’s right, the [object] is inside this box. Great job! Let’s try another one!”. This was said in a positive intonation and with a cheerful facial expression. If the box was empty, the experimenter would say, “Oh no! You didn’t get it right. The [object] is inside this box. Let’s try another one!” and would click on any other box to reveal the object. The experimenter would use a disappointed tone and facial expression. This emotional contrast between conditions was intended to make the child’s success or failure more salient. Following the three trials, the experimenter reviewed the child’s performance: “You got the first question right/wrong, the second question right/wrong, and the third question right/wrong”.

Initial Success Prediction. After the manipulation phase, children were informed of the possibility of winning coins for all subsequent questions. The experimenter said: “Now for my next questions, you’ll get coins for every right answer. You won’t get any coin for a wrong answer. A treasure chest will appear on the screen after each question, but we won’t know if you got coins or not. We’ll see how many coins you got at the end of our game”. To help children understand, illustrations were presented while explaining how they can win coins. Next, children were asked how many coins they thought they would win during the game. A 9-point scale was used in-person using only drawings of coins where children would point to an answer (1, 3, 4, 5, 7, 9, 11, 13, or 16 coins). This scale was reduced to a 4-point scale for online participants as children needed to verbalize their answer (A (4 coins), B (8 coins), C (12 coins), or D (16 coins)).

Familiarization Phase. This phase aimed to assess children's initial confidence and to familiarize them with the task expectations. Children were asked to answer four novel questions, one in each of the following categories: object location, personal information about other individuals, object labels, and facts (the same categories used in the Pilot Study). The four available answers were chosen either randomly or based on facts that are typically unknown to children. Following each answer, children were asked how confident they were that the answer was correct using a three-point scale: 1- a little sure, 2- half sure, or 3- very sure. Initially, the scale used in-person was "somewhat sure" instead of "half sure". However, when the study was administered online, children struggled to understand the meaning of somewhat sure and could no longer point to the scale (often, parents were not in the room with them). Therefore, the change to "half sure" allowed a better illustration of the scale with improved comprehension by the children. This scale was shown on either a cardboard poster (in-person) or on the screen (online). Additionally, a treasure chest appeared on the top left of the screen with a question mark at the end of each question. This reminded the children that they may win coins for each correct answer without knowing the amount. To ensure that they understood this reward system, after the first question, children were told: "See the treasure chest? You either got some coins or no coins, we'll see at the end of the game."

Informant Introduction. Children were then introduced to a cartoon owl named Ezra, a knowledgeable character, whom they may ask for help. He was described as follows: "See this picture? This is Ezra. He knows everything, including the answers to all the questions in the game. He always gives the correct answer. For every question, you can either try to answer by yourself, or you can get help from Ezra. If you want to hear Ezra's answer, I will click on his picture, like this (*experimenter clicks on the picture and Ezra says, "It's this one"*). It's your

choice – you can try to answer by yourself, or you can get help from Ezra." Children were then told that asking Ezra for help is not cheating, that he is available for them any time. Moreover, a comprehension/memory question was asked and feedback was provided to ensure that they understood that Ezra knows all the answers to the questions in the game, and to remind them that it is ok to ask him for help. Just like the Pilot Study, they were told that they would not receive any feedback for the questions in this phase.

Asking Phase. Following Ezra's introduction, children were presented with a total of 12 questions in four separate categories (the categories used in the pilot): locating a hidden object (*Which box contains the blueberry?*), personal information about other individuals (*Which of these meals is Dariel's favourite meal?*), labels (*Which of these plants is named a "driss"?*), and facts (*How many stars are there in the Rosia constellation?*). The questions were in a random predetermined order, but in the same order for all children. Asking a variety of question types allowed us to investigate whether children may ask for help in different situations. The novel label words were one or two syllables and were software generated. A few procedures from the Pilot Study were changed to improve data collection. Since children in the Pilot Study often answered questions too quickly, the wording was revised to encourage them to select a source or opt out before guessing. For example, "One of these boxes has a blueberry inside" – following each description, children were asked, "Before you answer the question, how sure are you that you know the right answer: a little sure, half sure or very sure?". The scale was depicted on screen or on a cardboard poster just like the familiarization phase. After stating their certainty, children were asked whether they prefer to answer by themselves or ask for help first. If they asked for Ezra's answer first, the experimenter would click on his picture in the top right corner, and Ezra would state his answer in addition to highlighting his answer among the four answers

shown on screen. Following Ezra's answer, children were read the question and asked to provide their answer. If children preferred to answer by themselves, the experimenter would ask for their answer right away and skip the step of clicking on Ezra. Just as in the familiarization phase, a treasure chest with a question mark would appear on the top left corner at the end of each question. These steps were repeated for all twelve questions. Children were asked whether they wanted to answer by themselves or ask for help first for each question. This reminder was important to ensure that each child remembered they could ask for help, as some of them may have forgotten or become impulsive. The knowledgeable informant, Ezra, always provided the correct answer. If children asked if they got the right answer, they were reminded that no feedback could be provided for their answers.

Final Success Prediction. After the asking phase, children were asked how many coins they thought they received based on a rating scale (a 4-point scale online and 9-point scale in person; see Appendix B). The scales were identical to the ones shown just before the familiarization phase. At the end of the study, children were presented with the treasure chest to reveal how many coins they received during the game. All children received 9 virtual coins (an arbitrary amount) and were told that they did a great job. Children then received a small token of appreciation for participating in the study.

Results

Score Calculations

Help seeking behaviour was assessed by tabulating the number of times children requested help for each category of question in the asking phase. Sub-scores ranged between 0 and 3 and sub-scores were added for a total score between 0 and 12. Children's acceptance of the informant's answer after they requested help was assessed by dividing the number of times

children gave the corresponding answer to Ezra's, by the number of times children chose to ask Ezra for help. This score ranged between 0 and 1. Children who never asked for help did not receive this score. This score will be used for descriptive purposes.

Moreover, children's mean level of confidence in their own answers was calculated for the familiarization and asking phases and corresponding categories of questions (all ranging between 1 and 3 on a 3-point scale). Children's initial and final success prediction (the number of coins they thought they were going to win or won during the game) were tabulated. The scores ranged from 4 to 16 coins for children who participated online (with a 4-point scale) and 1 to 16 coins for those who participated in-person (with a 9-point scale).

Impacts of Levels of Success

Independent sample t-tests were used to analyze the impact of prior success on 5-year-old children's help-seeking frequency, their levels of confidence in their answers, and their initial and final success predictions. Findings revealed no significant effect of prior success on children's mean total score of help requests (all ps> .05). Moreover, children's prior success did not impact children's initial and final success prediction, nor their initial confidence and confidence throughout the game (see Table 2). Other factors such as place of experiment (virtual vs. in-person) and language of assessment (French vs. English) did not yield significant impacts on children's initial confidence, confidence throughout the game, and number of help requests (all ps> .05).

Table 2

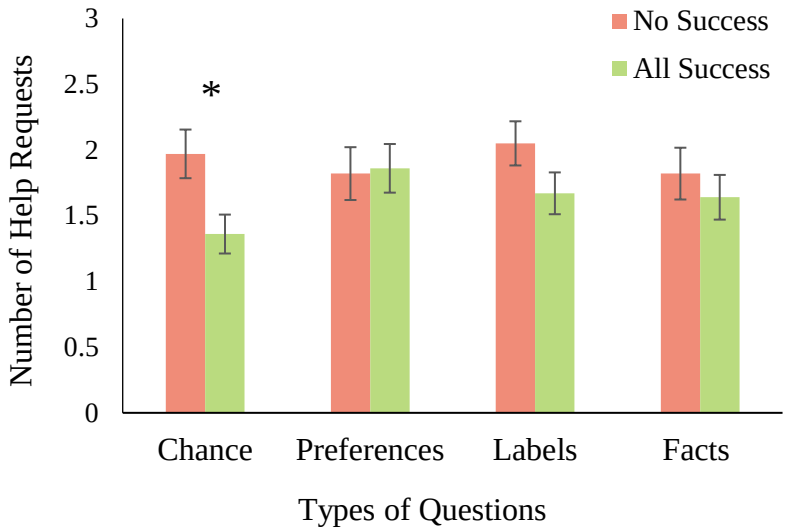
Mean initial and final success predictions, confidence levels during the familiarization and asking phases, and number of help requests by their levels of success

			Not Successful	Always Successful	
	Range	*N*	*Mean (SD)*	*Mean (SD)*	*Independent Sample t-test*
In-person					
Initial Success Prediction (9-point scale)	1-16	14	8.00 (7.21)	4.93 (1.74)	-1.08 (p>.05)
Final Success Prediction (9-point scale)	1-16	14	15.17 (2.04)	14.13 (3.18)	.698 (p>.05)
Online					
Initial Success Prediction (4-point scale)	4-16	67	11.52 (4.87)	12.47 (4.49)	-.84 (p>.05)
Final Success Prediction (4-point scale)	4-16	67	13.58 (4.00)	14.00 (3.45)	-.47 (p>.05)
All					
Confidence Familiarization Phase	1-3	81	2.33 (0.53)	2.32 (0.47)	0.73 (p>.05)
Confidence Asking Phase	1-3	81	2.23 (0.61)	2.23 (0.50)	0.98 (p>.05)
Help Requests Asking Phase	0-12	81	7.67 (4.07)	6.52 (3.58)	0.58 (p>.05)

Further investigation revealed a significant impact of prior success on children's number of help requests for questions involving object location, $t(79)= 2.62$, $p= .011$. Children who were successful were less likely to request help ($M= 1.36$, $SD= .96$) than those who were unsuccessful ($M= 1.97$, $SD= 1.16$). No other impact of prior success on children's help requests and confidence scores were found, nor did paired sample t-tests reveal differences for help requests and confidence between types of questions (see Figure 1 and Figure 2).

Figure 1

Children's mean total frequency of help requests during the asking phase by levels of success for each question type.

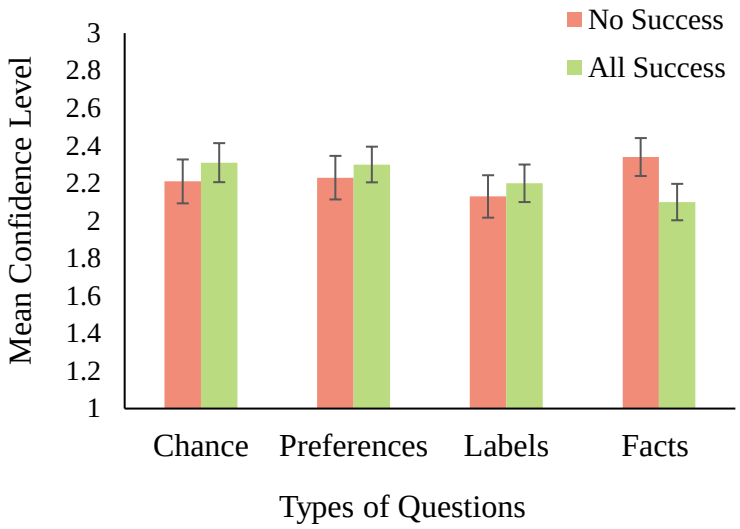


Note: Error bars represent the standard error of the mean.

* = children in the always successful condition requested significantly less help for chance questions than children in the not successful condition (p= .011)

Figure 2

Children's mean confidence levels throughout the asking phase by levels of success for each question type.



Note: Independent sample t-tests did not reveal significant results between the groups of success. Error bars represent the standard error of the mean.

Relationships Between Children's Individual Scores

Bivariate correlations between children's scores were conducted to better understand individual patterns. The success prediction analyses were separated between children who participated in-person and online since different scales were used. Children who participated in the study online who predicted more coin winnings before starting the game were also more likely to predict higher winnings at the end of the game, $r(65) = .364$, $p = .002$. All children who demonstrated higher initial confidence (during the familiarization) were more likely to have higher confidence during the asking phase, $r(79) = .511$, $p < .001$, and to request more help, $r(79) = .219$, $p = .050$. None of children's other main scores were significantly correlated (see Table 3). Of note, nine participants requested help for all questions and six participants did not

request any help. Out of the 75 participants who requested help at least once during the asking phase, only two participants did not endorse any of the informant's answers after requesting help.

Table 3

Relationships between children's success predictions, initial confidence and confidence throughout the game and number of help requests

In-person (*N* = 14)	Success Prediction 2	Confidence Familiarization Phase	Confidence Asking Phase	Help Requests
Success Prediction 1	.292	.433	.050	.284
Success Prediction 2		.396	-.019	.217

Online (*N* = 67)	Success Prediction 2	Confidence Familiarization Phase	Confidence Asking Phase	Help Requests
Success Prediction 1	.364**	-.007	-.082	.071
Success Prediction 2		.225	.041	.185

All Children (*N* = 81)	Confidence Asking Phase	Help Requests
Confidence Familiarization Phase	.511**	.219*
Confidence Asking Phase		-.003

***** =** Correlation is significant at the .05 level (2-tailed)
**** =** Correlation is significant at the .01 level (2-tailed)

Additionally, children were consistent in their behaviour; if they frequently requested help for one type of question, they were more likely to do so for other types of questions (see Table 4). Similarly, children were more likely to be confident across types of questions if they were highly confident for a specific question type (see Table 5).

Table 4

Relationships between children's number of help requests for different types of questions

	Help Preferences	Help Labels	Help Facts
Help Object Location	.659**	.649**	.504**
Help Preferences		.665**	.675**
Help Labels			.591**

****** = Correlation is significant at the .01 level (2-tailed)

Table 5

Relationships between children's confidence levels for different types of questions.

	Confidence Preferences	Confidence Labels	Confidence Facts
Confidence Object Location	.584**	.570**	.499**
Confidence Preferences		.599*	.613**
Confidence Labels			.560**

****** = Correlation is significant at the .01 level (2-tailed)

A generalized linear mixed model (GLMM) analysis (using R version 4.4.1) was implemented to better understand the relationship between children's confidence levels and their likelihood of requesting help. In total, 972 observations were used (81 subjects times 12 questions). Results revealed that higher confidence levels on a given question were significantly associated with a decreased likelihood of requesting help on that same question (see Table 6).

Table 6

Coefficients for GLMM predicting children's likelihood of help request behaviours based on their confidence levels.

Fixed Effects	Beta	*SE*	Z value	P value
(Intercept)	2.21	0.39	5.71	< 0.001
Confidence	- 0.73	0.12	-6.03	< 0.001
Random Effects	Variance	*SD*		
Participant ID	4.05	2.01		
Question	0.15	0.38		

Discussion

Does Children's Prior Success Impact Their Help-Seeking Behaviours Towards a Knowledgeable Informant?

This study aimed to explore how illusory control affects young children's reliance on informants when facing novel challenges. We manipulated children's success to increase or decrease their illusory control, and therefore their confidence in their abilities, and to understand illusory control's impact on their reliance on a knowledgeable informant. We hypothesized that children who have experienced prior success would exhibit more illusory control, leading them to feel more confident in answering unknown questions independently, and to consequently seek less help even without the requisite knowledge.

We created four categories of questions to observe variations in children's confidence and help-seeking behaviour across contexts. Two categories relied on episodic knowledge: object location questions (relying on chance) and questions about other individuals' preferences (inaccessible knowledge). The other two categories, novel labels and fact questions, typically rely on semantic knowledge, although children did not possess the required knowledge for these questions. To our knowledge, no study has investigated the impact of prior success in one context on children's preference to request help from a knowledgeable informant across other domains. Thus, additional exploratory analyses were conducted to understand potential impacts across the domains.

The results revealed that 5-year-old children who experienced complete prior success in locating objects were less likely to request help for subsequent object location questions. However, this prior success did not influence their help-seeking behaviours for other types of questions. This indicates that the influence of prior success was domain-specific, affecting only

their decisions related to the same type of questions used for the manipulation. Conversely, children who experienced failures in locating objects did not change their frequency of help requests for subsequent object location questions compared to other types of questions.

These findings suggest that children who experienced success may have attributed their success to a specific skill in locating objects, believing they did not need help despite not actually having control over the outcome. However, this belief remained specific to this skill and did not generalize to other domains. In contrast, children who experienced failure may have attributed the outcome to factors beyond their control, such as chance, which did not change their help-seeking behaviour for object location questions.

