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Individual and Contextual Factors Involved in School-Age Children's Self-Serving Dishonest Behavior in Competitive Settings

SUMMARY OF THE PH.D. THESIS

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THEORETICAL BACKGROUND

1.1. Overview of the Theoretical Background

1.1.1. Research Relevance

A growing body of research has documented the paradoxical nature of dishonesty (Evans & Lee, 2022; Lee, 2013; Talwar & Crossman, 2011). The developmental paradox of dishonesty relies on its progression from a normative aspect of development at younger ages to problematic adolescent behavior if relied upon constantly, being associated with adverse socio-cognitive and emotional outcomes (Dykstra et al., 2020a, b; Stouthamer-Loeber & Loeber, 1986).

Due to its different levels of complexity (from simple concealments to elaborated fabrications), dishonesty can provide a unique perspective on children's cognitive, emotional, and social development by informing researchers about the internalization of social norms and socio-cognitive skills (Ding & Lee, 2020; Talwar & Crossman, 2022). Thus, ***unraveling the mechanisms behind their dishonest behavior*** by manipulating the motivational contexts (e.g., creating games with different stakes) and the target's characteristics (e.g., familiarity) could assist parents, educators, and other practitioners in understanding their role in children's path to honesty and moral development. For example, addressing children's intentions when deceiving can inform ***moral education*** programs on emphasizing others' intentions rather than their overt behaviors when judging the rightness of someone's actions.

Despite the literature's main focus on the ***cognitive factors*** (Lee & Imuta, 2021; Sai et al., 2021), ***understanding how dishonesty is progressively socialized*** requires a ***comprehensive model*** intersecting the social, contextual, cognitive, and emotional dimensions (Talwar & Crossman, 2011). The concurrent investigation of the ***contextual factors*** associated with children's

dishonesty can help address its disruptive side by ***informing prevention/intervention programs*** on how children's environment can promote the value of honesty and teach them more appropriate social strategies for achieving their goals.

Children's motivations to be dishonest become more socially oriented with increasing age. Therefore, determining the extent to which a child could be motivated to provide misleading information and their ability to do so becomes crucial in specific settings (e.g., children's testimonies; Talwar & Crossman, 2012). ***Validating empirical tools*** that can aid practitioners in discerning between knowledgeable and unknowledgeable children in relevant contexts can highly contribute to advancing the legal field and restoring children's credibility in some situations.

1.1.2. Children's Dishonesty

1.1.2.1. Concealment (secrecy)

Scholars used the term *secrecy* when referring to the children's use of concealment. Much like dishonesty, secrecy is ubiquitous, with 97% of people reporting having at least a secret at every moment (Slepian et al., 2017). Recent theoretical accounts argue that concealment is only one aspect of secrecy, not its outset. Slepian (2022) posited that secret-keeping would not be possible without the initial *intention* to conceal information. Therefore, rather than defining secrecy as the active concealment of sensitive information, a more comprehensive definition would be the "intention to keep information unknown from one or more others" (Slepian, 2022). Although subtle, this new definition distinguishes between two components of secrecy: *having*/*knowing* a secret and *keeping* a secret, which are entirely different.

According to Slepian (2022), the concealment of a secret can be achieved by three related processes: monitoring, expressive inhibition, and alteration. To ensure no informational leakages,

individuals must carefully *monitor* their behavior (verbal and non-verbal) and interactions (e.g., what they are communicating and how their partner is reacting). Consequently, if one detects the danger of revealing the secret while monitoring their social interactions, they will try to *inhibit* any response that may lead to that and convey a different way of communicating in order to ensure secrecy. In order to inhibit the relevant information from being disclosed, individuals may engage in *alteration behaviors*. For example, one could try changing the topic of a conversation (Sun & Slepian, 2020), ask different questions (Bitterly & Schweitzer, 2020), or choose to respond to other questions received that do not involve revealing the secret (Rogers et al., 2017). In more extreme cases, individuals could also use *deception* (fabricating statements) to ensure secrecy. However, using deception instead of other more benign alteration behaviors could have major social implications and require additional socio-cognitive skills to be successful (Visu-Petra et al., 2016).

As Bok (1983) stated, "we are all, in a sense, experts on secrecy. From earliest childhood, we feel its mystery and attraction". Developmental evidence showed that children's ability to understand and keep secrets typically appears from age 5 (Anagnostaki et al., 2010, 2013; Pipe & Wilson, 1994). After grasping the idea that secret information must be kept unknown from others, across school-age years and beyond, children are also starting to understand the contexts in which secrets are being shared and kept and the social dynamics involved (e.g., the level of trust in others; Lavoie et al., 2017; Watson & Valtin, 1997). School-age years bring a major change in children's lives due to the social diversification it entails and the rise of peer relationships' importance for children's overall development (Bosacki, 2021). With that, the power of secrecy also increases, becoming an essential tool for establishing and maintaining meaningful relationships with peers. Research shows that children and adolescents reported keeping approximately two secrets per day,

which can mean that the overall frequency of children's secrecy tends to increase as children get old (Lavoie et al., 2017).

1.1.2.2. Deception

Deception has been defined as "the deliberate attempt, whether successful or not, to fabricate and/or manipulate in any other way factual and/or emotional information by verbal and/or nonverbal means in order to create or maintain in others a belief that the communicator himself or herself considers false" (Masip et al., 2004; Vrij, 2008). Despite this overarching definition, we argue that trying to mislead others is not always a matter of simply fabricating a false belief. Instead, it may be more of an effort to fabricate the belief that the deceiver considers the information false and to instill this belief in the receiver's mind (Masip et al., 2004).

To better understand the individual and social forces shaping them, we placed children's lies at the intersection between the child's Self-interest and their focus (or absence thereof) on Other-interest (interlocutor/social group; See Figure 1). The current thesis focuses on children's self-serving deception (self-interest high, other-interest low) and how this unfolds throughout middle childhood.

Figure 1.

Types of Lies and the Main Experimental Paradigms Designed to Study Them (retrieved from

Visu-Petra, Prodan, & Talwar 2022)

Other-interest
HIGH

- **Altruistic *lies* -personal cost**

- **Polite lies -** personal cost
(Undesirable Gift)

Self-interest

LOW ——————————————————→ HIGH

Self-interest

- **Collective lies**
(School competition)

- **Other-protection lies**
(Forensic paradigm, Magician)

- **Prosocial/Politeness lies**
(Art Rating, Reverse Rouge)

Maladaptive lies:
- Pathological
- To inflict harm, for "fun"
- Griefing
(video games)

- **Self protection lies**
(Temptation Resistance Paradigm)

- **Competitive lies**
(Hide and seek, deceptive pointing, reputation)

LOW

Other-interest

The first form of deception seen in children is self-interested and protective, often referred

to as *antisocial lies*. Besides avoiding an imminent punishment, children's self-serving lies can

also be motivated by personal gains (rewards), which emerge in preschool years. Assisted by

rudimentary forms of ToM, children are starting to realize the possibility of manipulating others'

beliefs using deception in order to gain access to a desirable object. For example, Peskin (1992)

showed that 87% of 5-year-olds lied about the location of a prize in order to keep it for themselves,

while only 29% of 3-year-olds did the same. Children's motivation to lie becomes even more varied with increasing age being subjected to social influences.

Verbal deception commonly entails using false information that we are making others perceive to be true (i.e., *first-order deception*; Debey et al., 2015; DePaulo et al., 2003). However, there are also contexts in which the recipient can anticipate others' intent to deceive. This is especially true for highly competitive contexts, where people know that others may try to trick them (e.g., poker games). In such circumstances, one can provide truthful information to others who are skeptical about being misled (i.e., *second-order deception*; Ding et al., 2014; Sai, Wu et al., 2018; Sutter, 2009).

Introducing the idea of telling the truth to deceive as a distinctive deceptive strategy, Sutter (2009) first named it sophisticated deception. The author proposed that "telling the truth should be counted as an act of deception when the sender expects the receiver not to follow the sender's message and when the true message is sent for precisely this reason" (Sutter, 2009, pp. 56). To our knowledge, only two empirical studies investigate the emergence of second-order deception in children. In the first one, Sai, Ding, et al. (2018) explored 4- to 6-year-old children's ability to use truthful and untruthful claims to mislead a confederate in relation to their socio-cognitive development (e.g., second-order ToM and cognitive flexibility). Using a modified "hide-and-seek" task, researchers found that children as young as 4 can tell second-order lies (correctly indicating the location of a coin to mislead the opponent). They also showed that this deceptive behavior was only related to second-order ignorance, a prerequisite of second-order ToM, and not to cognitive flexibility or second-order false-belief understanding. The other study addressing second-order deception in children involved school-age participants between 12-14 years of age (Leng et al., 2019). The authors were interested in the brain mechanisms of second-order deception, engaging

children in instructed truth/lie trials vs. chosen truth/lie trials. During these trials, they measured participants' response times (RT) and event-related potentials (ERPs). Results were in line with previous research on adult samples, showing that deception intentions, rather than simply making counterfactual statements, increased the demand for cognitive control in liars.

Reviewing the literature to date on first- and second-order deception, we observe a significant difference in how truth-telling and lie-telling were tested. For example, past developmental research distinguished different deception sophistication levels employed using counterfactual statements (first-order deception), ranging from simple denials of things to elaborate false statements meant to ensure consistency (Evans & Lee, 2011). In contrast with this refined perspective on first-order deception, all the studies investigating second-order deception are based on a more rudimentary usage of the truth/lie. In the tasks described so far measuring second-order lies, the truth entailed a concise claim that was carried out sometimes by simply pressing a button, pointing in a direction, or telling a simple truth.

Considering the methodological and theoretical disparities in the literature, we propose that second-order deception, similar to first-order deception, can also have different levels of sophistication. In contexts where the deceiver has to mislead a target across multiple consecutive occasions (e.g., poker games), second-order deception could be employed by flexibly adjusting to the opponent's actions. This would lead to lower executive and mentalizing demands, and thus, we named it *elementary second-order deception*. In other settings, individuals may have to ensure the plausibility of their lies through subsequent explanations (similar to the TRP tasks for first-order deception). Here, second-order lying would entail alternating between more elaborate pieces of truthful and false information (e.g., "*I know this because I saw a documentary about this*"). Considering this, we named it *advanced second-order deception*.

Lastly, addressing the structural features of second-order deception, we also pinpoint the aspects that could make it more challenging to employ. Research showed that lie-telling and truth-telling can become habituated depending on their frequency of use. The *habituation effect* refers to how frequent/repeated a communication strategy should be (e.g., lie-telling) to become habituated and impose cognitive costs when adopting another strategy (e.g., truth-telling; Visu-Petra et al., 2014). Most cognitive perspectives on dishonesty argue that lie-telling is costly because truth-telling represents the default response type (Spence, 2004). Nevertheless, other research on the habituation effect suggests that if lying is used frequently enough, it can become a prepotent response, imposing cognitive costs on individuals' subsequent attempts to tell the truth (Verschuere et al., 2011). In the context of second-order deception, if children are getting used to telling truths/lies to deceive by inferring that the interlocutor is aware of their intention to deceive, when this strategy needs to be changed based on the target's actions (switching to telling lies/truths), this would be more challenging for children to employ.

1.1.3. Individual Factors Associated with Children's Dishonest Behavior

The seminal approaches addressing the mechanisms of human dishonesty focused on the socio-cognitive processes involved when someone is trying to cheat, lie, or mislead others. Research showed that **basic cognitive functions**, such as *processing speed* or *short-term memory*, allow individuals to swiftly adapt when dishonesty is needed (Debey et al., 2015; Visu-Petra et al., 2016). Furthermore, truth-default theories (e.g., Spence, 2004) posit that dishonesty automatically involves suppressing the truth, monitoring one's behavior, and planning the next moves while juggling multiple pieces of information to ensure consistency. All these cognitively demanding processes are enabled by the development of **executive functions (EFs)**. EFs are an umbrella

concept encompassing multiple processes that support our capacity to plan and meet goals (*planning*), inhibit prepotent responses (*inhibitory control*), handle multiple information at once (*working memory*), and alternate between them smoothly (*cognitive flexibility*; Diamond, 2013). Previous literature demonstrated that children's increasing complexity in misleading others is significantly associated with their executive functioning (Sai et al., 2021).

Whenever we act dishonestly, we try to achieve something in relation to others, making it an inherently social behavior. In order to succeed in their dishonest endeavors, one must fully understand the social contexts and others' mental states (e.g., desires, intentions, emotions), which supports the association with social cognition processes, such as ***theory of mind*** (ToM; Talwar & Lee, 2008; Walczyk et al., 2014; Walczyk & Fargerson, 2019). ToM represents the socio-cognitive ability to understand others' intentions, emotions, or desires and to predict someone's behavior based on these evaluations (Miller, 2022; Wellman, 2001). Before deciding to be dishonest, individuals must carefully assess the recipient's knowledge access and intentions and realize they can manipulate the recipient's mental state (Talwar & Crossman, 2011). Developmental science provided well-documented evidence on the parallel progression of children's early abilities to act dishonestly and ToM's emergence (Ding et al., 2015; Lee & Imuta, 2021; Sai et al., 2021; Walczyk & Fargerson, 2019). Nevertheless, less is known about how this parallel progression goes beyond preschool years when more advanced forms of ToM develop (Miller, 2022; Moldovan et al., 2020; Weimer et al., 2017).

Whereas socio-cognitive development can foster children's increasing ability to conceal something or mislead, other individual factors can hinder it. For instance, children with ***internalizing problems*** (e.g., OCD symptoms) proved less accurate when asked to keep a secret to spare others' feelings (Visu-Petra et al., 2016). In terms of its frequency, other findings suggest

that adolescents with depressive symptoms reported higher levels of dishonesty toward their parents (Laird & Marrero, 2010; Lavoie et al., 2017), which can, in turn, limit their access to professional help (Wisdom et al., 2006). Therefore, detangling the associations between internalizing symptoms, such as anxiety or depression, that are increasingly reported in children (Mullen, 2018; Polanczyk et al., 2015) and their dishonest behavior is also essential for clinical settings.

1.1.4. Contextual Factors Involved in Children's Dishonest Behavior

Children's dishonest abilities emerge due to increasingly sophisticated socio-cognitive skills and are further shaped by their emotional development (Dykstra et al., 2023; Talwar & Crossman, 2011). However, their motivation to employ such strategies and the process of learning when it is appropriate to be dishonest is mainly influenced by socialization (Talwar & Crossman, 2022; Talwar et al., 2022). Caregivers (e.g., parents) are the primary social agents early on, and they can significantly impact how children understand and (when they) practice dishonesty. Their influence can be exercised either explicitly, through specific messages about the importance of honesty, or implicitly, through ***parental practices*** (e.g., *emotional warmth, rejection, controlling behaviors*) that can affect children's propensity and proficiency to be dishonest in different extents across development (Talwar & Crossman, 2022). Research suggests that harsh or controlling parental practices foster children's dishonesty as they seek to avoid punishments or controlling parental tendencies (Stouthamer-Loeber, 1986; Talwar, Lavoie, et al., 2017). In turn, other parental practices, such as warmth-related behaviors, reinforce children's honesty (Baudat et al., 2022; Talwar & Crossman, 2011) or other dishonest acts aimed at protecting others (e.g., prosocial lie-telling; Popliger et al., 2011).

While addressing various types of dishonest acts in children (secrecy, cheating, or lie-telling), the existing literature mainly focused on the child-adult dyad, thus neglecting the dynamics imposed by *peer relationships*, which could change school-age children's needs and motivations and reinforce dishonesty (Dykstra et al., 2020a). The existing evidence on children's dishonesty toward peers is rather indirect, focusing on their evaluations of lie-telling toward friends (Lavoie & Talwar, 2022; Perkins & Turiel, 2007) or their self-reported frequency of lying to them (Dykstra et al., 2020a). To our knowledge, virtually no experimental evidence shows children's propensity to employ dishonest strategies toward familiar and unfamiliar peers in competitive settings.

Lastly, other contextual forces besides social agents can indirectly shape children's propensity and proficiency to be dishonest. Factors such as *socioeconomic status* or *bilingual education* received little (to no) attention in the literature despite their recognized associations with children's socio-cognitive development (Bialystok, 2018; Letourneau et al., 2013). Whereas for bilingual education, we have no previous literature addressing its association with children's dishonesty, socioeconomic status investigations yielded mixed results, being either negatively or non-significantly associated with children's dishonesty (Stouthamer-Loeber & Loeber, 1986; Tijenssen et al., 2017). These results can be attributed to the high variability in measuring SES (e.g., parental education, income, living conditions, or other composite scores) and the indirect effects it could have on other factors, such as parental practices or educational environment (Talwar & Lee, 2011; Tobol & Yaniv, 2019).
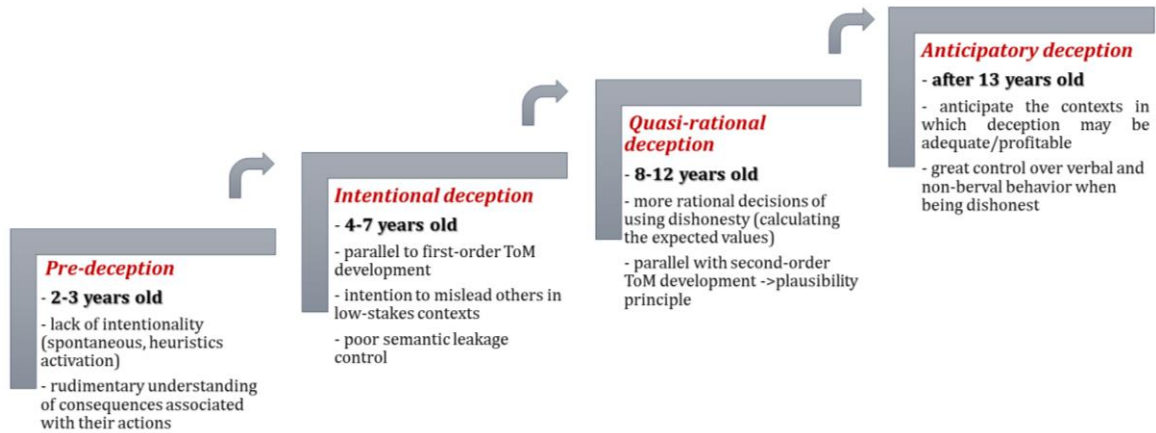
1.1.5. Theoretical Accounts of Children's Dishonest Behavior