Does Children's Prior Success Impact Their Confidence Levels?

Interestingly, no association between children's prior success and their self-reported confidence levels was observed. Minor fluctuations in confidence across domains were found within each condition, without a clear pattern. Children with prior success did not express more confidence in locating objects correctly than those who experienced prior failure. Contrary to our hypotheses, children did not generalize their success in one domain to confidence in their ability to answer all game questions correctly.

A key question remains: what led children with prior success to more frequently answer object location questions independently than their counterparts? Although the success manipulation impacted help-seeking behaviours, it did not affect their confidence in having the requisite knowledge for these questions. Children's mean confidence during the asking phase did not correlate with their overall frequency of help-seeking requests. However, children who were more confident in answering a question were less likely to request help for that question, even accounting for individual and question variability.

Several factors may explain why prior success did not impact reported confidence levels. Firstly, this study was the first to use these confidence scales and they have not been validated. In-person and online participants may have struggled to use these scales effectively. Future studies should consider conducting a pre-training with participants to ensure they are familiar and are able to use this scale.

Secondly, 5-year-old children may inherently struggle to assess their own confidence and/or to report it in a coherent manner. Internal confidence judgments, which are activated during information retrieval, may differ from explicit confidence ratings (Roebers et al., 2007). One indication of this is that there was minimal confidence variation across question types. We expected variations in confidence across question types given that there would likely be different perceived difficulties of the questions. For instance, questions requiring semantic knowledge may appear more difficult than those requiring episodic knowledge. Despite minimal confidence variation across question types, prior success differentially impacted help-seeking behaviour by question type.

Thirdly, children's mean confidence levels were above the halfway point, indicating they were generally more than "somewhat" or "half" confident about their answers. This overconfidence is consistent with literature which suggests younger children exhibit higher confidence levels, a trend which decreases with age (Roebers et al., 2007). This overconfidence may explain the discrepancy between overt confidence levels and help-seeking behaviour.

Lastly, overall confidence in answering correctly may not be a reliable predictor for the frequency of help-seeking behaviours. All children showed consistent answer patterns: higher confidence for one question type often correlated with higher confidence for other questions, and the same consistency was observed in help-seeking behaviour. However, despite this

consistency, the relationship between confidence and help-seeking remained inconsistent. Prior success may have subconsciously influenced confidence, or other factors may have been at play, such as strategy avoidance following failure. In this context, strategy avoidance refers to the tendency to disengage from certain strategies, like seeking help, after experiencing failure, potentially due to the belief that these strategies will not lead to success. As discussed in the introduction, it is possible that children who experienced failure later exhibited signs of "learned helplessness" (Dweck, 2017), leading them to lose motivation to succeed and refrain from requesting help. These children might also be more likely to take risks, as they no longer felt motivated to make the effort required to ask for help.

Another important observation is that children did not request help for all questions despite lacking the requisite knowledge and being informed there was no cost to seeking help. On average, children declined help for over a third of the questions, opting to answer independently. This aligns with previous findings showing that children do not always choose the most optimal learning strategy (Rowles & Mills, 2018). In this context, where children lack the necessary knowledge, the optimal strategy would be to ask for help from a knowledgeable informant, which would increase their likelihood of success. However, children's motivations may not have been solely focused on maximizing their chances of success. Rather, they might have been driven by other goals, such as exploring different approaches, enjoying the task, or pursuing the most engaging or fun aspects of the game. As a result, their choice to avoid asking for help, while non-optimal from a learning perspective, could have been a strategy well-suited to their personal motivations and goals for the activity.

Study Limitations

This study has several limitations. It demonstrates that prior success can differentially impact 5-year-olds' help-seeking behaviours, yet understanding the underlying relationship between prior success, confidence, and help-seeking remains challenging. It is possible that 5-year-olds struggle to monitor and report confidence accurately. Including older participants in future studies could provide better insight into this relationship.

Moreover, children's perceptions of the accurate informant could be a factor. While children were informed about the informant's accuracy, they did not experience it directly. Additionally, children showed high confidence even when they lacked the requisite knowledge, suggesting the presence of illusory control despite evidence of prior failure. Further assessment of children's perceptions and attributions toward the informant is necessary to differentiate between trust in the informant and the impact of illusory control on help-seeking behaviours. Other factors, such as perceived costs for seeking help, despite no actual consequences, might also influence children's decisions. For example, children might interpret asking for help as 'cheating', even if they were explicitly told that help-seeking was allowed in the study. Cultural factors may also play a role in children's perception and use of helpers. For instance, Mexican-American children have been found to be less likely to interrupt to ask for help compared to European American children, possibly due to cultural norms around social interaction (Ruvalcaba et al., 2015).While the specific cultural context of Mexican-American children is not directly relevant to our sample, this finding highlights the influence of cultural norms on children's help-seeking behaviours and underscores the potential for similar dynamics in other cultural contexts. Additionally, parents might discourage children from seeking help unless it is

deemed absolutely necessary. Feelings of embarrassment or perceived inadequacy could also deter children from requesting help, leading them to prefer answering questions independently.

Finally, the sample size may have contributed to the lack of evidence. Despite some indications of illusory control effects (Palmquist et al., 2016), the study's design differences may have led to weak power and type-2 errors. Future research should explore the impact of illusory control with an older age group across various learning contexts to further understand the possible relationship between illusory control, confidence, and help-seeking behaviours. Furthermore, examining the impacts while children have access to different types of informants would be important to investigate children's attributions to informants when requesting help from less "perfect" informants.

Chapter Four: Study 2

Purpose and Hypotheses

The primary objective of Study 2 was to further understand the impacts of illusory control on children's help-seeking behaviour. A methodology similar to Study 1 was used, with several key modifications. A critical change was the focus on 7- to 8-year-olds, allowing for a more in-depth assessment of how confidence influences children's decisions to engage in social learning. This shift extended the investigation to an age group not previously examined in research on illusory control and selective learning. Targeting this older cohort also enabled the use of a longer and more complex procedure, including more detailed assessment scales.

Following the success manipulation, children participated in two distinct learning situations. In the first situation, children were required to listen to two informants and then choose one of the informant's responses or provide their own. This design allowed us to examine the impact of illusory control on children's endorsement behaviours. By removing potential concerns about the cost of seeking help, we aimed to minimize any hesitations children might have about requesting assistance. As a result, we expected to see a higher number of children endorsing the informants' answers compared to those who would request help. This learning context is somewhat similar to "typical" selective learning studies but with additional answer options (four instead of two), and with the opportunity to choose their own answer that is different from the choices proposed by either informant. In the second situation, children had the option to either request help from an informant or to make a guess on their own without hearing any responses from the informants, following the structure of Study 1. By examining children's strategies in these different learning contexts, we intended to gain insights into the effects of

illusory control on their confidence and the perceived costs associated with children's learning decisions.

To further explore the role of children's confidence in shaping their learning preferences, additional measures of confidence were incorporated into the study. This allowed for a deeper investigation into individual differences and how these might impact children's learning. As discussed in the general introduction, little is known about the personal factors that could make a child more susceptible to illusory control. While we anticipate that the manipulation would induce illusory control, as reflected in children's reported confidence levels throughout the study, it is likely that individual differences—shaped by prior experiences—would affect the degree to which children experience illusory control. To account for this, we included a parental measure of children's confidence and self-esteem, based on the hypothesis that illusory control and confidence are related (Palmquist et al., 2016). No previous study has utilized a parent-reported measure of children's confidence in the context of investigating illusory control. We selected the Behavioral Rating Scale of Presented Self-Esteem for Young Children (Haltiwanger & Harter, 2019) for this purpose, as several of its items reflect aspects of illusory control (e.g., 'trusts his/her own ideas' and 'knows what he/she wants') and it is designed for children aged 8 and younger. Additionally, the scale has demonstrated strong psychometric properties, which are discussed further in the materials section.

A secondary goal of this study was to explore children's preferences between two types of informants: a teacher and a technological informant. In today's digital age, especially following the global COVID-19 pandemic, children are increasingly exposed to screens through tablets, phones, and computers (Hedderson et al., 2022; Qi, Yan, & Yin, 2023). Additionally, they have greater access to technological informants such as virtual assistants (e.g., Alexa, Siri)

and artificial intelligence (AI) systems (Devi et al., 2022). These technological sources are becoming more prevalent both at home and in educational settings (Devi et al., 2022). Despite their growing use, little is known about how children interpret and utilize these informants. Previous research indicates that children's illusory control affects their evaluation of the informant's characteristics and their subsequent use (Palmquist et al., 2016). This underscores the need to investigate how individual differences in illusory control influence children's learning from these informants. Given the frequent and growing presence of technological informants in classrooms, this study provides an initial exploration of children's evaluations and their use of technological versus human informants when answering difficult questions. An older age group was chosen for this study given their increased exposure to technology and improved comprehension of technology's capabilities (Girouard-Hallam & Danovitch, 2022). Additionally, we aimed to understand children's perceptions and attributions regarding these informants.

We hypothesized that children who experienced success at the beginning of the study would ask for help less frequently than those who experienced failure. Furthermore, we predicted that children who had experienced success would seek help from either the teacher or the technological informant at chance level, as they would not perceive the informant's feedback as valuable and would make their selections more or less randomly. On the other hand, we expected that children who experienced no success would ask for help more frequently. Contrary to those experiencing only success, they might show a preference for a specific informant; however, it is difficult to predict which informant may be preferred as very few studies have compared children's selective learning preference between a teacher and a technological informant. A series of studies by Wang et al. (2019) found that 5- to 6-year-olds and 7- to 8-year-olds showed differentiated selective learning performance depending on the question type when they had

access to an internet source, a teacher, and a peer. We would expect children would more often prefer the teacher if they prioritized a social connection and possibly have had good experiences with their teachers in the past. However, other research indicates that children 6- to 10-years-old demonstrate a clearer preference for technological informants over human informants (Girouard-Hallam & Danovitch, 2022). Children may prefer the search engine if they view the informant as being very knowledgeable and as a source of unbiased answers. In all, the preference will likely depend on the inferences made about the two informants, which are examined in the post-test phases.

Another structural difference between Study 1 and Study 2 is the nature of the informants. In Study 1, Ezra was a cartoon character introduced as an all-knowing informant. Therefore, the optimal strategy to answer novel question and achieve the greatest success in the game was to request help from him. Conversely, in Study 2, although informants are introduced as having either a certain expertise (the teacher) or having access to vast knowledge (the search engine via the internet), children were not told that there was a guarantee that informants would provide correct answers. Furthermore, because the informants were not "know it all's", children had to make their own assumptions as to the extent of the informants' knowledge across the different categories of questions. For semantic-knowledge type questions, one would expect that children might assume that both the teacher and the search engine could have access to that type of knowledge. However, it is unclear what children might expect regarding informants' knowledge about episodic-type of questions. It is possible that they think that the informants have just as much chance as themselves to obtain the correct answer or that they make other inferences based on their own assumptions (e.g., the search engine is part of the game, it might have access to the answers in the game). Examining children's confidence levels and help-

seeking behaviours across types of questions will be essential to better understand this relationship across different contexts.

Methodology

Participants

This study aimed for a final sample of 80 children between 7- and 8-year-old. This sample was computed based on a power analysis for an independent sample t-test, power of 0.80 and an estimated effect size d of 0.65, which corresponds to a medium effect size, informed again by findings from Palmquist et al. (2016), where effect sizes exceeded 0.79. Additional participants were scheduled and tested to account for cancellations, and all were kept. As mentioned previously, 7- and 8-year-old children were chosen given that they are typically familiar with technology (Danovitch et al., 2015; Girouard-Hallam & Danovitch, 2022) and would be better able to report confidence levels than 5-year-olds (Roebers et al., 2007). Like the previous study, only participants considered typically developing were eligible and were recruited through the laboratory database in Ottawa. This research was approved by the University of Ottawa Research Ethics Board.

In all, 92 typically developing children (49 females, 43 males) 7 and 8 years of age (M= 95.5 months; Range 84-107 months) were kept for analyses in this study. Forty-four participants were in the *not successful* condition and forty-eight were in the *always successful* condition. Nine additional participants took part in the study but were excluded from analyses due to major changes to the study (clarification of the confidence scale and removal of familiar questions). Seven additional participants were eliminated due to experimenter errors (4), technical difficulties (2), and one participant who witnessed their sibling participate in the study prior to testing. Seventy-seven participants participated in English and 15 participated in French. Two

participants resided in the United States while the rest resided in Canada: 16 from the province of Quebec (9 of whom were from Gatineau) and 73 from Ontario (61 of whom were from Ottawa).

Parents' demographic questionnaire responses indicated that 54 participants had European origins, 16 had mixed backgrounds, and 15 had other origins (Asian: 10; African: 2; Latin/South American: 1; Middle Eastern: 1; Other: 1), while seven participants preferred not to answer. Six participants spoke one language, 49 participants spoke two languages, 27 participants spoke three languages, and nine participants spoke four or more languages. Three parents declared a household annual income lower than 70,000$, 21 between 70,000 – 104,000$, 16 between 105,000 – 140,000$, and 38 higher than 140,000$; 14 parents did not answer. Of the 179 parents that were part of the study, four obtained a high school diploma, 11 completed partial post-secondary studies, 21 obtained a Cégep/college degree, 68 obtained a bachelor's degree, and 70 reached graduate studies; two of them preferred not to answer.

Materials and Procedure

Study 2 includes the same materials as the previous studies (see Appendix B for study outline). Additionally, parents were asked to complete a set of questionnaires prior to testing, which explored several areas: 1) children's access to and use of technology at home and at school, 2) children's confidence in using technology, and 3) the Behavioral Rating Scale of Presented Self-Esteem for Young Children (Haltiwanger & Harter, 2019), which assesses children's self-esteem and confidence in everyday situations (see Appendix D). For this scale, each item was presented across the page, with a statement on the left side and a contrasting statement on the right. Parents were required to choose the side that best described their child, and then indicate whether that description was *sort of* like or *very much* like their child. Only one answer could be selected per item. This scale has demonstrated internal consistency ranging from

.85 to .91, with the overall rating of children's overall self-esteem correlating at .65 with their scores on the questionnaire and only .39 with their perceived IQ (Haltiwanger & Harter, 2019).

Children were recruited in the same way as previous studies. The study was conducted during a single online visit using the Zoom software, lasting about 25 minutes. The study was administered in both English and French. Parents were asked to place their child in a quiet area and not intervene during testing, except for technical difficulties or to help their child express their answers verbally if they were pointing at the screen. Parents were free to leave the area or to be seated behind the child during testing. Sessions were video recorded to allow verification of the children's answers by another experimenter.

There were nine phases in this study: the manipulation phase, the initial success prediction, the familiarization phase, the informant introductions, the endorsement phase, the asking phase, the final success prediction, the inference phase, and the confidence questionnaire.

Manipulation Phase. The content in this phase was the same as Study 1. Children's level of success was manipulated and they experienced either success or failure on 3 trials of an object location task (e.g., *Which of these boxes has a toy inside?*).

Initial Success Prediction. Again, children were asked to report the number of coins they thought they were going to win during the game. To improve precision, a 6-point scale (4, 8, 12, 16, 20, or 24 coins) was used to assess children's success predictions instead of the 4-point scale used previously.

Familiarization Phase. This phase was structured similarly to Study 1 with a few modifications. Children were asked five questions: the same four novel questions from Study 1, plus an additional familiar question ("*Which of these animals is a frog?*"). This familiar question was included to allow children to use the full range of the confidence scale, as we expected them

to be “very sure” of their answer. Analysis of the responses showed that all but one participant answered that they were very sure, and everyone answered the question correctly. After answering each of the five questions, a treasure chest with a question mark appeared on the screen, just as in Study 1.