1.1.5.1. The Activation-Decision-Construction-Action Theory (Walczyk & Fargerson, 2019)

Talwar & Lee (2008) were the first to propose a comprehensive theoretical framework for the association between children's dishonest behavior and socio-cognitive development, namely, the *three-stage model*, which was further extended by Walczyk and Fargerson (2019) through the Activation-Decision-Construction-Action Theory (ADCAT) of deception adapted for children (see Figure 2). The first three stages of ADCAT mirror the three-stage model, pinpointing specific details about children's lack of intentionality in the emergence stage (*pre-deception stage*) and the rationality that guides children's deceptive endeavors beginning school-age years (the plausibility principle applied in the *quasi-rational deception stage*). The last stage aims at extending the knowledge on children's developing dishonest abilities by addressing how their skills advance in pre-adolescence. Children come to anticipate the contexts in which they could act dishonestly, having an adequate understanding of the conventional paradox of deception (Lee, 2013). Moreover, they are skilled at controlling their overt (verbal and non-verbal) behaviors to sustain their lies in high-stakes contexts as they practice the delivery of lies across various settings (Walczyk & Fargerson, 2019).

Figure 2.

Developmental Stages of Children's Deceptive Abilities in the ADCAT Model

Pre-deception
- 2-3 years old
- lack of intentionality (spontaneous, heuristics activation)
- rudimentary understanding of consequences associated with their actions

Intentional deception
- 4-7 years old
- parallel to first-order ToM development
- intention to mislead others in low-stakes contexts
- poor semantic leakage control

Quasi-rational deception
- 8-12 years old
- more rational decisions of using dishonesty (calculating the expected values)
- parallel with second-order ToM development ->plausibility principle

Anticipatory deception
- after 13 years old
- anticipate the contexts in which deception may be adequate/profitable
- great control over verbal and non-berval behavior when being dishonest

The ADCAT posits that being deceptive entails four major components, which ToM and EFs sustain differently. The first component is *Activation*, which involves retrieving relevant information with working and short-term memory assistance. In this initial phase, ToM could facilitate children's understanding of what the interlocutor expects and knows. Critically, the ADCAT extension provided by Moldovan et al. (2020) argues that rudimentary forms of ToM, such as *ignorance attributions* or *knowledge access,* would enable children to understand that others are not knowledgeable of some facts and thus, help them reason if being dishonest can be an adequate strategy.

Once they can reason about the chances of getting caught and anticipate others' actions, children face the *Decision* to be dishonest or not. In order to make that decision, children are helped by their EFs and ToM in calculating the expected values of honesty and deception. Since school-age years, children engage in quasi-rational deception, meaning they calculate the difference between the benefits of deception vs. truth-telling. Here, advanced forms of ToM (e.g., second-order ToM or interpretive diversity understanding) may assist children in mentally projecting how different people would interpret the same information to decide between truthful and false details (Moldovan et al., 2022). These complex decisions are, however, cognitively demanding, imposing

a great cognitive load, which also apply to secret-keeping contexts. In secrecy, children also face, according to Slepian (2022), a decision – to reveal or conceal a secret, which could impose the same cognitive load.

With the decision to manipulate others' beliefs through lying, children are elaborating a deceptive response in the *Construction phase*. With increasing age, ToM and EF assist children in constructing *plausible lies.* To be successful in more complex deceptive endeavors, children must inhibit the prepotent truthful responses while juggling multiple pieces of information and switching between truths and false to ensure consistency (Talwar & Crossman, 2011). In the concealment of secrets, the construction phase would entail the monitoring and expressive inhibition processes posited by Slepian's (2022) model. These cognitively demanding processes supported by EF help individuals assess how well they are keeping secrets and the level of danger in slipping secret-related information in their utterances.

1.1.5.2. An Integrative Model of Children's Self-Serving Dishonesty – Individual and Contextual Influences

We define dishonesty as a broad concept encompassing different behaviors employed for self- or others-oriented interests. Dishonest behaviors for self-serving purposes include concealing, cheating, or deceiving (Garcia et al., 2023; Srour, 2021). As stated before, all these specific behaviors can have different levels of complexity, ranging from concealing a secret by remaining silent to more sophisticated ways of hiding something (*alteration behaviors*), such as lie-telling (Slepian, 2022).

When deciding to use deception in specific contexts, children can adopt various strategies to be successful. They can use false information to mislead others (*first-order deception*), which

in turn can be conveyed non-verbally through deceptive pointing or verbally, using specific indications (e.g., *The sticker is in the blue box*), denials (e.g., *No, I did not peek!*), or more elaborated false utterances to ensure consistency and plausibility (e.g., *I know this because I learned it in school*). Nevertheless, in highly competitive contexts, children could anticipate the interlocutors' knowledge about their intentions to deceive and how a suspicious target can perceive their (un)truthful statements. Hence, children may use truths and lies to deceive others in specific settings (e.g., zero-sum games), a misleading strategy known as *second-order deception*. Depending on how second-order deception is conveyed, we are further distinguishing between *elementary* vs. *advanced second-order deception.*

In line with previous theoretical models, we posit that children's deceptive behaviors are sustained by specific socio-cognitive processes, such as ***baseline cognitive processes, ToM,*** and ***EFs***, depending on their sophistication (Talwar & Lee, 2008; Walczyk & Fargerson, 2019). For example, first-order ToM could assist children in realizing that they can alter someone's mental state and instill false beliefs through lying, increasing 4-year-olds' propensity to lie compared to younger children (Talwar & Lee, 2008). In order to maintain their initial lies or construct more elaborate ones, children need to acquire higher-order ToM forms, such as second-order ToM (Evans & Lee, 2013) or interpretive diversity understanding (Moldovan et al., 2020), which facilitate their recursive thinking and understanding of the active mind.

Similarly, EFs were shown to be differently associated with children's lies depending on their complexity, meaning that the stronger relationship between EF and deception was found for their ability to maintain their lies, which is indeed more cognitively demanding than for their initial, more simple lies (Sai et al., 2021). We posit that secrecy also involves ToM and EF, the
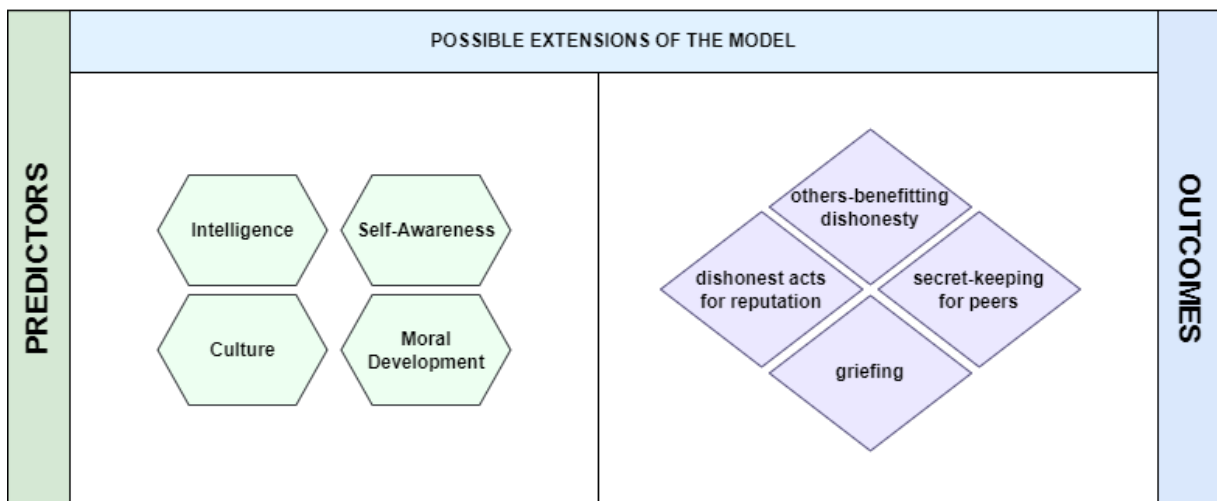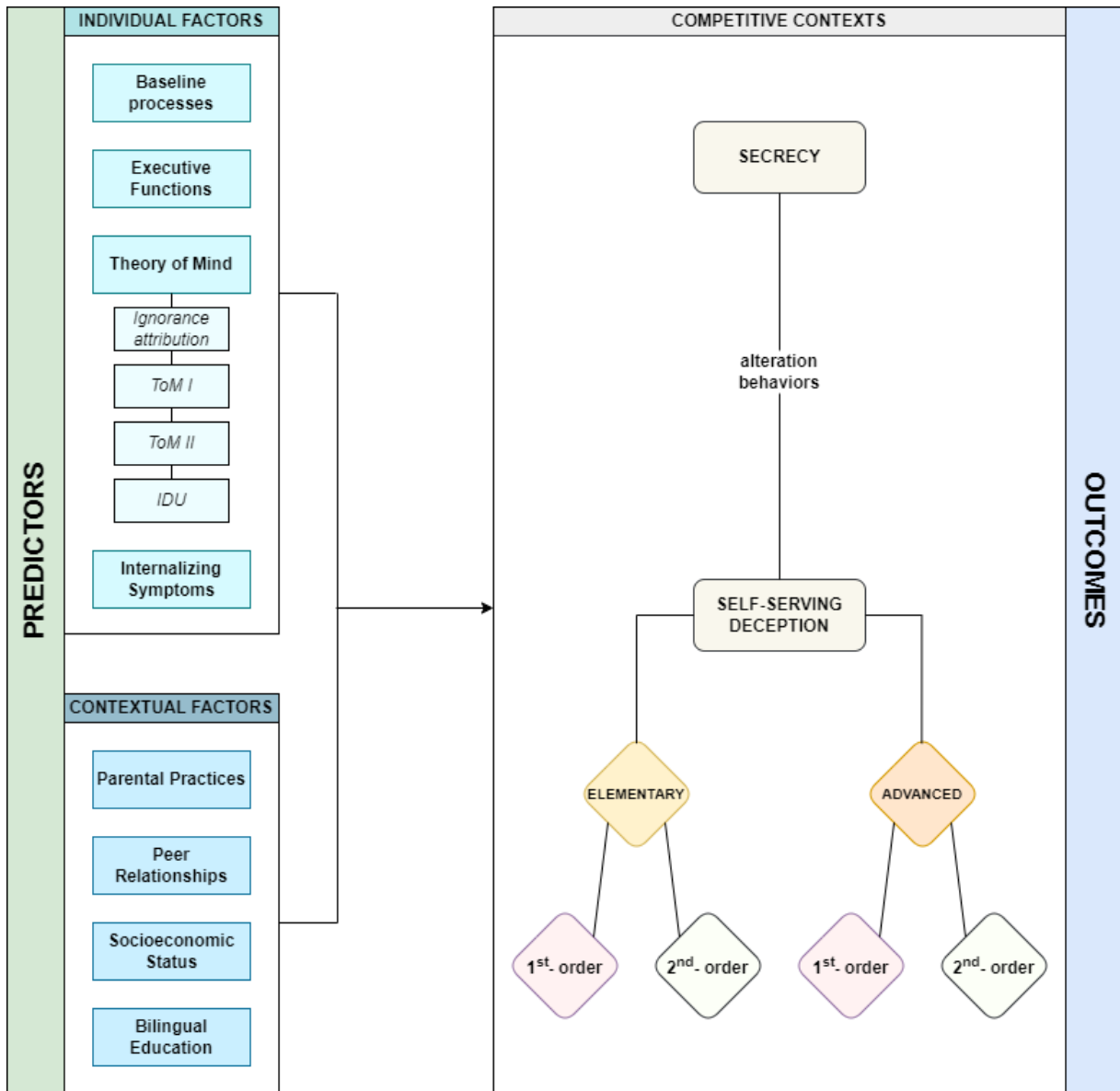
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active concealment process of secrets relying on monitoring (which requires understanding others'

mental states), expressive inhibition, and alteration (Slepian, 2022).

Besides the socio-cognitive factors, we also emphasize the importance of emotional aspects

of children's development in their propensity and proficiency to be dishonest. Adolescents'

internalizing problems (e.g., depressive symptoms) have been longitudinally and bidirectionally

associated with their secret-keeping and lie-telling frequency, with detrimental effects on their

social relationships (child-parents and peer relationships; Dykstra et al., 2020a, b; Dykstra et al.,

2023; Lavoie et al., 2017). These findings set the stage for the socio-environmental influences that

could impact children's dishonesty as they age. Perhaps children's internalizing problems mediate

the relationship between poor social relationships and their frequent use of deception.

If children's knowledge about *how* to succeed in their dishonest endeavors could be

dictated by their socio-cognitive and emotional abilities, their developing sense of *when* it is

acceptable/profitable to do so is mainly shaped by *socio-environmental forces*, such as parental

practices, peer relationships, socioeconomic status, or educational environment. We already know

that ***parental rearing practices*** are strongly related to children's overall development, including

dishonesty. Parental support and autonomy were proven to foster children's disclosure and

honesty, whereas controlling and harsh parental tendencies increased their reliance on secrecy and

deception (Baudat et al., 2022; Bureau & Mangeau, 2014; see Eguaras et al., 2021 for a review).

Strengthening the influence of parenting, other findings suggest that parental practices moderate

the relationship between children's propensity and proficiency to deceive and their socio-cognitive

development (Ding et al., 2023; Talwar et al., 2017). Similarly, ***peer relationships*** are also

essential contexts in which children can practice dishonesty. Previous research demonstrated that

poorer friendships predicted higher rates of lie-telling over time, which can impact adolescents'

internalizing problems without a robust support system (Dykstra et al., 2020a, 2023). Despite these crucial findings, children's dishonesty in the context of peer relationships did not receive that much attention in the literature. Perkins and Turiel (2007) showed adolescents complex ways of reasoning about whether it is acceptable to lie to their peers, which warrants more investigation into their actual lie-telling behavior.

Lastly, the current model emphasizes the importance of other, more distal contextual factors that could indirectly affect children's deception. For example, ***socioeconomic status*** was associated with children's socio-cognitive development through its effect on other relevant aspects, such as parental practices. Recent studies demonstrated that EFs vary as a function of SES, and that parental factors, such as cognitive stimulation, fully mediate this relationship (Rosen et al., 2020). Therefore, children's socio-cognitive development or other social factors (e.g., parental practices) could mediate the relationships between SES and children's dishonesty. The other important factor to be accounted for is the educational environment, which was previously shown to influence children's reliance on deception if punitive (Talwar & Lee, 2011). We refer to the sequential bilingualism acquired through the school environment (***bilingual education***), previously linked to an advantage in deceptive abilities for bilingual individuals (Suchotzki & Gamer, 2018). As a possible mechanism explaining this advantage, ToM was shown to have higher levels of development in bilingual children than in monolinguals due to relevant skills, such as metalinguistic or sociolinguistic awareness (Yu et al., 2021). Therefore, it is likely that ToM mediates the relationship between deception and bilingualism, but this was never investigated in children.

PREDICTORS

INDIVIDUAL FACTORS
- Baseline processes
- Executive Functions
- Theory of Mind
  - *Ignorance attribution*
  - *ToM I*
  - *ToM II*
  - *IDU*
- Internalizing Symptoms

CONTEXTUAL FACTORS
- Parental Practices
- Peer Relationships
- Socioeconomic Status
- Bilingual Education

COMPETITIVE CONTEXTS
- SECRECY
- alteration behaviors
- SELF-SERVING DECEPTION
- ELEMENTARY
  - 1st- order
  - 2nd- order
- ADVANCED
  - 1st- order
  - 2nd- order

OUTCOMES

POSSIBLE EXTENSIONS OF THE MODEL
- Intelligence
- Self-Awareness
- Culture
- Moral Development
- others-benefitting dishonesty
- dishonest acts for reputation
- secret-keeping for peers
- griefing

THEORETICAL AND METHODOLOGICAL AIMS

2.1. Theoretical Aims

I. We aimed to investigate ***different types of dishonesty in school-age years***, ranging from simple concealment to strategic attempts to deceive using elaborate statements, while focusing on the relatively less investigated types of deception in school-age children, namely ***second-order deception.***

II. We aimed to address the ***developmental differences*** in children's dishonest behaviors in school-age years, which are marked by intensive cognitive advancements and social changes through longitudinal and cross-sectional designs.

III. We wanted to explore the ***individual and contextual mechanisms*** supporting children's dishonesty throughout middle childhood. We explore the individual mechanisms of children's dishonesty in all of our studies by investigating their relationship with various types of dishonesty, such as concealment (in Study 1), first-order deception (in Study 3 and 4), and elementary second-order deception (in Study 2 and 3). In this respect, we investigate the following ***socio-cognitive and emotional factors***: baseline cognitive processes (processing speed and short-term memory; Study 1), theory of mind (assessed in all the studies, but in different developmental stages, such as ignorance attribution, first-order ToM, second-order ToM, and interpretive diversity understanding), EFs (inhibitory control, cognitive flexibility, and working memory; Study 1, 2, 3), internalizing problems (anxiety and depression; Study 1). We also explore the ***socio-environmental (contextual) mechanisms*** of children's deceptive behavior: parental practices, peer relationships, socioeconomic status, and bilingual education.

IV. Building on previous literature and present findings, our last aim is to advance a ***new integrative model of children's self-serving dishonesty*** that extends the previous models and unifies some of the individual and contextual factors associated with children's self-serving dishonesty.