Informant Introductions. Children were introduced to two informants: one was depicted as a classroom teacher, and the other as a search engine. The following script was used to present them: “Now, before we get to the next questions: See the picture on the left? This is Paola. She is a teacher at an elementary school. She has been a teacher for 10 years. See the picture on the right? This shows Cyberi, which allows you to search things on the internet. Cyberi is not a person but a search program.” The idea behind these introductions was to present an “average” teacher and a typical search program. By indicating the amount of experience of the teacher, children would not need to try to make assumptions based on her appearance to try to gauge her knowledge. For the search program, no pronouns were used on purpose to avoid personification of the informant. Half of the participants were introduced to Paola first, with her picture in the top left corner of the screen. The other half were introduced to Cyberi first, with its picture in the top left corner of the screen.

Endorsement Phase. During the endorsement phase, children answered eight questions, with access to answers from the two informants. Children were told the following: “For the next questions, you will get information from Paola and the Cyberi program. For each question, first, Paola and the Cyberi program will give their answers. Then, I’ll ask you which of four answers is the right answer – you can choose the same answer as Paola or the Cyberi program or you can choose another answer if that’s what you think is the right answer. Choosing Paola or the Cyberi program’s answer is not cheating, they are available to you. Again, I won’t tell you which

answers you got right or wrong. You will win coins for each right answer, but we will only know how many you won at the end of the game. Just try to do your best. Do you have any questions before we continue?" Therefore, for each of the eight questions in the endorsement phase, children were able to choose the same answer as the teacher or the search program or simply choose another answer. The informants provided different answers to each question.

Each question was shown on the laptop screen consecutively. First, the context of the question was explained (e.g., *One of these boxes has a chocolate inside*). Second, children were asked how confident they are in knowing the correct answer using a three-point scale at the bottom of the screen (*Before you answer the question, how sure are you that you know the right answer: a little sure, half sure, or very sure?*). Third, each informant presented their answer sequentially, with the order alternating every question. Paola presented her answer in a video clip, and children could see her face while she provided her answer (e.g., *The chocolate is inside this box*). The search program said the answer using audio only, while children saw a picture of the computer program. While voicing their answer, a circle highlighting their answer appeared, using the colour corresponding to the informant. Finally, children were asked to choose one of the four answers shown on the screen (e.g., *Which box contains the chocolate inside?*). The two circles indicating the helpers' answers stayed on the screen until the child moved on to the next question. A treasure chest with a question mark appeared on-screen after each of the eight questions was answered, just like Study 1.

Asking Phase. The asking phase is identical to the endorsement phase except children were asked whether they wanted help from one of the informants instead of having both informants present their answers to each question. It was explained to the children that they have the choice of answering each question by themselves without seeing Paola's and the Cyberi

program's answers, or that they may ask for help from one of them before giving their final answer. They were informed that they can only ask one informant for help per question and were told that we would click on the corresponding helper's picture if they asked for help. The choices were repeated to ensure proper understanding. Again, children were told that asking one of the informants for help is not cheating, and that the assistance is available to them. They were also reminded that they win coins for every correct answer, and that they will see how many coins they got at the end of the game. They were asked whether they had any questions before getting started.

For each individual question, the context of the question was first explained (e.g., *One of these boxes has a chocolate inside*). Then, children were asked how confident they are in knowing the right answer using the three-point scale (*Before you answer the question, how sure are you that you know the right answer: a little sure, mostly sure or very sure?*). Next, children were asked if they wanted to answer the question by themselves or ask for help before giving their answer (*Do you want to answer by yourself or ask for help before you answer?*). If they preferred to answer the questions by themselves, the experimenter asked the question right away and the children had to choose one of four answers shown on the screen (e.g., *Which box contains the chocolate?)*. If they preferred to ask for help before giving their answer, the experimenter asked, "*Do you want to ask Paola or the Cyberi program?*". After choosing, the experimenter clicked on the appropriate helper's photo, the helper stated the answer, and a coloured circle appeared around the helper's answer. To provide her answer, Paola also appeared in a video clip in the same location as her photo (on the top left or right corner of the screen). Thereafter, the experimenter asked the question and children had to choose one of four answers shown on the screen. Childre were asked a total of 10 questions: eight novel questions from the

four types of questions mentioned previously and two familiar questions. For the two familiar questions, children were asked whom they would like help from but thereafter, the experimenter explained that the informant's answer would not be provided. The goal of the familiar questions was to assess children's confidence, expecting that all of them would indicate that they were "very sure" about their answer. All but four participants answered that they were very sure about both answers. Two of them were a "little sure" about a question asking them to count the number of marbles on a picture. The other two were "half sure" when asked what shape was shown on the screen. A single pseudo-random order was created for the questions, and all children answered them in the same sequence.

Final Success Prediction. After answering questions from the asking phase, children were asked how many coins they thought they got in the game using the same 6-point scale as previously used. Lastly, children were informed how many coins they received in the game. All children received 16 coins.

Inference Phase. Subsequently, children were asked questions regarding Paola and the Cyberi program as informants to assess children's positive attributions of these informants. They were provided descriptions and asked to choose if it best described Paola or the Cyberi program. For instance, "Which one is smart? Paola or the Cyberi program?" There were seven descriptions total: (1) smart, (2) knows everything, (3) most likeable, (4) best helper, (5) mostly gave correct answers, (6) nice, and (7) cool.

Confidence Questions. For the last part of the study, children were asked to answer questions about their confidence in their own learning abilities. These questions were adapted from the "Confidence in One's Intelligence" questionnaire developed by Dweck (2000) to align with the developmental level of the children. For each pair of statements, children had to pick the

descriptor that was most true for them. The three questions were the following: (1) Do you usually think you are intelligent OR you don't think you are intelligent?, (2) It's easy for you to learn new things OR it's difficult for you to learn new things?, (3) You are not very confident that you are smart OR you feel pretty confident that you are smart?. Following each description selection, they were asked whether it was sort of true, true, or very true for them. Therefore, for each statement, scores ranged from 1 to 6.

At the end of the study, children and their parents were thanked for their participation, and were provided a ten-dollar gift certificate to the bookstore of their choice within two weeks of their participation.

Results

Score Calculations

The number of times children endorsed or sought help from one of the informants was tabulated. For each of the four question categories, scores ranged between 0 to 2 and a total score was computed by adding sub scores together, providing a range of 0 to 8 for each phase. The number of times children gave an answer corresponding to one of the informants' was divided by the number of times children chose to request help from them. This score ranged between 0 and 1. Children who never requested help received a score of 0.

Moreover, children's mean level of confidence in their own answers was calculated for each category of questions in each phase, and a total score was computed for each of the phases (all scores ranging between 1 and 3). Furthermore, children's coin predictions before and after the games were tabulated (6-point scale: 4, 8, 12, 16, 20, or 24 coins).

Additionally, children's answers to three questions regarding their confidence in everyday life were tabulated into a total score ranging between 1 (low confidence) and 18 (high confidence).

Lastly, the fifteen items on the parental questionnaire regarding children's self-esteem were tabulated into a total score (each item ranged from 1 to 4 for a total score range of 15 to 60). The higher the score, the more parents rated the trait as indicative of high confidence.

Overall, there was no missing data except for 13 children's responses to familiar questions, which were lost due to experimenter error, along with some missing parental demographic and questionnaire items. All missing data are detailed in the results section.

Children's Frequency and Use of Technological Devices

Each participant parent filled out a questionnaire describing their child's use of technological devices. Parents reported that children most often use a TV, a tablet, and a laptop compared to other electronics. Most often, children use technology to watch movies, play games, listen to music, and complete school assignments. The descriptive data is presented below (see Figure 3 and Figure 4).

Figure 3

Children's frequency and volume of use of technological device types.

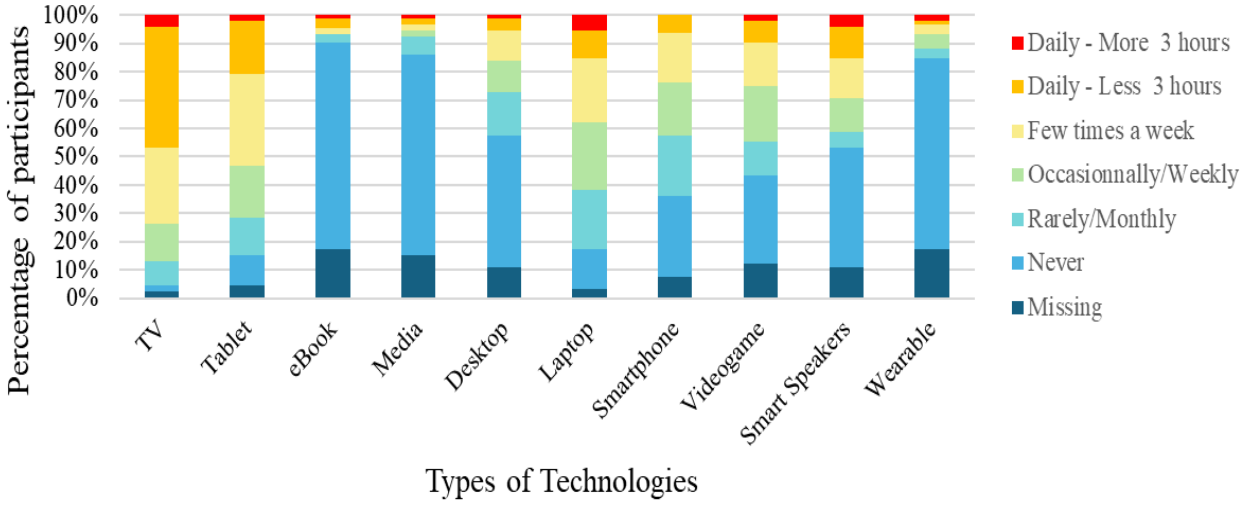
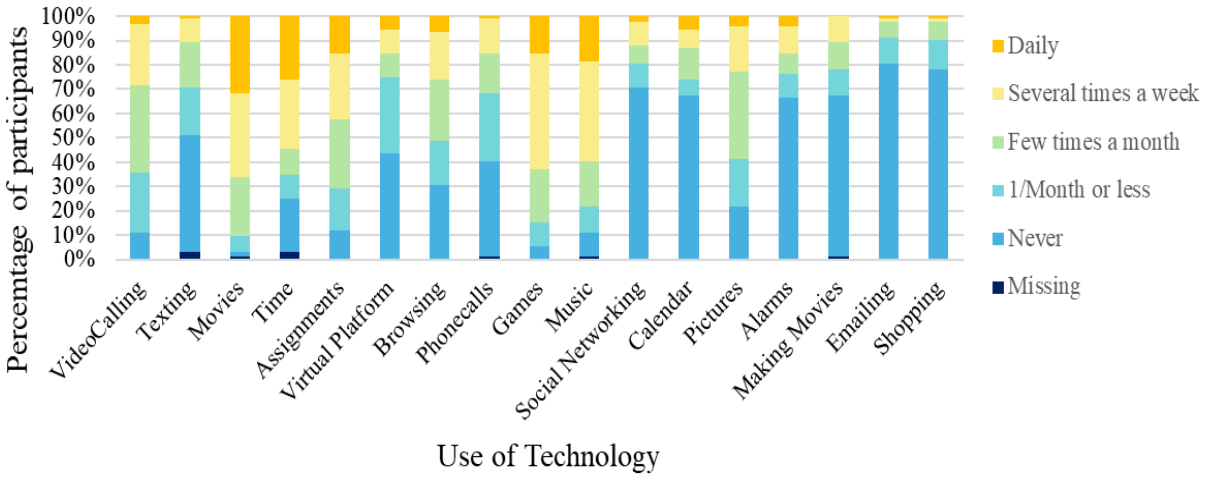


Figure 4

Children's frequency and volume of use of technology by application.



Does Prior Success Impact Endorsement and Help-Seeking Behaviours?

Independent sample t-tests were used to analyze the impact of prior success on participants' endorsement and help seeking frequency in the endorsement phase and asking phase, their levels of confidence in their answers, and their coin prediction before and after the

games. The results revealed that children with no success made lower coin predictions before and after the game than those who had high success. No significant effect of prior success was found on children's mean frequency of endorsements, help requests, and levels of confidence (see Table 7).

Table 7

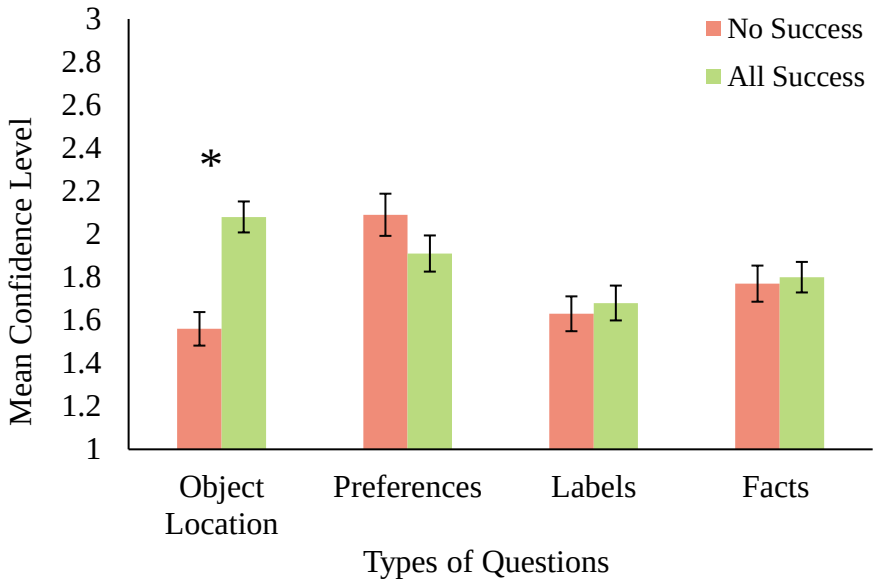
Mean frequency of endorsement and help request scores, confidence levels, and initial and final coin predictions by success condition

		Not Successful (N=44)	Always Successful (N= 48)	
	Range	*Mean (SD)*	*Mean (SD)*	*Independent Sample t-test*
Familiarization Phase				
Success Prediction 1	4-24	12.36 (6.67)	15.83 (5.53)	-2.72 (p= .008)
Confidence Level	1-3	1.78 (0.34)	1.83 (0.45)	-.66 (p>.05)
Endorsement phase				
Informant Endorsements	0-8	5.80 (1.77)	5.31 (2.04)	1.21 (p>.05)
Confidence Level	1-3	1.76 (0.40)	1.87 (0.36)	-1.34 (p>.05)
Asking phase				
Request for Help	0-8	4.14 (2.30)	3.69 (2.24)	.95 (p>.05)
Confidence Level	1-3	1.75 (0.40)	1.73 (0.42)	.24 (p>.05)
Success Prediction 2	4-24	14.45 (6.75)	18.08 (3.87)	-3.20 (p= .002)

Further investigation revealed a significant impact of prior success on children's endorsements for object location questions $t(90)= 2.89$, $p= .005$. Children with prior success were less likely to endorse informants' answers ($M= 1.10$, $SD= .88$) than those who did not have prior success ($M= 1.57$, $SD= .63$). Additionally, children who had prior success were more confident about knowing the correct object location while having access to the informants' answers ($M= 2.08$, $SD= .50$) than those who did not have prior success ($t(90)= -4.96$, $p< .001$; $M= 1.56$, $SD= .52$). (see Figure 5 and Figure 6).

Figure 5

Children's mean confidence level during the endorsement phase by groups of prior success for each question type.

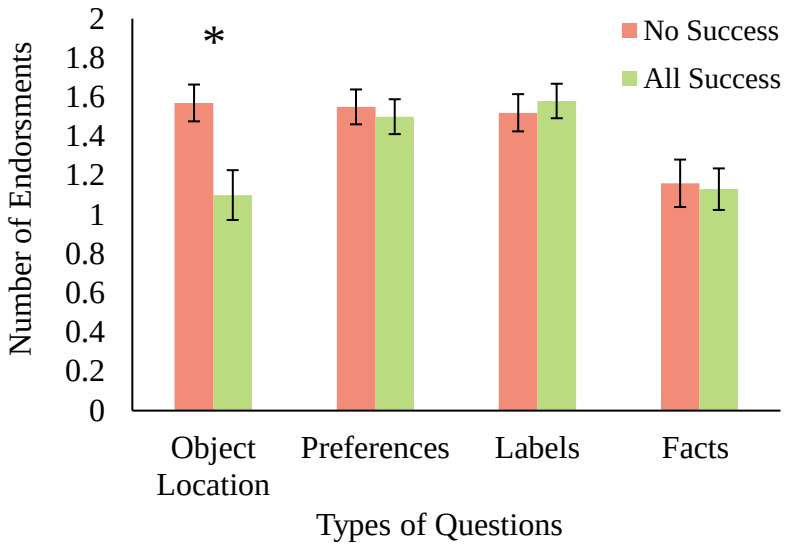


Note: Error bars represent the standard error of the mean.

* = children in the no success condition reported being significantly less confident than children in the all success condition ($p < .001$)

Figure 6

Children's endorsement behaviours during the endorsement phase by prior success group for each question type.



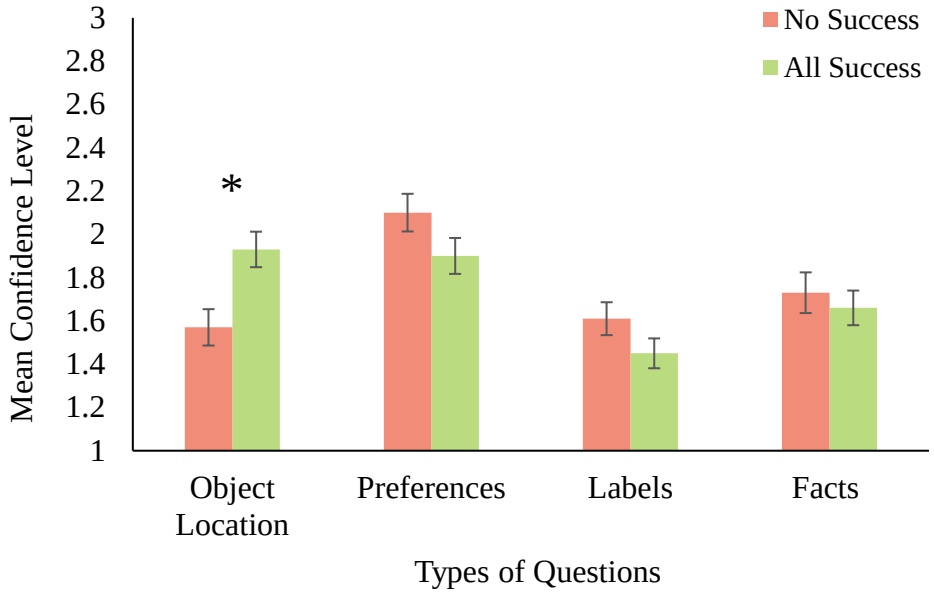
Note: Error bars represent the standard error of the mean.

* = children in the all success condition significantly chose more answers that were not endorsed by the informants than children in the no success condition (p= .005).

Moreover, during the asking phase, children with prior success had higher confidence about knowing the correct answer for object location questions ($t(90)$= -3.07, p= .003; (M= 1.93, SD= .57) than those with no prior success (M= 1.57, SD= .56). No other impact of prior success was found (see Figure 7 & Figure 8).

Figure 7

Children's mean confidence level during the asking phase by levels of success for each question type.

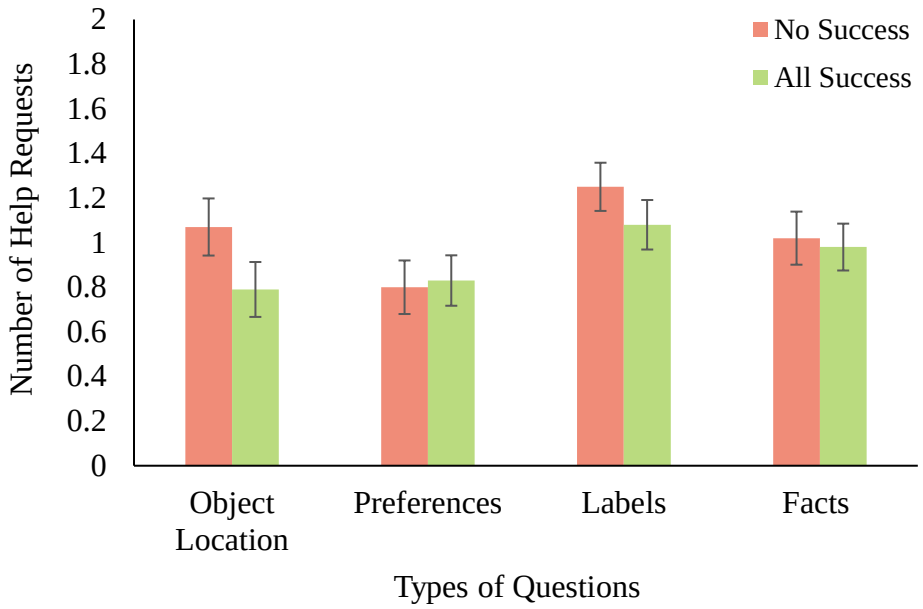


Note: Error bars represent the standard error of the mean.

* = children in the no success condition had significantly lower confidence in knowing the correct answers while answering questions during the asking phase than children in the complete success condition (p= .003).

Figure 8

Children's help requests behaviours during the asking phase by prior success group for each question type.



Note. No significant differences were found in help request behaviours between success conditions based on question type. Error bars represent the standard error of the mean.

Relationships Between Children's Individual Scores. Bivariate correlations between children's scores were conducted to better understand individual patterns. Children who demonstrated higher initial confidence (during the familiarization phase) were more likely to have higher confidence for subsequent sections of the game, and to predict more coin winnings at the end of the game. Children who predicted more coin winnings before starting the game were also more likely to predict higher winnings at the end of the game (see Table 8 for correlations).

Table 8

Associations between children's success predictions and confidence throughout the game

	Confidence Familiarization Phase	Confidence Endorsement Phase	Confidence Asking Phase	Final Success Prediction
Initial Success Prediction	.199	.124	.155	.545**
Confidence Familiarization Phase		.461**	.339**	.295**
Confidence Endorsement Phase			.641**	.268**
Confidence Asking Phase				.300**

***** = Correlation is significant at the .05 level (2-tailed)
****** = Correlation is significant at the .01 level (2-tailed)

Further analyses were conducted to understand the association between children's confidence, endorsement, and help-seeking behaviours. For the endorsement phase, no significant correlation was found between children's confidence and their endorsement behaviours. Conversely, during the asking phase, children who were less confident requested more help to answer questions, $r(90) = -.260$, $p = .012$. Moreover, children who endorsed an informant's answer during the endorsement phase were more likely to seek help during the asking phase, $r(90) = .262$, $p = .012$ (see Table 9 for correlations).

Table 9

Associations between children's confidence, endorsements and help-seeking behaviour

	Confidence Endorsement Phase	Help Requests Asking Phase
Endorsements	.155	.262*
Confidence Asking Phase		-.260*

***** = Correlation is significant at the .05 level (2-tailed)

A generalized linear mixed model (GLMM) analysis (using R version 4.4.1) was used to better understand the relationship between children's confidence levels and their likelihood of endorsing or requesting help. There were 736 observations for endorsement behaviours (choosing any informants' answer as opposed to choosing their own; 92 subjects, 8 questions)

and 907 observations for help-seeking behaviours (92 subjects, 10 questions; some participants did not provide answers to all questions due to experimenter error, which accounts for the 13 missing observations). Results revealed that confidence did not predict children's likelihood of endorsing an informant's answer (see Table 10). Conversely, higher confidence levels on a given question were significantly associated with a decreased likelihood of requesting help on that question (see Table 11).

Table 10

Coefficients for GLMM predicting children's endorsement behaviours based on their confidence levels.

Fixed Effects	Beta	*SE*	Z value	P value
(Intercept)	1.49	0.39	3.84	< 0.001
Confidence	- 0.22	0.15	-1.49	.137
Random Effects	Variance	*SD*		
ID	1.39	1.18		
Question	0.40	0.63		

Table 11

Coefficients for GLMM predicting children's help-seeking behaviours based on their confidence levels.

Fixed Effects	Beta	*SE*	Z value	P value
(Intercept)	1.40	0.36	3.92	< 0.001
Confidence	- 0.96	0.15	-6.37	< 0.001
Random Effects	Variance	*SD*		
ID	1.46	1.21		
Question	0.18	0.42		

Which Informant Do Children Prefer?

Paired-sample t-tests were conducted to investigate whether children in general demonstrate a preference to endorse or seek help from the teacher or the search engine. No

significant preferences were found for children's overall endorsement nor help-seeking behaviours across conditions (all *p*s > .05). However, children preferred to endorse the search engine's answers (*M*= 0.70, *SD*= .69) rather than the teacher's for fact questions (*t*(90)= 2.40, *p*= .0019; (*M*= 0.45, *SD*= .56).

An interesting order-of-informant effect was observed. Children were more likely to endorse the informant presented first, who appeared in the top left corner of the screen and used the colour orange to display their answers. In contrast, the second informant, placed in the top right corner and using the colour blue, was endorsed less frequently. However, no order effect was found regarding children's help-seeking behaviours during the asking phase (see Table 12).

Table 12

Children's informant preferences for endorsement and help requests by order condition

		Teacher First (N=46)	Seach Engine First (N= 46)	
	Range	*Mean (SD)*	*Mean (SD)*	*Independent Sample t-test*
Endorsement phase				
Endorsement of teacher's answers	0-8	3.22 (1.76)	2.48 (1.21)	2.35 (p= .021)
Endorsement of search engine's answers	0-8	2.09 (1.33)	3.30 (1.76)	3.74 (p<.001)
Asking phase				
Help requests to teacher	0-8	1.85 (1.59)	1.83 (1.58)	.07 (p>.05)
Help requests to search engine	0-8	2.02 (1.50)	2.11 (1.62)	-.27 (p>.05)

Findings also revealed a significant effect of prior success on children's choice to endorse the teacher's answers during the endorsement phase. Children who had no prior success endorsed the teacher's answers more frequently than those with prior success (see Table 13).

Table 13

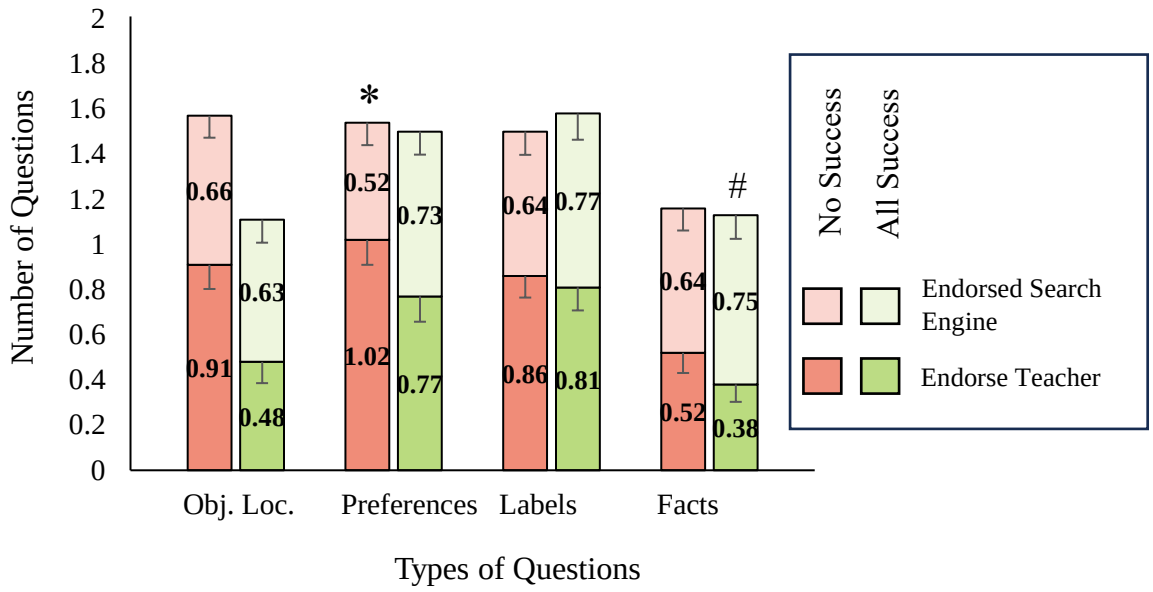
Children's informant preferences for endorsement and help requests by success condition

		Not Successful (N=44)	Always Successful (N= 48)	
	Range	*Mean (SD)*	*Mean (SD)*	*Independent Sample t-test*
Endorsement phase				
Endorsement of teacher's answers	0-8	3.34 (1.55)	2.40 (1.41)	3.06 (p= .003)
Endorsement of search engine's answers	0-8	2.45 (1.47)	2.92 (1.82)	-1.33 (p>.05)
Asking phase				
Help Requests to teacher	0-8	2.07 (1.82)	1.63 (1.30)	1.35 (p>.05)
Ratio of Endorsements of teacher's answers	0-1	0.51 (0.45)	0.43 (0.47)	.78 (p>.05)
Help Requests to search engine	0-8	2.07 (1.60)	2.06 (1.60)	.017 (p>.05)
Ratio of Endorsements of search engine's answers	0-1	0.58 (0.43)	0.56 (0.44)	.18 (p>.05)

Further investigation revealed that children with no prior success were particularly more likely to endorse the teacher's answers for other individuals' preferences questions (M = 1.02, SD= .73; $t(42)$= 2.62, p= .012) than the search engine's answers (M= .52, SD= .66). For factual questions, children with prior success were more likely to endorse the search engine's answer (M = .75, SD= .73; $t(42)$= -2.49, p= .016) than the teacher's answer (M = .38, SD= .53). No other significant effects were found for prior success on children's preference to endorse or seek help from a specific informant for other types of questions (see Figure 9 and Figure 10).

Figure 9

Children's informant preferences for endorsements during the endorsement phase by success group, for each question type.



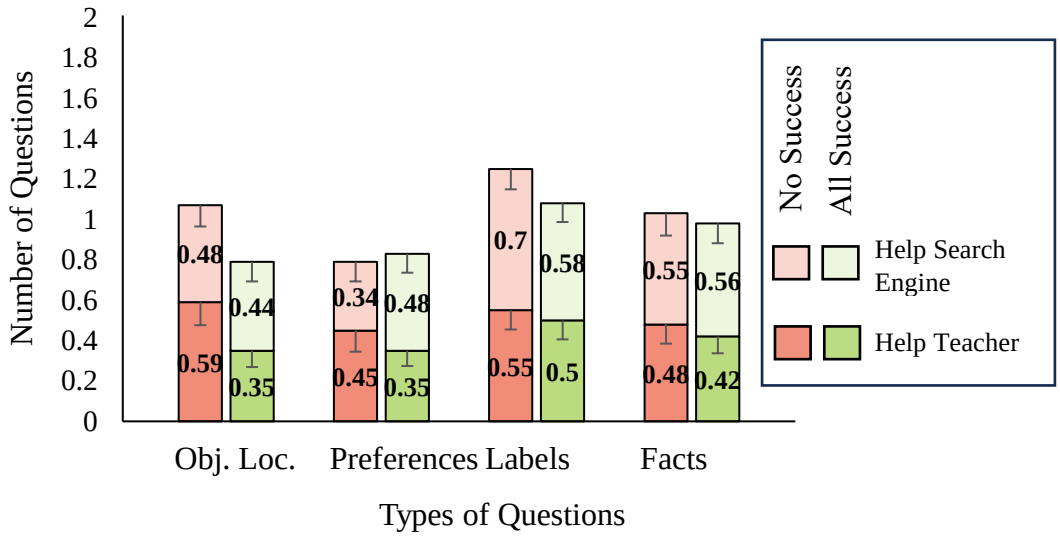
Note: Error bars represent the standard error of the mean.

* = children in the no success condition endorsed the teacher's answers significantly more than the search engine's (p= .012).

= children in the all success condition endorsed the search engine's answers significantly more than the teacher's (p= .016).

Figure 10

Children's informant preferences for help-seeking during the asking phase by success group, for each question type.