2.2. Methodological Aims

I. We wanted to devise a ***new paradigm for assessing the elementary levels of children's strategic deception.***

II. Our second objective was to ***create an ecological paradigm*** capturing other ***motivational elements*** of dishonesty in middle childhood, focusing on children's ***propensity to mislead their peers.***

III. We also aimed to investigate older children's ***advanced deceptive skills*** by maintaining their initial lies through subsequent explanations in conjunction with their higher-order ToM (interpretive diversity understanding).

IV. Our last aim targets the practical implications of the current thesis. We wanted to extend the limited research on ***adapting the Reaction Time Concealed Information Test*** (RT-CIT) ***for children*** (Visu-Petra et al., 2016).

ORIGINAL RESEARCH CONTRIBUTIONS

Study 1: A longitudinal investigation of children's ability to withhold information in an adapted RT-CIT paradigm

Study 1[1] was a longitudinal investigation of school-age children's ability to withhold evidence in the Reaction-Time based Concealed Information Test (RT-CIT; Ben-Shakhar & Elaad, 2003; Lykken, 1959; Verschuere et al., 2011). RT-CIT is a well-validated memory paradigm used to detect concealed knowledge of items relevant to a mock crime scenario. Such concealed information about critical items encountered during the mock crime (i.e., probe items) was introduced to the subjects sparingly, along with other pieces of irrelevant information (i.e., irrelevant and target items). Then, response times for probe items are compared to those for irrelevant ones (e.g., klein Selle & Ben-Shakhar, 2023). The "CIT effect" relies on this theory in the sense that relevant items (probes) carry a special significance for individuals that encountered them before (knowledgeable subjects), which leads to an enhanced physiological/behavioral orienting response when presented with those stimuli (e.g., higher reaction times; Meijer et al., 2014; Sokolov, 1996). To our knowledge, the only attempt to create an adapted version of the RT-CIT for children was made by Visu-Petra and colleagues (2016).

We aimed to extend the very limited existing literature on detecting concealed information in children using the RT-CIT (Visu-Petra et al., 2016) in several directions. First, it verified, for the first time in the literature, the longitudinal reliability of the test by assessing children at two time points with distinct scenarios requiring them to deny the possession of relevant information

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[1] The content of this section represents parts of a manuscript submitted in the *Journal of Applied Research in Memory and Cognition*. The authors are Visu-Petra, L., Millen, A. E., Lee, A., Buta, M. & Prodan, N.

for personal or prosocial reasons. This offers essential information for the possibility to re-administer the RT-CIT to previously knowledgeable participants, which to our knowledge, has not yet been tested even in adults. Second, it followed the potential socio-cognitive and emotional correlates of individual differences in the appended lie-RT across the two-time points by measuring interrelations with *baseline cognitive* (processing speed and short-term memory), *executive* (verbal and visuospatial working memory, inhibition, and shifting), *social* (theory of mind), and *emotional processes* (anxiety and depression symptoms).

3.1.1. Methods

We included 194 children tested twice, approximately one year apart. Children were assigned to one of the two groups: the Unknowledgeable group (Unknowledgeable, n = 97) or the Knowledgeable group (Knowledgeable, n = 97). In each group, children were 8-11 years old at the first time point (Unknowledgeable group – M = 113.25 months, SD = 8.33, 49 girls; Knowledgeable group – M = 113.83 months, SD = 15.56, 54 girls) and 9-12 years old at the second one (Unknowledgeable group – M = 124.75 months, SD = 8.35; Knowledgeable group – M = 125.34 months, SD = 15.58).

Children's ability to conceal information was assessed using the Reaction Time Concealed Information Test adapted for children (Seymour et al., 2000; Visu-Petra et al., 2016). Children from both experimental groups went through a different scenario at each time point, in which they endorsed a first-person perspective of the events. At *Time 1* children were immersed in an imaginative scenario in which knowledgeable participants had to keep the secret of peeking at someone's gift from a raffle organized at school. At *Time 2*, children were asked to imagine that they had to keep the secret of a surprise gift received from their aunt in order to spare her feelings.

In the testing phase of the paradigm children were presented with different items (probe, target, and irrelevant items), and were instructed to admit the recognition of target the items (elements that they were allowed to see in both scenarios), but to deny the recognition of all the other items (probes and irrelevants). The probes items were not explicitly mentioned, so the instructions could remain identical for both groups. This way, we did not specifically instruct knowledgeable children to deny probe items.

The task encompassed 3 blocks of trials, with two practice blocks. During the final test block, 4 probe items, 4 target items, and 16 irrelevants were randomly shown 4 times (96 stimuli in total). If the child did not respond to each item displayed in time, an hourglass appeared, followed by the next stimulus. We recorded participants accuracy and reaction times for each item.

Processing speed was evaluated using the Simple Reaction Time test (SRT) from CANTAB (Owen et al., 1990), whereas *short-term memory* was assessed through the Forward Digit Span. Its reverse, the Backward Digit Span task was also used to evaluate children's *verbal working memory*. *Spatial working memory* was evaluated through The Spatial Working Memory test (SWM) from CANTAB (Owen et al., 1990), while for assessing *the inhibitory control and cognitive flexibility* we used the Inhibition and Shifting tasks from NEPSY II (Developmental Neuropsychological Assessment; Korkman et al., 2007). Lastly, we used the Social Perception subtest from the Developmental Neuropsychological Assessment II (NEPSY II; Korkman et al., 2007) to evaluate children's *verbal and contextual ToM* and the Revised Child Anxiety and Depression Scale (RCADS-C, Chorpita et al., 2005) for children's *internalizing symptoms*.

3.1.2. Results and Conclusions

In line with our expectations, linear mixed effect models revealed that at Time 1 and 2 there were significant main effects of stimuli type (probe vs irrelevant) and knowledge condition (knowledgeable, unknowledgeable) and a significant interaction between those two, such that ***RTs were slower and the accuracy was lower*** for the probe items compared to irrelevant items for children in the knowledgeable group compared to the unknowledgeable group respectively (see Figures 1, 2, 3, and 4).

Figure 1.

Reaction Time for Stimuli Type and Knowledge Condition at Time 1.
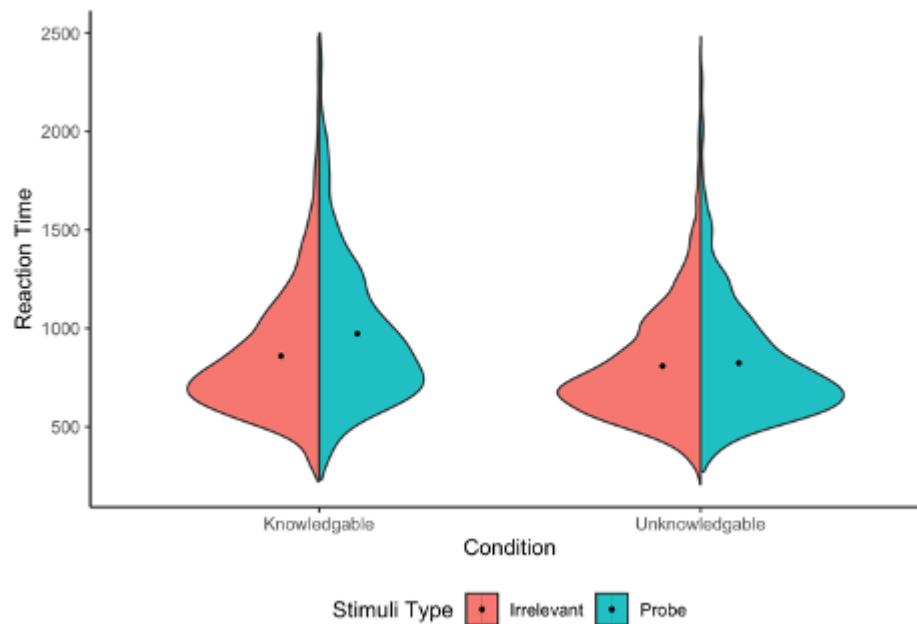
Figure 2.