Note: No significant differences were found in informant preferences between success conditions based on question type. Error bars represent the standard error of the mean.

Children's Individual Informant Preferences. Children who endorsed the teacher during the endorsement phase were more likely to seek help from the teacher during the asking phase, $r(90) = .350$, $p = .001$. Moreover, children who endorsed the search engine during the endorsement phase were more likely to accept the computer's answer when they sought help from them during the asking phase, $r(90) = .329$, $p = .001$. Finally, children who attributed more positive characteristics to the teacher than the search engine were more likely to endorse the teacher's answers, $r(90) = .218$, $p = .037$, and less likely to endorse the search engine's answers during the endorsement phase, $r(90) = -.296$, $p = .004$. They were also more likely to seek help from the teacher, $r(90) = .412$, $p < .001$, and to endorse their answer when they sought help, $r(90) = .215$, $p = .040$. In addition, they were less likely to seek help from the search program,

r(90)= -.370, *p*<.001, and less likely to endorse the search program's answers after seeking its help, *r*(90)= -.257, *p*=.013 (see Table 14).

Table 14

Association between children's endorsement and help-seeking behaviours and their attribution of positive characteristics to the teacher informant

	Help from Paola	Help from Cyberi	Accept Help Paola	Accept Help Cyberi	Preference for Paola Index
Endorsement Paola	.350**	-.037	.196	-.021	.218*
Endorsement Cyberi	-.048	.194	.205	.329**	-.296**
Preference for Paola Index	.412**	-.370**	.215*	-.257*	

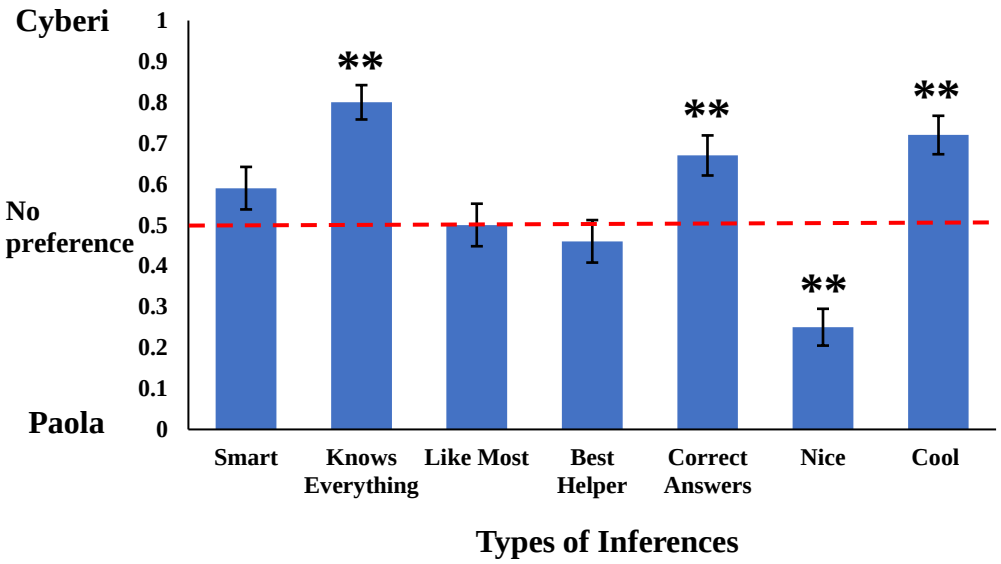
***** = Correlation is significant at the .05 level (2-tailed)
****** = Correlation is significant at the .01 level (2-tailed)

For the endorsement phase, no significant correlations were found between children's confidence levels and their endorsement of the teacher's or the computer program's answers. Conversely, during the asking phase, children with higher confidence levels were less likely to seek help from the teacher, *r*(90)= -.224, *p*= .032. No other association between children's confidence and their request for help from the computer program were found.

Children's Informant Inferences. One-sample t-tests were conducted to better understand children's attribution of positive characteristics towards the teacher and computer program. Results revealed that children were more likely to say that the computer "knows everything", "knows the correct answers", and is "cool". Children were also more likely to say that the teacher was "nice". Children did not attribute other positive characteristics more than chance (see Figure 11).

Figure 11

Children's attribution of informant characteristics



** = One-sample t statistic is significant at the .01 level (2-tailed)

Relationship Between Children's Illusory Control Task Scores and External Confidence

Following the Illusory Control Task, children were asked to answer questions about confidence in their own learning abilities in everyday life. The more children reported that they were intelligent (item 1), the higher success they predicted prior to and following the game. They were also more likely to accept the computer program's answers when they asked for help. Similarly, the more confidence children had that they were smart (item 3), the greater their predictions of success prior and after the game. They were also less likely to accept the teacher's answers when they asked her for help. Additionally, the more children reported that it was easy for them to learn new things, the less they asked for help during the asking phase, and the less they asked for help from the computer program. No other significant correlations were found between children's answers regarding their confidence in their learning abilities and their confidence, endorsements, and help seeking behaviour (see Table 15 & Table 16).

Table 15

Association between children's confidence in their learning skills and their success predictions, and confidence levels and endorsement behaviours during the endorsement phase

Learning Confidence Scale Items	Success Prediction 1	Success Prediction 2	Mean Confidence	Endorsement	Endorsement Teacher	Endorsement Computer program
1. Intelligent	.316**	.402**	.102	.117	.086	.056
2. Easy to Learn	.129	-.006	-.067	-.120	-.057	-.085
3. Confident Smart	.259*	.209*	-.024	-.053	-.151	.079

***** = Correlation is significant at the .05 level (2-tailed)
****** = Correlation is significant at the .01 level (2-tailed)

Table 16

Association between children's confidence in their learning skills and their success predictions, and their confidence levels and help/endorsement behaviours during the asking phase

Learning Confidence Scale Items	Mean Confidence	Help	Help from Teacher	Help from Computer program	Accept Help Teacher	Accept Help Computer program
1. Intelligent	.134	.130	.072	.116	.075	.207*
2. Easy to Learn	-.099	-.218*	-.032	-.286**	-.096	-.185
3. Confident Smart	.003	-.026	-.026	-.012	-.268**	.039

***** = Correlation is significant at the .05 level (2-tailed)
****** = Correlation is significant at the .01 level (2-tailed)

With respect to the parental questionnaire about children's confidence-related personality traits, higher parental confidence attribute ratings were associated with lower probability that children would endorse an informant during the endorsement phase, especially for the computer

program. They were also less likely to ask for help during the asking phase, and even less so from the computer program. Lastly, they were more likely to attribute more positive characteristics to the teacher than the computer program (see Table 17 & Table 18).

Table 17

Association between parents' measure of their child's positive attributes, and the child's success predictions, confidence level, and endorsements during the endorsement phase

	Success Prediction 1	Success Prediction 2	Mean Confidence	Endorsement	Endorsement Teacher	Endorsement Computer Program
Personality Parent Measure	.117	.077	-.036	-.216*	.164	-.401**

***** = Correlation is significant at the .05 level (2-tailed)
****** = Correlation is significant at the .01 level (2-tailed)

Table 18

Association between parents' measure of their child's positive attributes, and the child's success predictions, confidence level, and help-seeking behaviours during the asking phase

	Mean Confidence	Help	Help from Teacher	Help from Computer Program	Accept Help Teacher	Accept Help Computer Program	Preference for Paola
Personality Parent Measure	.092	-.267**	-.113	-.276**	-.157	-.103	.341**

***** = Correlation is significant at the .05 level (2-tailed)
****** = Correlation is significant at the .01 level (2-tailed)

With regards to the parental questionnaire on children's confidence in using technology, no significant associations were found between parent-reported confidence and the children's preference for endorsing, seeking help from, or attributing positive characteristics towards the teacher or search engine (all ps > .05).

Discussion

Does Illusory Control Impact Children's Confidence, Endorsement, and Help-Seeking Behaviours?

A primary goal of this study was to examine how illusory control, or children's overconfidence in having accurate knowledge, impacts their endorsement and help-seeking behaviours in a new learning situation. The results revealed that 7- and 8-year-olds' prior success (or failure) in a rigged object location task influenced their subsequent performance on several measures.

First, children who experienced complete success predicted a higher likelihood of correctly answering novel questions both before and after completing the task, compared to their peers who experienced prior failure. This suggests that prior success increases children's confidence in their ability to tackle new challenges, leading to more optimistic predictions about their performance.

Second, the findings indicate that children's prior success influences certain aspects of their selective learning processes, but this effect is domain and modality specific. Differences between the two success conditions were mainly found for object location questions, implying that children used a different learning strategy only when facing the same question type as the manipulation phase. Children who experienced failure exhibited lower confidence levels for object location questions during both the endorsement and the asking phases. This indicates that prior success bolsters confidence selectively, affecting specific domains more than others. Conversely, children with prior success endorsed fewer informants' answers during the endorsement phase, but did not seek less help during the asking phase. These group findings suggest that reduced confidence alone may not increase the demand for help when it must be

explicitly requested. The necessity to explicitly ask for help may be a barrier, leading children to attempt to answer questions independently rather than asking for and considering an informant's answer. However, this behaviour is costly, as the children lacked the necessary knowledge to answer these questions accurately. While children were more likely to assume that the informants had access to semantic information (e.g., labels and factual knowledge), it remains unclear whether they believed the informants had access to episodic information (e.g., personal preferences of others). Despite this uncertainty, children could have chosen to take the informants' responses into account before making their final decision.

Notably, children were consistent in their confidence ratings throughout the study. Higher initial predictions were associated with higher final predictions. Also, children's greater confidence in one phase increased the likelihood they would be confident in other phases. Higher confidence during the asking phase predicted a lower likelihood of requesting help. These individual differences are noteworthy as they suggest a relationship between children's confidence and their help-seeking behaviours across conditions. These contrast other findings which only revealed an association between children's mean confidence during the endorsement phase and their endorsement behaviours, and not between children's mean confidence during the asking phase and heir help-seeking behaviours.

The primary question remains: does confidence play a role in children's decision to seek help from or endorse an informant? Our hypothesis was that children's prior success or failure would manipulate their sense of illusory control, thereby influencing their confidence levels, which would in turn affect their endorsement and help-seeking behaviours. The findings suggest that children's prior success influenced their confidence levels and endorsement behaviours (specifically for object location questions), but not their help-seeking behaviours. Several

possibilities need to be considered. First, as previously mentioned, there may be an additional perceived cost (implicit or explicit) that deters children from requesting help. For instance, children are taking more risk when requesting help for episodic types of questions given there is uncertainty whether the teacher or the search engine would have access to such information. Secondly, children might have a strong desire to answer questions independently, even when they have lower levels of confidence. Older children might also be more encouraged by their mentors to attempt problems themselves as much as possible prior to asking for help. Indeed, although only novel questions were presented, children requested help less than half the time on average. Thirdly, the prior success manipulation might not cause a large enough change in children's confidence to motivate them to take the extra step of seeking help. Lastly, there is the possibility of a Type-II error. The differences in help-seeking behaviour between success groups align with the effects observed in Study 1, suggesting that the effect could be small and undetected. Together, given the discrepancies between group and individual performance, this could indicate that the impact of prior success on confidence was insufficient to prompt children to explicitly request help.

Anecdotally, some children disclosed to the experimenter that when requesting help they sought to verify the accuracy of their own answer. Others explained that they wanted to verify the accuracy of the informant's answer. Therefore, children may try to guess their own answer before deciding whether to seek help. Once they received the informant's answer, they may have compared both answers. Children's confidence in their own answer might have determined whether they choose the informant's answer or their own.

Of note, this confidence scale has not been used in previous research. A three-point scale was chosen for simplicity and repetitive use throughout the study. Unfortunately, it does limit

our ability to discern more subtle variations in confidence. During the familiarization phase children had the opportunity to become familiar with the scale. All but one child indicated they were very sure regarding the correct answer to the familiarity question, indicating a good understanding of the scale. Similarly, all but four children indicated that they were very sure regarding the correct answer to the two familiar questions during the asking phase. More studies are needed to better understand whether the scale reflects children's true confidence level.

Do Children Present a Preference Towards a Teacher or Technological Informant?

The second main goal of this study was to explore children's informant preferences. Few studies to date have investigated children's preference between a human informant and a computer program. Overall, children did not show a preference for one or the other. Only for fact-type questions did children demonstrate a preference to endorse the search engine's answers over the teacher's answers. At the conclusion of testing, children described the search engine significantly more often as the one that "knows everything", that "knows the correct answers", and to be "cool". The teacher was more often reported to be "nice". Interestingly, children's informant attributions correlated with their help-seeking preferences. The more children attributed positive characteristics to the teacher, the more often children sought and accepted help from the teacher, and the less likely they were to ask for and accept help from the computer program. Children also demonstrated consistency in their informant preferences.

Children's preferences were notably influenced by the order in which informants were presented. They were more likely to endorse the first informant introduced, who appeared in the top left corner of the screen. Although the order of the informants' answers alternated for each question, children, on average, endorsed the first informant for one additional question compared to the second. This finding highlights how even seemingly superficial factors such as

presentation order can influence children's endorsement behaviours and informant preferences, supporting previous research in the selective learning literature (e.g., Cossette et al., 2020; Juteau et al., 2021). Importantly, the order of informant presentation was counterbalanced across the study, with half the children introduced to the teacher first and the other half to the search engine, ensuring that this effect did not influence average group results. Regarding the impact of children's prior success on their informant preferences, we expected children who experienced complete prior success not to demonstrate any preference and explored whether children who experienced no success would demonstrate a preference. Children's prior success did indeed differentially impact their informant preferences. Children who experienced prior failure were more likely to endorse the teacher's answers, especially for questions regarding individuals' preferences. Conversely, children who experienced prior success were more likely to endorse the computer program's answers when answering factual questions. Here again, the impacts of prior success and children's informant preferences were more noticeable when they had the informant's answers available, as opposed to when they needed to request help explicitly. Only when children reported higher levels of confidence did they request less help from the teacher. Altogether, the evidence demonstrates a tendency for children to endorse the computer program when they experience more confidence and to endorse the teacher when they experience less confidence.

Interestingly, the parental measure of children's self-esteem correlated with children's endorsement and help-seeking behaviours. Specifically, the more confidence traits parents attributed to their child, the less likely children were to endorse answers from any informant, particularly the computer program. A similar pattern was observed for help-seeking behaviours: children whose parents perceived them as more confident were less likely to seek help,

especially from the computer program. At the same time, these children were more likely to attribute positive characteristics to the teacher. These results align with the observed effects of manipulated confidence on children's endorsement and help-seeking behaviours. However, a notable contrast emerged: higher parental ratings of confidence traits were associated with children being more likely to choose the teacher, which differs from children's self-reported confidence during testing and their informant preferences. This discrepancy suggests that the parental measure may reflect a different dimension of confidence—one that is more associated with social preferences or a desire to connect with others. Given that the parental questionnaire included items related to self-esteem and confidence across various contexts, including social skills, it is possible that higher perceived confidence corresponds to a preference for engaging with social partners, such as the teacher, rather than relying on non-human sources like the computer. This study is among the first to examine the relationship between children's individual traits and their informant preferences, as well as their willingness to engage in social learning. These findings underscore the importance of incorporating parental perspectives when studying children's learning strategies. Individual differences, as perceived by parents, may play a significant role in shaping how children approach learning.

Together, results reveal that confidence can impact children's preference between a teacher and a computer program. Why would that be the case? If children are less confident, it is possible they may want to seek not only the correct answer from an informant, but also reassurance. Therefore, they might be searching for a social connection, which is why they prefer to seek help from a teacher (Wang et al., 2019). Another possibility is that children who are more confident may already have an answer in mind (as described earlier in this discussion), however they wish to verify the accuracy of either the informant or their preselected answer. As children

(on average) viewed the computer program as knowing and reporting all the correct answers, the children perhaps posit that they are more likely to obtain accurate feedback to their inquiry by seeking the computer program's feedback.

Other elements were found to correlate with children's response patterns. Children who reported being intelligent or "confident that they are smart" generally predicted that they would experience higher success during the game. More importantly, children who described learning new things as being easy for them were less likely to request help overall, especially with respect to the computer program. Although children's overall confidence was a weak indicator of whether they would endorse or request help, children's general judgment of their learning abilities appears to be a better predictor of their likelihood to seek help. More studies are needed to explore the dimensions of children's confidence which may play a role in their decision to trust informants in new learning contexts.

Study Limitation

There are several limitations to consider in this study. First, two distinct research questions were examined using a single study design, which may have introduced confounding variables. Specifically, the presence of prior success or failure experiences could have influenced children's preferences for the teacher or search engine informant. For example, Kim et al. (2020) found that children with low success experiences were more likely to align their beliefs with a knowledgeable informant compared to those with no prior experience. However, this effect was not observed with an ignorant informant. To better isolate these effects, future studies could include a *no prior experience* condition when investigating the impact of prior success on both children's help-seeking behaviour and informant preferences.

Second, the study's inclusion of two informants with ambiguous accuracy levels likely influenced the relationship between prior success and children's help-seeking decisions. While confidence measures provided insights into the mechanisms at play, ambiguity about the informants' reliability may have increased children's indecisiveness. For instance, children with no prior success reported lower confidence during object location questions in the asking phase but did not necessarily seek more help from either the teacher or the search engine. In contrast, children in Study 1 with no prior success did seek more help from a knowledgeable informant. This discrepancy suggests that the presence of two informants may have introduced uncertainty, creating an additional barrier to help-seeking. Future studies could use clearer learning contexts with informants of known accuracy to reduce ambiguity and provide a more direct test of how prior success influences help-seeking. Including measures of children's inferences about informants would also offer further clarity.

Third, this study examined how different components of confidence impact children's learning decisions—a challenging endeavour due to the lack of established self-report measures for children's confidence. To address this, we modified Dweck's (2000) self-report questions, which assessed confidence in intelligence and learning abilities, and included a parental measure of confidence/self-esteem (Haltiwanger & Harter, 2019). While our findings highlight associations between children's self-perceptions, parental observations, and learning decisions, the precise nature of these relationships remains unclear. It is also uncertain how these measures of confidence relate to children's confidence in their own knowledge and whether additional confounding variables influenced outcomes. Confidence likely involves multiple dimensions that impact learning behaviours in distinct ways. For example, children with higher self-esteem may be better at accurately assessing their abilities and less prone to overconfidence overall. Future

research should explore the different dimensions of confidence and their interactions to provide a more nuanced understanding of how confidence influences learning decisions.

Finally, similar to Study 1, the sample size may have contributed to a lack of statistical power, particularly given the two-informant paradigm. Differences between this study's design and Palmquist et al. (2016) could have resulted in weak power and increased the risk of Type II errors. Future studies should compare the effects of prior success on children's learning behaviours using both one-informant and two-informant paradigms. Including a *no prior experience* condition would further clarify how prior experience influences informant preferences. These refinements would allow for a stronger assessment of the effects of prior success and children's reliance on informants.

Chapter Five: General Discussion

Results Summary

This dissertation offers several new contributions to the developmental literature on illusory control and selective social learning.

The Pilot Study (Chapter 2) introduced a novel task designed to examine the impacts of illusory control, children's overconfidence in their own abilities, on their inclination to engage in social learning. Using a computer task, 3- to 8-year-olds experienced differing levels of success and answered novel questions with the option to request help from an all-knowing informant. No known study had investigated the association between children's overconfidence in their abilities and their preferences to engage in social learning. This study provided a starting point to assess the potential effects of prior success on help-seeking behaviour.

Study 1 (Chapter 3) explored how illusory control impacted 5-year-old children's decisions to seek help from an accurate informant across different contexts. The results revealed influences of illusory control which were domain-specific: children who experienced prior success requested less help on object location questions, the same question type used for the manipulation, when compared to those who had experienced prior failure. Interestingly, no significant differences were found in overall confidence levels, although higher confidence ratings for individual questions were associated with a reduced likelihood of requesting help on these same questions.

Building on these findings, the Study 2 (Chapter 4) had two objectives. It examined the effects of prior success and confidence on 7- and 8-year-olds' choices regarding social learning and explored their preferences between human and technological informants. Study 2 found that prior success continued to influence children's social learning choices, with those who had

experienced success showing higher confidence and being less likely to endorse informants' answers. In spite of this, their help-seeking behaviours was not significantly affected by prior success. As in Study 1, children's higher confidence for specific questions correlated with a lower likelihood of seeking help for those questions.

Furthermore, the study revealed that children did not show a clear preference for either a human (presented as a teacher) or a technological informant (presented as a computer program). They were more inclined to endorse the computer program's answers for factual questions, but those who viewed the teacher more positively were more likely to request and accept her help. Children with prior failure were more likely to endorse the teacher's answers, while those with higher confidence were less likely to seek help from her.

Illusory Control, Confidence Levels, and Help-Seeking Behaviour Across Studies

This research sheds light on both exogenous and endogenous factors that influence children's selective social learning. We examined the effects of illusory control and children's confidence in their abilities on their decisions to engage in independent learning or to seek help from an informant. The findings in Studies 1 and 2 underscore the role of prior success in manipulating illusory control. However, this manipulation had a significant impact on children's learning only in a specific context: when they were confronted with the same task (locating hidden objects) where they had previously experienced success or failure. Outside of this context, prior success had minimal influence on performance across other types of questions. These results highlight the specificity of the success manipulation on children's confidence and their endorsement and help-seeking behaviours.

Notably, there were differences across studies. Prior success did not influence the reported confidence levels of 5-year-olds, whereas it did for 7- and 8-year-olds. This discrepancy

may point to developmental differences. As discussed in Chapter 3, research has shown that 5-year-olds struggle with uncertainty monitoring. Roebers et al. (2007) report that as children grow older, use of the lower end of the confidence scale becomes more prevalent, and by age 8 children may attribute lower confidence to incorrect answers compared to correct ones. This metacognitive ability is crucial for recognizing when it is necessary to seek help. Previous studies have also found that younger children generally exhibit higher levels of confidence, which decreases with age (Roebers et al., 2007). While high confidence in younger children can encourage exploration and independence, it can also lead them to overlook the benefits of learning from others.

Another difference across studies concerns the impact of prior success on children's willingness to engage in social learning. For 5-year-olds, prior success influenced their preference to rely on their own answers for tasks similar to the manipulation. In contrast, 7- and 8-year-olds who experienced prior success were less likely to endorse informants' answers, but only for object location questions. However, these older children did not request less help than those without prior success. Importantly, the performance of the two age groups was not statistically compared due to differences in task design (e.g., varying numbers of trials), meaning the tasks were not directly comparable. As such, the discrepancy in outcomes—where one group showed a significant effect and the other did not—could reflect random sampling fluctuations rather than a true difference.

A key difference between the studies lies in the characteristics of the informants. While all informants were presented as having some expertise, only the informant in Study 1 was described as having guaranteed accuracy, which may have increased children's certainty in obtaining accurate information if they sought help. In Study 2, however, the presence of two

informants may have caused children to hesitate when choosing between them, especially if they did not have a clear preference, leading them to avoid explicitly requesting help. On the other hand, when children had access to informants' answers, it required less effort to endorse them, and it was likely more challenging to disregard them. Additionally, individual differences in inhibitory control could influence how children balance their confidence in their own answers against those of the informants. These findings suggest that further research is needed to explore how individual differences, such as illusory control, interact with independent learning across different contexts.

Research Implications

Few studies have explored the concept of illusory control in children and how it influences their decisions to engage in social learning. Palmquist et al. (2016) conducted a notable study examining how success in a hidden object game of chance affected the preferences of 4- and 5-year-olds when choosing between a helpful and a non-helpful informant. Across four studies, they found that children's success altered their monitoring and use of external sources of information. Specifically, children who experienced complete success with both helpful and unhelpful informants did not consistently choose the helpful informant beyond chance, unlike those who succeeded at a chance level. Even when children experienced success both with a helpful informant and independently, those with prior success remained indifferent to external information sources. The authors suggested that prior success likely bolstered children's confidence in their own abilities, leading them to underestimate the role of luck and feel less inclined to rely on others. Interestingly, despite correctly identifying the helpful informant, most children who experienced complete success did not recognize that this informant helped them the most.

Our research builds on this work by providing further evidence that success manipulation can indeed influence children's illusory control. Children's confidence in their own skills likely increased with prior success causing them to rely more on their own answers and less on informants. Despite different methodologies, both projects had distinct goals to better understand the role of illusory control. The Palmquist et al. (2016) studies used manipulation to control children's success and allow them to experience the helpfulness of the informant(s), with a focus on assessing children's monitoring of informants' characteristics. Children had to choose which of the two available informants they would like to ask for help. In contrast, our goal was to affect illusory control by allowing children to experience success on their own in order to understand its effects on children's choice to learn independently or seek help from the informants. This approach allowed us to gain a deeper understanding of the underlying mechanisms which affect children's learning strategies, specifically their preference for independent problem-solving versus reliance on informants.

Palmquist et al. (2016) argued that their manipulation of success induced illusory control in 4- and 5-year-olds, as evidenced by their lack of preference between helpful and unhelpful informants after experiencing complete success. However, their study did not include direct measures of confidence to verify this manipulation. In our Study 1, prior success did not significantly alter 5-year-olds' reported confidence levels, possibly reflecting their developmental limitation in their ability to accurately monitor and report lower confidence. In contrast, prior success clearly influenced the reported confidence levels of 7- and 8-year-olds, suggesting that older children are better equipped to articulate changes in their confidence. These findings highlight an important distinction: children's internal confidence and their ability to

report on it are not always aligned, particularly for younger children who may experience shifts in confidence that they cannot yet effectively express.

Kim et al. (2020) also investigated how prior success influenced 4-year-olds' decisions to make independent judgments. Similar to our studies, half of the participants experienced prior success, without informants' participation. The other half did not experience any prior success or failure. Children's success rate in a game of chance was manipulated only for those with complete success, as they were expecting that the other group would succeed around chance level. Interestingly, they found differentiated effects where only children who experienced very low rates of success showed a preference to request help from the knowledgeable informant (above chance) when compared with those without any prior experience. There were no differences between children with high prior success and those without any prior experience, contrasting other selective learning literature. This is somewhat different from our findings, where children with prior success expressed varied preferences for independent learning across different types of questions, showing that both success and failure modulate their performance. Authors argued that children without prior experience could have had difficulties judging the informant's intentions when providing advice, or that children might have been overconfident about the location of hidden stickers compared to domains used in other studies (e.g., object labels).

While these findings highlight the role of illusory control in various contexts, Kim et al. (2020) recommended that future studies control for the variability in children's success rates during manipulation. Indeed, the high success group in their study included children who on average succeeded just 1.5 times out of 4, which is below chance level. Additionally, they only compared the groups' *consistent* belief alignment with the knowledgeable or ignorant informant

across conditions, making it difficult to discern the subtle effects of success levels on informant preference. In contrast, by carefully controlling children's success levels and examining the frequency of endorsements or help requests, our studies were able to capture subtle differences in learning strategies across groups. Our findings align with Kim and colleagues' study, indicating that lower success led children to prioritize informant-dependent learning.

A novel aspect of our research is the investigation of how illusory control influences children's choices to engage in social learning across different learning contexts. In our studies, children experienced success or failure in one domain (object location) and then answered questions across four different domains. Interestingly, prior success impacted their performance only in the same domain as the manipulation, suggesting that children's confidence in their abilities increased only within that specific context and did not generalize to other areas. Although this is the first study to demonstrate this finding, it mirrors other studies on children's evaluations of informants' expertise generalization. For example, one study found that children often view an informant's expertise as domain-specific, and incompetence as domain-general (Koenig & Jawal, 2011). Other studies have identified a "halo effect," where children make global judgments about informants based on specific information (e.g., Brosseau-Liard & Birch, 2010; McDonald & Ma, 2015). By around age 4, children consider both an informant's episodic competency and their area of expertise when making attributions and deciding whether to endorse them (Clegg et al., 2019). Clegg et al. (2019) proposed a U-shaped developmental pattern, where 5-year-olds were less likely to endorse an expert outside their expertise if the expert had shown incompetency earlier, while 4- and 7-year-olds maintained their initial preference. Thus, children's age, the informant's characteristics, and the learning context may play a role in children's informant inferences.

Would children use similar criteria to evaluate their abilities? Other factors, such as a child's current mental state, prior knowledge in different domains, or confidence levels, likely influence their judgment of the generalizability of their skills. Our studies show that children with prior success or failure in object location did not generalize their perceived ability or incompetence to other domains. Future research should explore how success manipulations across different domains influence children's learning strategies. We had two distinct question types: episodic and semantic. If the success manipulation were applied to a more general domain, such as various types of episodic knowledge, children might extend their inferences about their abilities to that domain. Conversely, research suggests that even a single failure can significantly impact children's reliance on external help (Palmquist et al., 2016). Thus, a single failure in one domain could potentially diminish children's perceived competence across different domains, which remains an important area for future investigation.

Understanding individual differences is crucial to comprehending how children perceive and interact with various information sources in everyday life. Notably, children's confidence in their abilities can sometimes hinder their learning. Our studies demonstrate that when children have the option whether or not to engage with knowledgeable or competent informants, those with prior success often prefer self-reliance. By providing the choice not to engage in social learning, our studies simulate the real-world conditions children frequently encounter in diverse learning environments.

Children's Informant Preferences

Few studies have investigated children's preferences between technological and human informants, particularly comparing a teacher with a digital assistant. These studies aimed to explore how children choose between these two types of informants, each presented with just

enough information to establish them as typical authorities respectively. Our research reveals unclear patterns in informant preference. While children tended to endorse the search engine's information more often than the teacher's information for factual questions when the information was presented openly, this preference did not extend to situations where they had to explicitly request help.

Notably, the success manipulation had differentiated impacts: children who experienced prior failure were more likely to endorse information from the teacher, especially concerning other individuals' preferences, while those with prior success were more inclined to endorse the search engine's answers for factual questions. Additionally, the more confident the children felt, the less likely they were to request help from the teacher. However, it is important to emphasize that these findings are based on exploratory analyses.

Only one other study has examined how children evaluate information from unspecified internet sources compared to known human informants (Wang et al., 2019). Their findings showed that when Chinese children aged 5- to 6-years-old answered trivia-like questions, they did not display a clear preference between the internet, a teacher, or a peer. In contrast, 7- and 8-year-olds were more likely to endorse the teacher's answers when they conflicted with those from the internet. However, when answering questions involving specific numerical values, scientific phenomena, or historical information, children of all ages preferred the internet and the teacher over the peer. These results align with our current research, suggesting that children consider both the content of the questions and the context when evaluating the reliability of informants.

Wang and colleagues (2019) also highlighted the role of cultural factors in shaping children's perceptions of informants. They noted that in Chinese sociocultural traditions, respect

for authority may influence children's selective trust towards the teacher. Additionally, children's limited online experiences might further affect their evaluation of internet sources. Understanding how children perceive different types of informants is crucial for comprehending the reasoning behind their inferences during testing.

Our exploratory analyses on children's attribution of positive characteristics to the teacher and search engine were particularly insightful. Children were more likely to describe the search engine as "knowing everything," "knowing the correct answers," and being "cool," while they more frequently described the teacher as "nice." The stronger children's attribution of positive characteristics were towards either informant, the more likely they were to seek help from and accept answers provided by that informant. Despite these tendencies, children did not demonstrate a clear overall preference for one informant over the other, though they did show a preference for the search engine with respect to factual questions.

Other studies have found similar context-dependent results. For example, children aged 7 to 10 years identified Google as a better and more accurate informant than a human, yet they doubted Google's ability to answer questions about the future (Girouard-Hallam & Danovitch, 2022). Additionally, 4- to 5-year-olds were more likely to endorse improbable testimony from hearsay than when it was referenced by the internet, whereas 8-year-olds were less likely to endorse testimony from hearsay than when it was referenced by a text-based source in either a book or the internet (Danovitch & Lane, 2019). However, none of these age groups displayed a preference for impossible event testimony (Danovitch & Lane, 2019). Another study found that preschoolers sought information from human and technological informants equally (Danovitch et al., 2015). These findings suggest that the specific characteristics of human and technological informants significantly influence children's attributions towards and reliance on them.