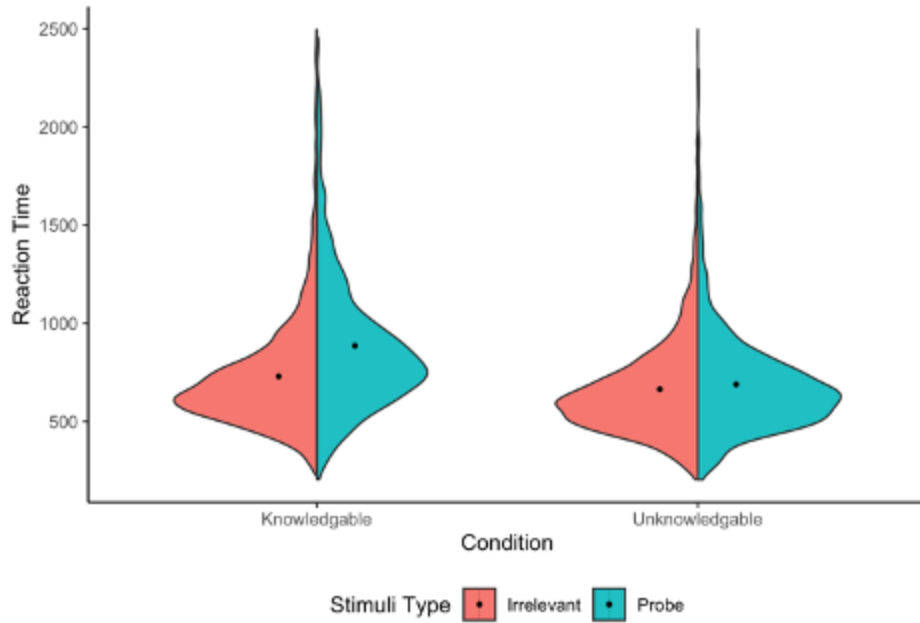*Mean Reaction Time for Stimuli Type and Knowledge Condition at Time 2.*

Figure 3

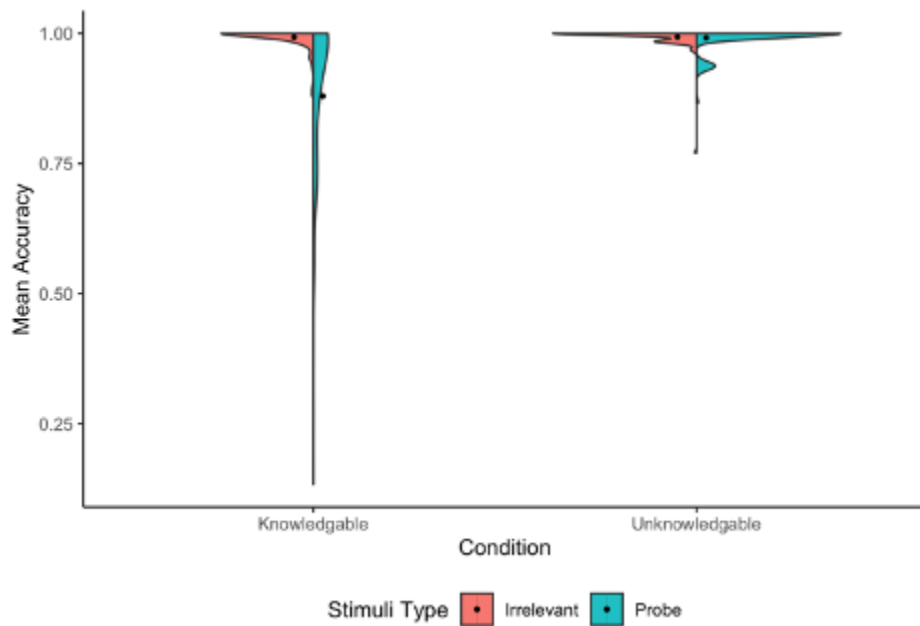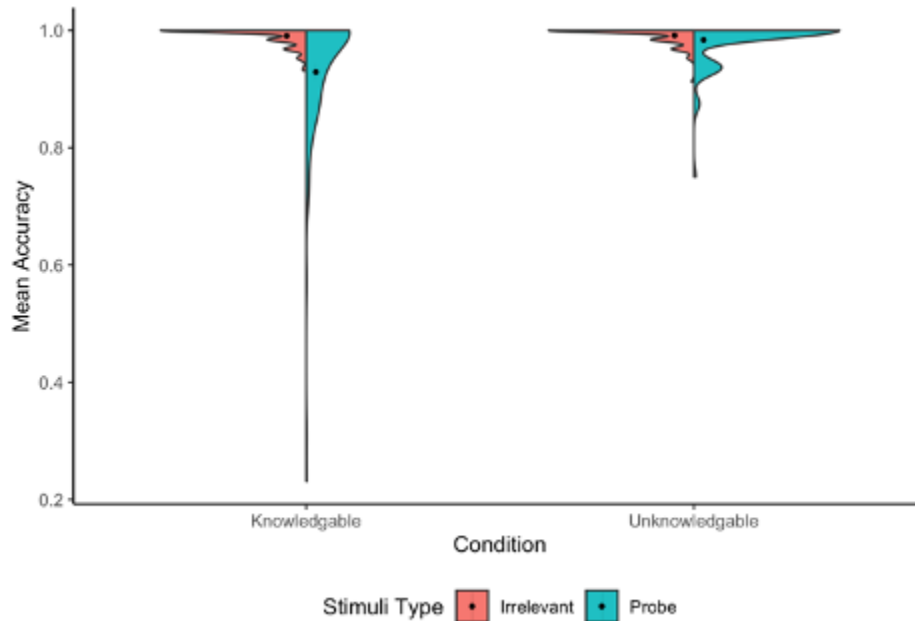*Mean Accuracy for Stimuli Type and Knowledge Condition at Time 1.*

Figure 4

Mean Accuracy for Stimuli Type and Knowledge Condition at Time 2.

Thus, we provided preliminary evidence of the possibility to readminister RT-CIT and the robustness of this tool in detecting knowledgeable children over time (with a detection efficiency of knowledgeable children higher at T2 than T1). We also showed that it's capacity to detect knowledgeable children is nor related to the individual differences in children's socio-cognitive and emotional development over time, as we did not obtain any significant relations between children's performance in the RT-CIT task and their socio-cognitive or emotional performance or reported scores.

Study 2: Elementary second-order deception in school-age children and its socio-cognitive correlates

Going beyond children's secret-keeping, in **Study 2[2]** we addressed school-age children's *elementary second-order deception and its socio-cognitive correlates*. Second-order lying, or "reverse psychology" as colloquially known, represents the ability to understand that the interlocutor is aware of one's deceptive intentions and to take advantage of this awareness. Consequently, the deceiver thinks that the target thinks they are telling a lie, so they would alternate between truthful and untruthful statements to mislead (Ding et al., 2014; Sai, Ding et al., 2018; Sai, Wu et al., 2018).

We extended the seminal behavioral study by Sai, Ding, et al. (2018), which investigated second-order lying in young children, by 1) adding a crucial modification to the task design allowing for more trials and multiple alternations (between truths and lies) in the deceptive strategies employed; 2) expanding the age range to middle childhood (compared to 4-6 years in Sai, Ding, et al., 2018); 3) including more EF measures (working memory added besides the inhibition and cognitive flexibility measured in the previous study). We predicted that age, precursors of ToM (ignorance attribution) and EFs would be positively related to children's second-order deception.

3.2.1. Method

We obtained written parental consent for 101 8- to 10- year -old children. The sample included 52 8-9 years-olds (28 females and 24 males; M_{age} in months = 111.43, SD = 6.19) and 49 10-years-olds (21 females and 28 males; M_{age} in months = 126.9, SD = 5.12).


In order to evaluate school-age children's elementary second-order lying behavior, we used an adapted version of the hide-and-seek task employed by Sai, Ding, et al. (2018). Children were instructed to hide a coin in one of their hands, while a confederate would try to guess the location of the coin during multiple trials. To create a highly competitive context, the confederate told the child that if they each time they did not find the coin the child would win a point. However, if the confederate did find the coin, the confederate would win the respective point. At the end of the game, if participants accumulated enough points, they could win a surprise reward (i.e., at least 4 points in each round). The task encompassed 6 rounds with a maximum of 7 trials each (42 trials in total). If children won half-plus-one trials from the total number of trials in each round (i.e., 4 points out of a maximum of 7), the confederate proceeded to the next round.

During the *first round* of the game (*Truth 1*), the confederate always chose the hand that was <u>not</u> indicated by the child, so that children had to communicate the true location of the coin by verbally indicating if they hid it in their "left" or "right" hands. In the *second round* (*Lie 1*), the confederate changed the strategy and chose the same hand as <u>indicated by the child</u>, participants required them to switch between deceptive strategies and now provide the false location of the coin to gain points. The *third round* (*Truth 2*) was identical to the first one. Because our study included a wide age range of children, we extended the task by adding more rounds to increase the complexity of the task for older children. In the *fourth round* (*Random*), the confederate chose in a <u>predetermined random order</u> (i.e., the order was the same for every participant), irrespective of what they indicated as the location of the coin. The first four rounds were identical for all participants. However, the order of the last two rounds differed depending on the deceptive strategy children had to employ after the random round. More specifically, for Group 1 ($n = 51$; M_{age} in months = 118.07; SD = 9.68; 23 females) in the *fifth round* (*Truth 3.1*) of the task, children

needed to tell the truth to deceive the recipient (the confederate chose <u>the opposite hand again</u>). In contrast, in the *sixth round (Lie 2.1)*, they needed to lie about the location of the coin in order to win points (the confederate chose <u>the same hand</u> as the one indicated by the child). With regard to Group 2, ($n = 50$; M_{age} in months = 119.82; $SD = 9.56$; 26 girls), after the random round of the task (the *fourth round*), the order was reversed compared to Group 1's fifth and sixth rounds. More specifically, participants first had to use lie-telling to deceive successfully (*Lie 2.2*), whereas, in the final round, they had to tell the truth to mislead the opponent (*Truth 3.2*; see Figure 1)

Figure 1

The Experimental Procedure for the Elementary Second-Order Lying Behavior for the Two Groups (Group1 – Truth after Random round; Group 2- Lie after Random round) with a Maximum of 7 Trials in Each Round
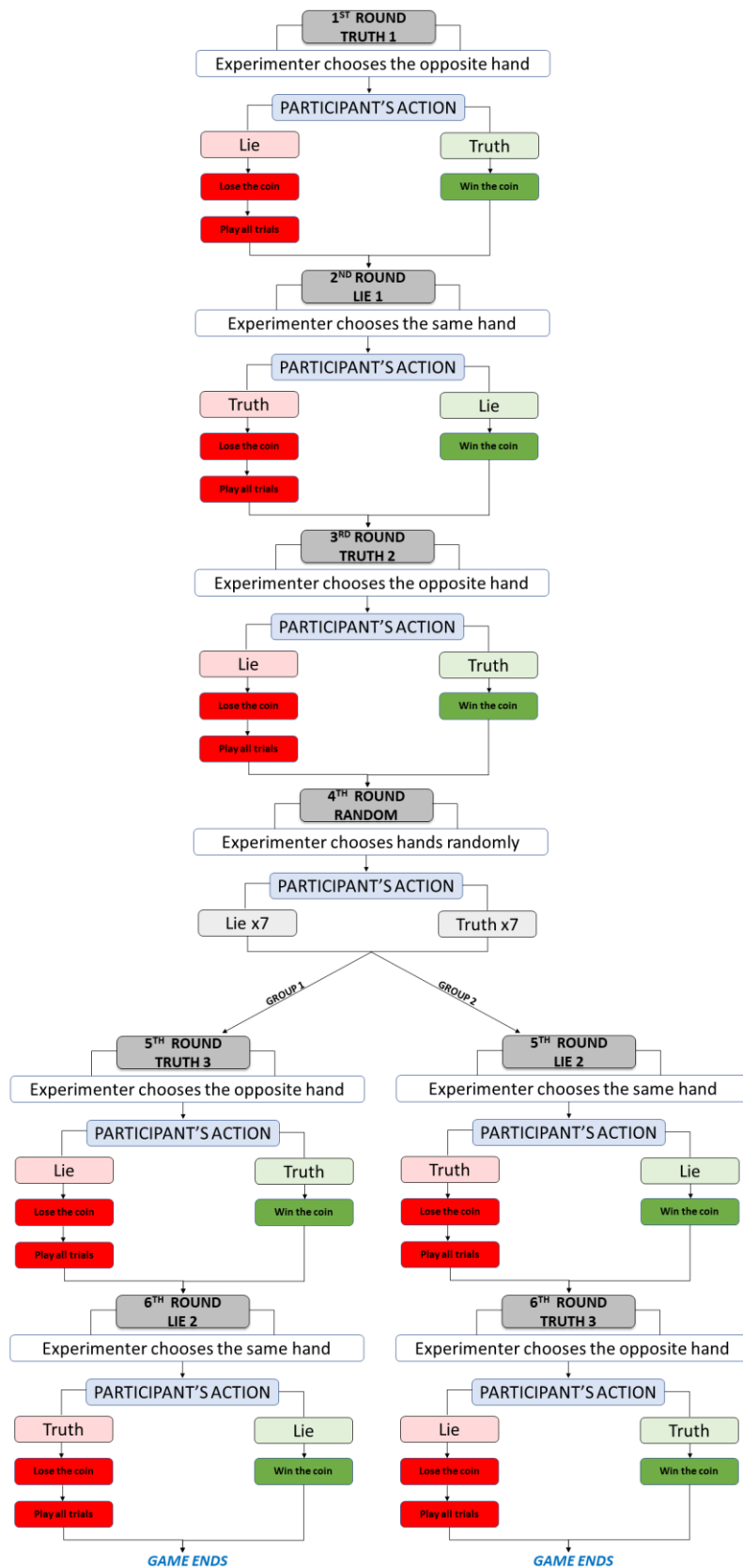
Two vignettes adapted from White et al. (2009) were used to evaluate children's ***first- and second-order ignorance attributions.*** Their ***inhibitory control and shifting ability*** was assessed using the The Inhibition and Shifting task from NEPSY II (Developmental Neuropsychological Assessment II; Korkman et al., 2007), whereas children's ***verbal working memory*** was tested through the Backward Digit Span task (Wechsler, 2003).

3.2.2. Results and Conclusions

Approximately 71% of children (72 of 101) told elementary second-order lies, based on the cut-off point of 4 successful trials. A preliminary analysis revealed no significant differences between the two experimental groups in overall second-order lying accuracy or other socio-cognitive measurements. Therefore, all subsequent analyses treated them as a single group.

As predicted, second-order ignorance attribution ($\beta = 0.33$, Wald = 27.57, $p = .000$, OR = 41.57), and verbal working memory ($\beta = 0.74$, Wald = 10.03, $p = .002$, OR = 3.72) positively predicted children's decision to use second-order lies, whereas age was a negative predictor. This was in line with previous literature demonstrating that the ability to infer others' ignorance on whether they are lying is positively related to preschoolers' second-order deception (Sai, Ding et al., 2018). Addressing its structural features and the factors that may modulate it, we also demonstrated the possibility of ***habituation***, showing children's higher accuracy when telling lies to deceive ($M = 70.59$; the more frequent type of response elicited) compared to their performance when using lies to deceive ($M = 51.88$). This is a valuable contribution because it is the ***first attempt to investigate the habituation effect in children's second-order deception specifically and in child deception more generally***. It also has major implications for how we define truth-telling vs. lie-telling and the extent to which we possess a universal cognitive default response set.

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Study 3: Socio-cognitive correlates of primary school children's deceptive behavior toward peers in competitive settings

In **Study 3[3]**, we changed the motivational context of children's deception by experimentally investigating children's willingness to deceive familiar and unfamiliar peers in a highly competitive computerized game. Previous research documents indirect evidence on children's propensity to deceive their peers, adolescents reporting lower levels of deception towards their friends (Dykstra et al., 2020) or negative evaluation of lie-telling to their peers (Perkins & Turies, 2007). Nevertheless, to the best of our knowledge, no experimental evidence was provided thus far. Based on this evidence, we expected children to lie more the unfamiliar opponent than the familiar one, and that their ability to employ sophisticated strategies to deceive would be positively related to their ToM and EFs.

3.3.1. Method

Seventy-five 6- to 8-year-old participants were included in this study ($M_{age} = 90.67$ months, $SD = 6.63$; age range between 80.21 and 107.60 months; 34 boys and 41 girls).

We developed a *new hide-and-seek paradigm assessing children's strategic peer deception for personal gain* as a function of stimuli type (liked vs. disliked), peer opponents' familiarity (familiar vs. unfamiliar peers), and actions (following vs. not following children's indication about the objects' location). This was a new hide-and-seek computerized game we developed to elicit and assess various misleading strategies simultaneously. The game encompassed 1 practice round and 4 experimental rounds played with two different opponent dyads.

In the *game's preparatory stage*, participants were asked to name a friend or classmate with whom they got along very well. After that, they were presented with 15 cartoon characters on the computer screen. Children were first asked to choose 5 of the 15 characters they liked the most by clicking on them using a mouse. Next, they were asked to choose another 5 of the 10 remaining characters that they did not like. Next, children were introduced to a *practice round* played with two default players (the same for all participants) of unknown familiarity and during which participants received feedback on their performance across 5 trials. Participants were told the game would involve several cards depicting their previously chosen, liked, and disliked cartoon characters and two opponents interested in keeping the cards for themselves. First, children clicked on a cards deck to reveal a card depicting a specific character (liked or disliked) from a pack in the center of the screen. Next, they clicked on one of two boxes (purple or blue) to place that card in them. After they put the card in one of the boxes, one of two unknown opponents asked them: "*Where is the card?"* (see Figure 1) and they had to indicate one of the boxes by pressing the purple key (for indicating the purple box) or the blue key (for indicating the blue box).

Figure 3.3.1.