Interestingly, research has demonstrated that children's preference for endorsing technological informants increases during the preschool years (Noles, Danovitch, & Shafto, 2015). Four-year-olds initially preferred to ask a human (stranger) informant for information but showed an increased preference for technological informants by age 5 (Noles, Danovitch, & Shafto, 2015). Conversely, children in kindergarten, second grade, and fourth grade reported that humans would be better than computers at understanding emotions and solving moral dilemmas (Danovitch & Keil, 2008).

Proposition of a Social – Asocial Model

Further research is needed to explore children's preferences for technological versus human informants across various learning contexts. Notably, comparing these informants can be challenging due to the ambiguity around what constitutes a non-human "social" informant. As technological informants become increasingly accessible and capable, it will be crucial to examine how their characteristics influence children's learning strategies and whether children apply similar selective learning mechanisms. As noted in Chapter 1, little is known about the role of social interaction in children's use of learning strategies when engaging with technological informants.

To address this gap and facilitate further study, I propose a continuum-based framework for categorizing social and asocial learning, rather than treating these as a dichotomy (see Table 19). This continuum encompasses four categories of informant-based learning, defined by three key criteria:

1. The nature of the source (human or non-human),
2. The format of information delivery (socially interactive or not),
3. The origin of knowledge (external source or self-generated).

Positioning informants along these dimensions allows for a more nuanced understanding of informant-based learning, helping researchers determine which social aspects to consider in different learning contexts.

Table 19

Proposed Social-Asocial Continuum Framework

	Social ←	Direct Other-Dependant Learning	Indirect Other-Dependant Learning	→ Asocial
Nature of source (human or non-human)	Human	Non-human	Non-human	Non-human
Origin of knowledge (other or own)	Other	Other	Other	Own
Delivery of information (social or not)	Social	Social	Not social	Not social

For instance, when children watch a televised educational series like Dora the Explorer, Dora would be categorized as a non-human source (despite her human-like traits) that conveys information in a socially engaging manner, using verbal and non-verbal cues to interact with viewers. Her knowledge originates from her creators, external to the listener. According to our framework, this would represent a case of *Direct Other-Dependent Learning*.

It is important to emphasize that this model functions as a continuum, meaning that a learning context can exhibit varying degrees of social and asocial characteristics within each category. For example, Dora, compared to other cartoon characters, displays more human- and child-like traits, which could make her more socially relatable for children. The portrayal of such social traits may influence children's learning choices, highlighting the need to consider these subtleties when examining informant-based learning. As future studies examine different types

of informants, it will be valuable to refine this model by incorporating additional social dimensions that could affect children's learning decisions.

Additionally, the increasing facsimile of communication afforded by AI-powered digital assistants presents a level of social interaction not previously available from technological assistants. As these technologies become more ubiquitous, it will be increasingly important to understand children's perception and the results of their interactions with these devices.

In our studies, the informants utilized provide examples that can be mapped onto this social-asocial continuum. Ezra the Owl, though non-human, is portrayed as knowledgeable, using pronouns (he/him) and socially interacting with children through voice and visual cues. Despite these minimal social interactions, Ezra can be classified as a *Direct Other-Dependent Learning* informant. On the other hand, Paola the Teacher represents a typical human informant, conveying information in a more traditional social format (via video), fitting into a *Social Learning* category.

Meanwhile, Cyberi—intended to represent a search engine—lacks human characteristics and doesn't provide information in a social format. In everyday scenarios, children typically initiate interaction with search engines which do not offer feedback, making this an *Indirect Other-Dependent Learning* scenario. However, in Study 2, Cyberi delivered information in a social format equivalent to Paola, using both voice and visuals. Thus, within the context of Study 2, Cyberi would also be considered an example of *Direct Other-Dependent Learning*. This distinction between real-world use and study context is important, as it may have influenced children's perceptions and learning strategies depending on the social attributes of the informant.

As exposure to different types of informants continues to grow, understanding the impact of learning strategies and informant preferences on children's day-to-day functioning will be

crucial. Future research could compare informants such as teachers, search engines, and technological assistants (e.g., Alexa) across age groups, including preschoolers, school-aged children, and teenagers. Experimental designs might vary the social characteristics of each informant, testing their influence on children's learning strategies within the framework of a social-asocial continuum. A continued focus on refining the criteria and dimensions of social interaction within this continuum is important for deepening our understanding of how children adapt their learning strategies in different social and asocial learning contexts.

Additionally, exploring how children engage depending on the type of knowledge (e.g., episodic vs. semantic) would provide further insights. Researchers should consider classroom settings, cultural factors, and children's prior experiences with informants. Crucially, future studies should develop tools to investigate the reasoning behind children's inferences and preferences for different types of informants.

Research Limitations and Strengths

These studies are not without limitations. As some of the first to investigate the impact of a success manipulation on children's illusory control, the initial plan was to assess its effects on children's learning across a broad age range. However, due to the absence of significant manipulation effects during the Pilot Study, we decided to focus on specific age groups to better determine whether the success manipulation had any impact. This decision limited our ability to extrapolate developmental changes in the effects of illusory control.

The global COVID-19 pandemic also presented unprecedented challenges. Data collection for Study 1 was interrupted, but we successfully adapted the studies for online administration. However, this transition introduced some difficulties, particularly in communicating answers with the younger age group. To address this, the scales and answer

choices were modified so that children could voice their responses instead of pointing. Despite these adjustments, some younger children required parental assistance, especially when struggling to read letters or numbers.

Regarding our sample, it is important to acknowledge that although we involved participants from diverse cultural and economic backgrounds, the majority were from WEIRD populations (Western, Educated, Industrialized, Rich, and Democratic; Henrich, Heine, & Norenzayan, 2010). Consequently, the study's conclusions should be interpreted within this context, and further research is needed across different cultures, as differences in learning strategies and informant inferences are expected. Additionally, since we moved to online administration, it is important to consider that participants were likely more familiar with technology. Although we collected information about children's technological use, it remains challenging to gauge the extent of their prior experiences and how these experiences may have influenced their selective trust in informants. Such factors could potentially bias children's preferences and use of informants.

It was essential to incorporate measures of children's confidence during testing and outside of the study. However, few measures have been validated for assessing children's confidence in their own abilities, leading us to adapt scales to gather detailed information for a manipulation check, and to understand the underlying mechanisms of children's learning strategies. We used a self-report questionnaire to assess children's confidence in their intelligence and a parental questionnaire to measure children's self-esteem—concepts hypothesized to influence children's everyday confidence in their learning abilities. Nonetheless, more research is needed to explore the relationship between these related concepts and to determine which aspects of children's confidence impact their selective social learning.

Conversely, the studies had several methodological strengths. The tasks were designed to be game-like, and children appeared highly engaged and motivated by the opportunity to win coins for correct answers. Although these tasks do not perfectly replicate real-life situations, the familiar and rewarding context likely encouraged children to strive for correct answers. Remarkably, only two participants did not complete the tasks. Moreover, despite some initial challenges, we successfully adapted the studies for online administration. This transition significantly reduced the time commitment required from parents, who no longer needed to travel to the university campus, thereby making participation easier. As a result, we were able to reach a more diverse sample, despite the necessity of having access to a computer for participation.

Conclusion

The studies in this dissertation investigated the concept of illusory control and how children's confidence in their own abilities influences their decisions to engage in social learning. The Pilot Study was instrumental in developing an illusory control task designed to assess the impact of prior success on children's help-seeking behaviour. In Study 1, results indicated that the controlled prior success of 5-year-olds in finding hidden objects influenced their likelihood of requesting help from an accurate informant for similar question types. Although prior success did increase their confidence in knowing the correct answers, the more confident children were about a specific question, the less likely they were to seek help for that question. Study 2 demonstrated that prior success could also affect the confidence levels of 7- and 8-year-olds when answering novel questions, particularly when they had access to two informants: a teacher and a computer program. Children who experienced prior success reported higher confidence and were less likely to endorse the answers of either informant. However, this

prior success did not significantly impact their help-seeking behaviour. Interestingly, while children overall did not show a strong preference between the teacher and the computer program, they did tend to favour the computer program over the teacher when answering factual questions. This research uniquely contributes to the field of illusory control and selective learning and was the first to examine the impact of illusory control on children's choice to engage in social learning across different learning situations. The incorporation of self-reported and parent-reported confidence measures added significant value to the findings. The proposed asocial-social continuum will guide other researchers in considering social dimensions of technological or non-human informants when investigating children's preferences and attributions to different types of informants. The findings further highlight the need for further investigation into individual differences in selective social learning. Understanding these differences can provide valuable insights into how children navigate learning environments and make decisions about whom to trust for information.

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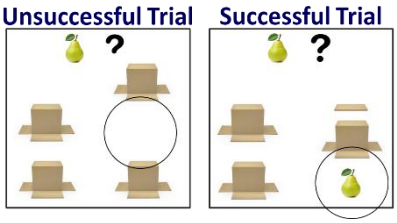
Appendices

Appendix A

Pilot Study Outline

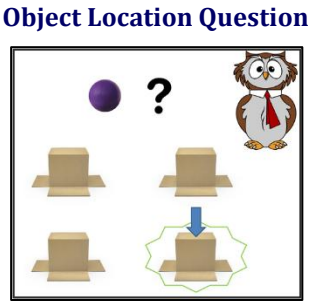
1- Manipulation phase

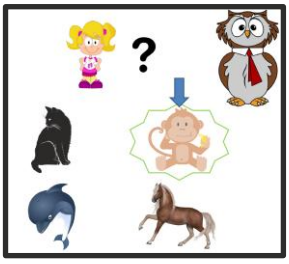
a. Children experienced one of three conditions: always successful (3 successful trials), partially successful (first 2 successful trials and last unsuccessful) and not successful (3 unsuccessful trials).

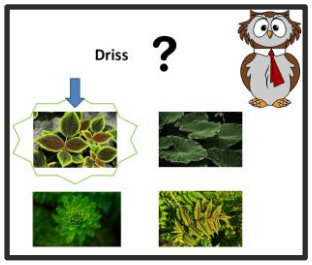


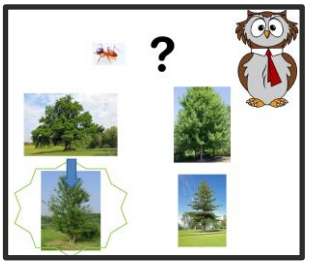
2- Asking phase

a. Children were introduced to Ezra, a knowledgeable informant.
b. They then answered 12 questions pertaining to hidden object locations, other individuals' preferences, novel labels and facts.
c. If they chose to ask Ezra for help, he shared his answer both visually and verbally.



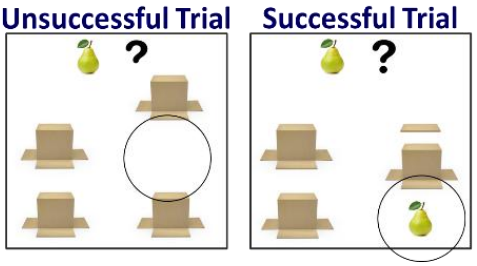
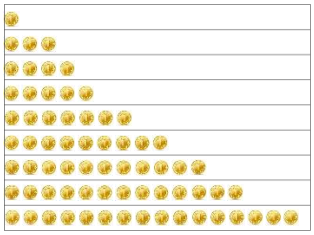
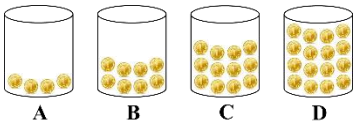
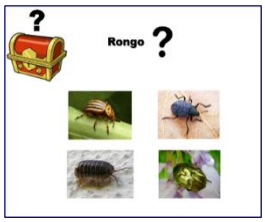
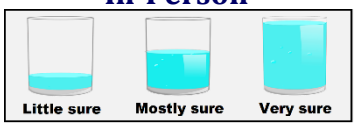
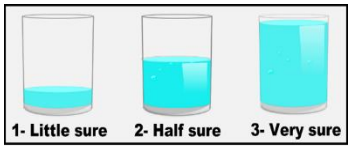


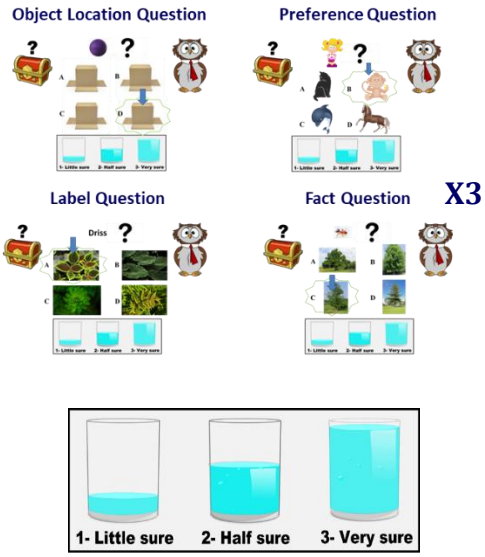
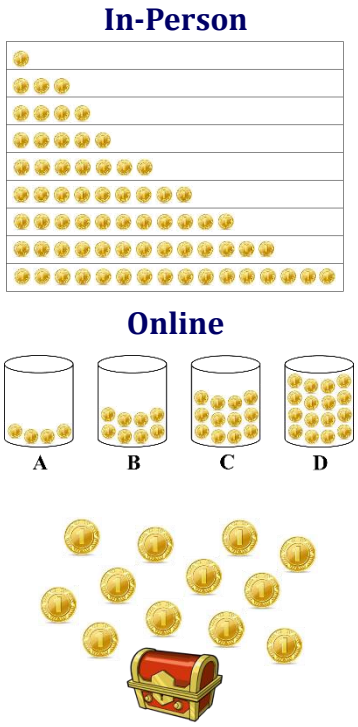




Appendix B

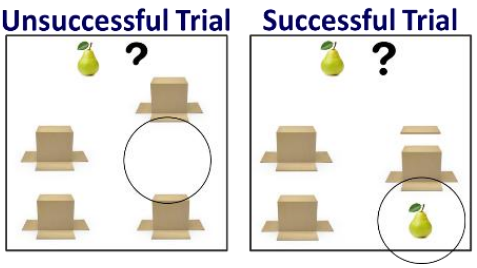
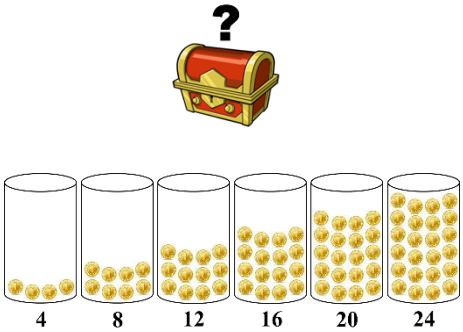
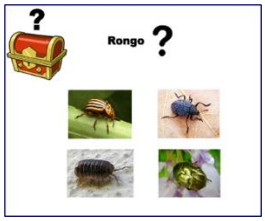
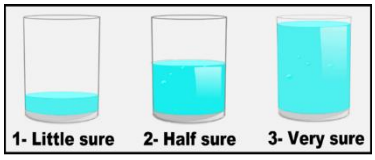
Study 1 Outline

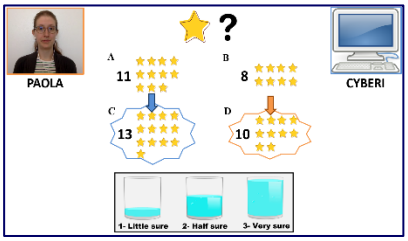
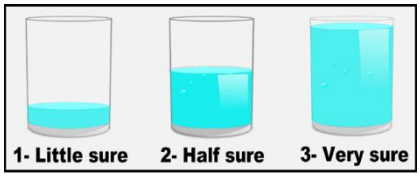
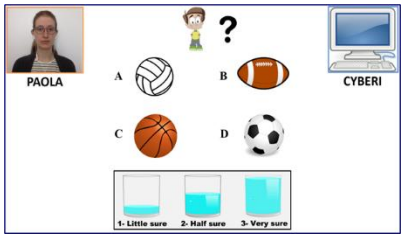
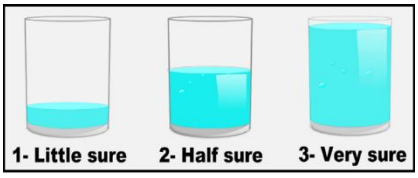
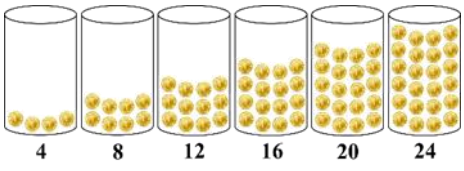
MANIPULATION		Children were randomly assigned to 1 of 2 conditions: - **Always Successful** (3 successful trials) - **Not Successful** (3 unsuccessful trials)
INITIAL SUCCESS PREDICTION	**In-Person**  **Online** 	Children were informed about the possibility of winning virtual coins for following questions. Using a 4-point scale (online) and a 9-point scale (in-person), children were asked how many coins they thought they would win during the game.
FAMILIARIZATION PHASE	 **x4** **In-Person**  **Online** 	Children were then asked 4 novel questions that pertain to: object location, other people's preferences, labels, and facts. For each question, first children chose one of four answers, and then indicated how sure they were about their answer using a 3-point scale. The scale used online was identical except the middle point became "half sure".
INFORMANT INTRODUCTION		Children were introduced to Ezra, an owl who knows everything including all the

		answers to the questions in the game. For the next questions children could either answer by themselves or ask Ezra for help, and then give their final answer.
ASKING PHASE		Children were presented 12 questions that involved the same 4 types of questions as the familiarization phase. Each question had four choices of answers. For each question, children first indicated how sure they were about knowing the correct answer, then chose to either answer by themselves or ask Ezra for the answer first. Last, they were asked for their final answer.
FINAL SUCCESS PREDICTION		At the end of the study, children guessed how many coins they won using the same 4-point scale (or 9-point scale) as their initial prediction and after were shown they won 12 coins.

Appendix C

Study 2 Outline

MANIPULATION		Children were randomly assigned to 1 of 2 conditions: - **Always Successful** (3 successful trials) - **Not Successful** (3 unsuccessful trials)
INITIAL SUCCESS PREDICTION		Children were informed about the possibility of winning virtual coins for following questions. Using a 6-point scale, children were asked how many coins they thought they would win during the game.
FAMILIARIZATION PHASE	 X5 	Children were then asked 5 novel questions that pertain to: object location, other people's preferences, labels, facts, and one familiar question. For each question, first children chose one of four answers, and then indicated how sure they were about their answer using a 3-point scale.
INFORMANT INTRODUCTIONS	 PAOLA  CYBERI	Children were introduced to Paola, an elementary school teacher, and Cyberi, an internet search program. For the next questions children could either answer by themselves or ask one of

		the informants for help, and then give their final answer.
ENDORSEMENT PHASE	 **X8** 	Children were presented 8 questions that involved the same 4 types of questions as the familiarization phase. Each question had four choices of answers. For each question, children first indicated how sure they were about knowing the correct answer, then each informant presented their answer, and then children chose which answer to endorse (either their own or one of the informants').
ASKING PHASE	 **X10** 	Children were presented 10 questions; 8 that involved the same 4 types of questions as the familiarization and endorsement phase and 2 familiar questions. Each question had four choices of answers. For each question, children first indicated how sure they were about knowing the correct answer, then chose to either answer by themselves or ask for help from one of the informants first. Last, they were asked to provide their final answer.
FINAL SUCCESS PREDICTION		At the end of the study, children guessed how many coins they won using the same 6-point scale as their initial

		prediction and after were shown they won 16 coins.
INFERENCE PHASE	  PAOLA CYBERI Smart?	Children were asked 7 questions about their perception of informants' characteristics.
CONFIDENCE QUESTIONS	A You usually think you are intelligent  X3 B You DON'T think you are intelligent 	Children were asked 3 questions about their confidence in their own learning abilities. e.g., *A- You usually think you are intelligent, B- You don't think you are intelligent*

Appendix D

Study 2 Questionnaires for Parents/Guardians

Questionnaire #1

We are interested in knowing more about the types of electronic devices you and your child use. *For each following device, parents had to indicate whether 1) the device was found in the home, 2) the device was found at school or during after-school activities, and 3) how frequently their child used the device (never, rarely/monthly, occasionally/weekly, few times a week, daily/less than 3 hours), or daily/more than 3 hours).*

The devices were the following:

- TV/Smart TV, Tablet (iPad, iPod touch, PDA, Galaxy Tab, Nexus)
- eBook readers (Kindle, Kobo, Nook)
- Portable media player (MP3/4 players, iPod Nano)
- Electronic device (desktop), Laptop (MacBook, Netbook, Chromebook)
- Smartphone (Android phone, iPhone, Windows phone)
- Video game console (television or handheld/Nintendo, PSP, Shield, Xbox)
- Smart speakers/Home assistants (Google Nest, Amazon Alexa)
- Wearable device (smart watch, Google glass, virtual reality glasses)

Questionnaire #2

Please indicate the frequency of use of electronic devices for the following tasks. *Parents used the following scale: never, 1/month or less, few times a month, several times a week, daily. The tasks were the following*:

- Video calling (Skype, Facetime, Google Hangout, Zoom)
- Texting or picture chatting
- Watching movies or shows
- Telling time
- Working on school assignments or projects
- Attending school on a virtual platform (during school year)
- Browsing/internet search
- Making phone calls
- Playing games (offline & online)
- Listening to music
- Visiting social networking sites (Facebook, Instagram, Snapchat, Twitter, TikTok, Youtube, Reddit)
- Using a calendar
- Taking pictures or videos/posting pictures or videos
- Setting up alarms
- Making movies or music videos
- Emailing
- Shopping
- Other(s), please describe…

Questionnaire #3

The following statements refer to your child's confidence when using electronic devices. *Parents rated their child's confidence using this scale: 1 (Strongly Disagree), 2 (Disagree), 3 (Neutral), 4 (Agree), 5 (Strongly Agree). Statements were the following:*

1. My child has less trouble learning how to use an electronic device than he/she does learning other things
2. When my child has difficulties using an electronic device, they know they can handle them.
3. My child is not what I would call an electronic device person.
4. It takes my child much longer to understand how to use electronic devices than the average person.
5. My child has never felt able to learn how to use electronic devices.
6. My child enjoys trying new things on an electronic device.
7. My child finds having to use electronic devices frightening.
8. My child finds many aspects of using electronic devices interesting and challenging.
9. My child doesn't understand how some people can seem to enjoy spending so much time using electronic devices.
10. My child has never been very excited about using electronic devices.
11. My child finds using electronic device confusing.
12. My child feels nervous that they are not good enough with electronic devices to be able to use them.

Questionnaire #4:

The Behavioral Rating Scale of Presented Self-Esteem for Young Children (Haltiwanger & Harter, 2019)

For each following question, please choose which statement (A or B) best describes your child. Then, check whether that description is *sort of* like your child or *very much* like your child. *Parents could only check ONE of the four boxes for each statement*.

1. A) Prefers activities that stretch his/her abilities; sets high goals OR
   B) Does not prefer activities that stretch his/her abilities; does not set high goals

2. A) Smiles infrequently; face often shows sadness or negative feelings OR
   B) Smiles readily; face does not often show sadness or negative feelings

3. A) Trusts his/her own ideas; knows what he/she wants; is able to make choices and decisions OR
   B) Doesn't trust his/her own ideas; acts uncertain in making decisions; needs suggestions from others

4. A) Does not move forward to do things on his/her own; does not take initiative OR
   B) Moves forward to do things on his/her own; takes initiative

5. A) Lacks confidence to approach challenging tasks; stays away from challenge OR
   B) Approaches challenging tasks with confidence

6. A) Able to assert his/her point of view with other children when opposed OR
   B) Not able to assert his/her point of view when opposed

7. A) Hangs back; watches only or doesn't get involved OR
   B) Does not hang back; does more than watch, is involved

8. A) Describes self in generally positive terms OR
   B) Describes self in generally negative terms

9. A) Is able to set goals independently OR
   B) Cannot set goals independently

10. A) Makes good eye contact OR
    B) Avoids eye contact

11. A) Remains in group activities and gets involved; does not withdraw OR
    B) Withdraws from group activities; stays on sidelines or doesn't get involved

12. A) Lacks confidence to initiate activities OR
    B) Initiates activities confidently

13. A) Eager to try doing new things OR
    B) Not eager to try doing new things

14. A) Tolerates frustration caused by his/her mistakes; perseveres OR
    B) Gives up easily when frustrated by his/her mistakes

15. A) Shows pride in his or her work or accomplishments OR
    B) Does not show pride in his or her work or accomplishments

Appendix E

Ethics Approval Certificates (Dated Oldest - Newest)

File Number: H04-16-10 **Date (mm/dd/yyyy):** 04/12/2017

Université d'Ottawa University of Ottawa
Bureau d'éthique et d'intégrité de la recherche Office of Research Ethics and Integrity

Ethics Approval Notice

Health Sciences and Science REB

Principal Investigator / Supervisor / Co-investigator(s) / Student(s)

First Name	Last Name	Affiliation	Role
Patricia	Brosseau-Liard	Social Sciences / Psychology	Principal Investigator

File Number: H04-16-10

Type of Project: Professor

Title: Preschoolers' attention to the credibility of others

Renewal Date (mm/dd/yyyy)	Expiry Date (mm/dd/yyyy)	Approval Type
05/26/2017	05/25/2018	Renewal

Special Conditions / Comments:
N/A

550, rue Cumberland, pièce 154 550 Cumberland Street, room 154
Ottawa (Ontario) K1N 6N5 Canada Ottawa, Ontario K1N 6N5 Canada
(613) 562-5387 • Téléc./Fax (613) 562-5338
www.recherche.uottawa.ca/deontologie/ www.research.uottawa.ca/ethics/

File Number: H04-16-10 **Date (mm/dd/yyyy):** 05/10/2018

Université d'Ottawa University of Ottawa
Bureau d'éthique et d'intégrité de la recherche Office of Research Ethics and Integrity

Ethics Approval Notice

Health Sciences and Science REB

Principal Investigator / Supervisor / Co-investigator(s) / Student(s)

First Name	Last Name	Affiliation	Role
Patricia	Brosseau-Liard	Social Sciences / Psychology	Principal Investigator

File Number: H04-16-10

Type of Project: Professor

Title: Preschoolers' attention to the credibility of others

Renewal Date (mm/dd/yyyy)	Expiry Date (mm/dd/yyyy)	Approval Type
05/26/2018	05/25/2019	Renewal

Special Conditions / Comments:
N/A

550, rue Cumberland, pièce 154 550 Cumberland Street, room 154
Ottawa (Ontario) K1N 6N5 Canada Ottawa, Ontario K1N 6N5 Canada
(613) 562-5387 • Téléc./Fax (613) 562-5338
www.recherche.uottawa.ca/deontologie/ www.research.uottawa.ca/ethics/

File Number: H04-16-10 **Date (mm/dd/yyyy):** 05/22/2019

Université d'Ottawa University of Ottawa
Bureau d'éthique et d'intégrité de la recherche Office of Research Ethics and Integrity

Ethics Approval Notice

Health Sciences and Science REB

Principal Investigator / Supervisor / Co-investigator(s) / Student(s)

First Name	Last Name	Affiliation	Role
Patricia	Brosseau-Liard	Social Sciences / Psychology	Principal Investigator
Sophie	Fobert	Social Sciences / Psychology	Co-Investigator
Aimie-Lee	Jueteau	Social Sciences / Psychology	Co-Investigator
Florence	Aquilina	Social Sciences / Psychology	Student Researcher
Thilini	Herath	Social Sciences / Psychology	Student Researcher
Isabelle	Cossette	Social Sciences / Psychology	Research Assistant

File Number: H04-16-10

Type of Project: Professor

Title: Preschoolers' attention to the credibility of others

Approval Date (mm/dd/yyyy)	Expiry Date (mm/dd/yyyy)	Approval Type
05/26/2019	05/25/2020	Renewal

Special Conditions / Comments:
N/A

550, rue Cumberland, pièce 154 550 Cumberland Street, room 154
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File Number: H04-16-10 **Date (mm/dd/yyyy):** 04/29/2020

Université d'Ottawa University of Ottawa
Bureau d'éthique et d'intégrité de la recherche Office of Research Ethics and Integrity

Ethics Approval Notice

Health Sciences and Science REB

Principal Investigator / Supervisor / Co-investigator(s) / Student(s)

First Name	Last Name	Affiliation	Role
Patricia	Brosseau-Liard	Social Sciences / Psychology	Principal Investigator
Sophie	Fobert	Social Sciences / Psychology	Co-Investigator
Aimie-Lee	Jueteau	Social Sciences / Psychology	Co-Investigator
Florence	Aquilina	Social Sciences / Psychology	Student Researcher
Thilini	Herath	Social Sciences / Psychology	Student Researcher
Isabelle	Cossette	Social Sciences / Psychology	Research Assistant

File Number: H04-16-10

Type of Project: Professor

Title: Preschoolers' attention to the credibility of others

Approval Date (mm/dd/yyyy)	Expiry Date (mm/dd/yyyy)	Approval Type
05/26/2020	05/25/2021	Renewal

Special Conditions / Comments:
N/A

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File Number: H04-16-10 **Date (mm/dd/yyyy):** 06/11/2021

Université d'Ottawa University of Ottawa
Bureau d'éthique et d'intégrité de la recherche Office of Research Ethics and Integrity

Ethics Approval Notice

Health Sciences and Science REB

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Patricia	Brosseau-Liard	Social Sciences / Psychology	Principal Investigator
Sophie	Fobert	Social Sciences / Psychology	Co-Investigator
Aimie-Lee	Jueteau	Social Sciences / Psychology	Co-Investigator
Florence	Aquilina	Social Sciences / Psychology	Student Researcher
Thilini	Herath	Social Sciences / Psychology	Student Researcher
Isabelle	Cossette	Social Sciences / Psychology	Research Assistant

File Number: H04-16-10

Type of Project: Professor

Title: Preschoolers' attention to the credibility of others

Approval Date (mm/dd/yyyy)	Expiry Date (mm/dd/yyyy)	Approval Type
05/26/2021	10/31/2021	Renewal

Special Conditions / Comments:
Renewal exceptionally granted due to the fact that the Principal Investigator is on maternity leave. A new application sh be submitted through eReviews before the expiry date of the certificate.

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04/10/2022

Université d'Ottawa
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University of Ottawa
Office of Research Ethics and Integrity

CERTIFICAT D'APPROBATION ÉTHIQUE | CERTIFICATE OF ETHICS APPROVAL

Numéro du dossier / Ethics File Number	H-10-21-7107
Titre du projet / Project Title	(English) Preschoolers' and school-age children's attention to the credibility of others (French) L'attention portée à la crédibilité des autres chez les enfants d'âge préscolaire et scolaire
Type de projet / Project Type	Recherche de professeur / Professor's research project
Statut du projet / Project Status	Renouvelé / Renewed
Date d'approbation (jj/mm/aaaa) / Approval Date (dd/mm/yyyy)	18/10/2021
Date d'expiration (jj/mm/aaaa) / Expiry Date (dd/mm/yyyy)	17/10/2023

Équipe de recherche / Research Team

Chercheur / Researcher	Affiliation	Role
Patricia BROSSEAU-LIARD	École de psychologie / School of Psychology	Chercheur Principal / Principal Investigator
Sophie FOBERT	École de psychologie / School of Psychology	Co-chercheur / Co-investigator
Aimie-Lee JUTEAU	École de psychologie / School of Psychology	Co-chercheur / Co-investigator
Isabelle COSSETTE	École de psychologie / School of Psychology	Co-chercheur / Co-investigator
Emma PELLEGRINI	École de psychologie / School of Psychology	Assistant de recherche / Research Assistant
Carolyn HOLMES	École de psychologie / School of Psychology	Assistant de recherche / Research Assistant

Conditions spéciales ou commentaires / Special conditions or comments

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