The Cartoon Heroes Cards Game Setting in the Practice Round
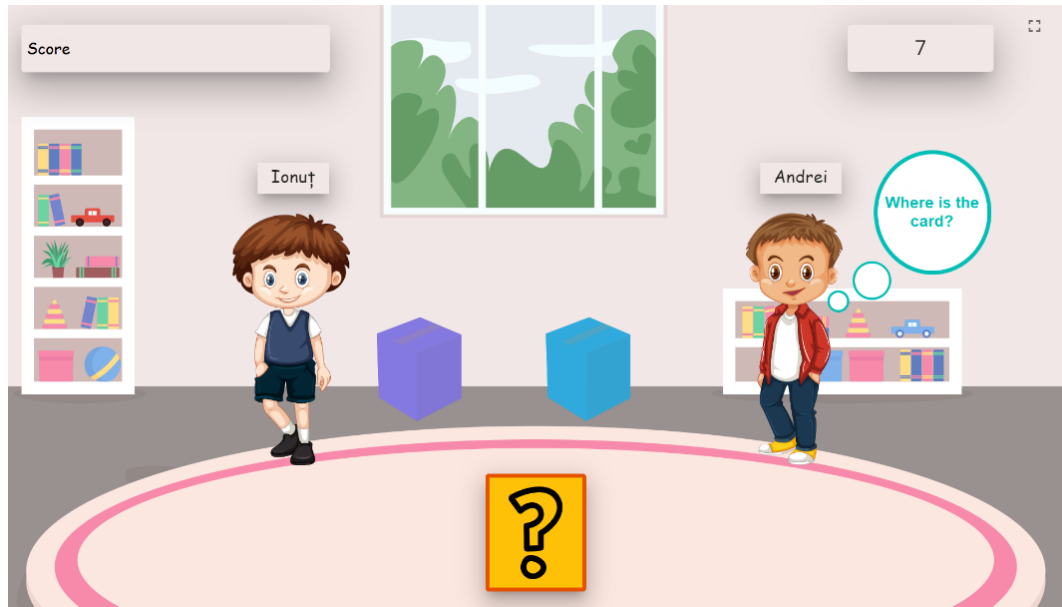
Points were won if children kept the cards picturing their favorite characters but gave the opponents the cards with the disliked cartoon characters. Lastly, participants were told that if they won at least 5 points in each round, they would receive physical stickers picturing their favorite cartoon characters. They received one of the stickers at the end of the practice round in order to motivate them and the others (with a maximum of 4 additional stickers to be gained) at the end of the game, depending on their performance.

Rounds 1 and 3 of the game were played against a dyad on opponents consisting from children's best friend/best classmate who always followed their indications about the cards' location, and another unfamiliar opponent, a child from another school who did not follow participants indications about the cards' location during the game. For the familiar opponent, participants were prompted to choose the avatar that resembled the most their friend/best classmate, whereas for the unfamiliar opponent they were asked to choose it randomly.

Rounds 2 and 4 of the game were played against another dyad of opponents but which consisted of two unfamiliar children from other schools. The participants chose an avatar for each opponent and gave them random names. Again, the unfamiliar opponent from **the left side** of the screen always checked the *box indicated by the child*. Consequently, if the participant drew a card picturing a *liked* character, they had to indicate the *false location* of the card to mislead the opponent and keep the card. However, if the participant drew a card picturing a *disliked* cartoon character, they had to indicate the *actual location* of the card to avoid keeping it and losing the point. The unfamiliar opponent from **the right side** of the screen always checked the *opposite box* to the one indicated by the child, so if the participant drew a card with a *liked* cartoon character, they had to indicate the *true location* of the card to mislead the opponent. If the participant drew a card with a *disliked* character, they had to point to the *false location* to avoid keeping it and losing the point. Based on the points accumulated, participants had a score for each type of action employed during the game, depending on the combination of the card's type (liked vs. disliked) and opponents' actions (same vs. opposite): *LikedSame, DislikedSame, LikedOpposite, DislikedOpposite*

The newly developed competitive game represents a playful, ecological method for assessing **children's propensity to mislead peers**. It resembles the rule-structured games they play at that age and involves salient stimuli (stickers with various cartoon characters adapted for their age). More so, it allows for **assessing multiple forms of behavioral deception** (from simple to more sophisticated strategies, like telling the truth to deceive) while **simulating social interactions in which children may have to tell lies in the presence of multiple peers** (e.g., other friends).

First- and second-order theory of mind were assessed using the Sally and Anne task (for ToM I; Baron-Cohen et al., 1985) and the "John thinks that Mary thinks that…" paradigm (for

ToM II; Perner & Wimmer, 1985). The Corsi block-tapping task (Corsi, 1973) was used to assess children's *visuospatial working memory*. Lastly, The Inhibition and Shifting task from NEPSY II (Developmental Neuropsychological Assessment II; Korkman et al., 2007) was used to assess children's ability to *inhibit and flexibly switch* between responses.

3.3.2. Results and Conclusions

Our findings suggested that children adopted specific strategies in order to mislead the opponents (see Figure 2). Also, they were more likely to deceive the unfamiliar opponent ($M = 0.784$, $SD = 0.247$) compared to the familiar one ($M = 0.675$, $SD = 0.245$) in the *Liked-Same-F* trials there they had to keep the liked character and when the opponent followed their indications, so they offered false information to deceive. This provides preliminary evidence on children's social preferences from early school years and the importance of honesty in friendships. More so, their ability to employ more *complex deceptive strategies* (e.g., telling truths and/or lies to mislead the opponents who were aware of their deceptive intentions) was *significantly related to their higher-order ToM* (second-order false belief understanding) and *EFs* (inhibitory control, cognitive flexibility, and visuospatial working memory). This complements and extends previous literature on the nuanced associations between children's socio-cognitive development and the complexity of their deceptive plots for self-serving purposes in middle childhood.

Figure 2.

The Participants' Frequencies in Pointing to the Cards' Location Depending on the Interaction

Between the Cards' Type and Opponents' Action
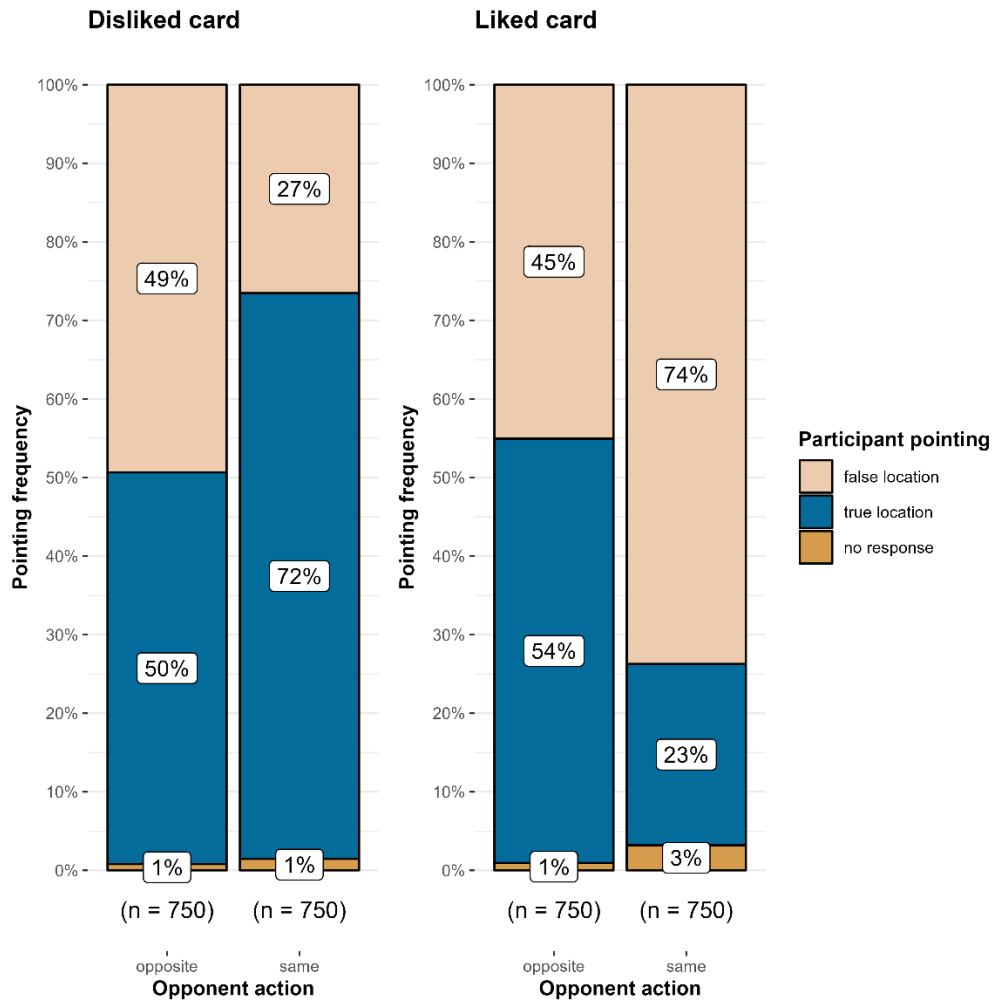
Study 4: Interpretive diversity understanding, parental practices, and contextual factors involved in primary school-age children's cheating and lying behavior

Lastly, in **Study 4**[4], we aimed to investigate the socio-cognitive and contextual factors associated with children's ***advanced verbal self-oriented deception*** in competitive contexts (trivia games). For the first time in the literature, we investigated children's interpretive diversity understanding (higher-order ToM development) in relation to children's deception. Interpretive diversity understanding represents the ability to understand the constructive nature of the human mind and that the same stimuli can have different interpretations based on people's beliefs and past experiences (Lalonde & Chandler, 2002; Weimer et al., 2017). As for the contextual correlates, we assessed parental practices, peer relationships, socio-economic status, and bilingual education. All these socio-environmental factors have been proved to be significantly associated with children's socio-cognitive and emotional development, which could al impact their dishonesty (Talwar & Crossman, 2022; Visu-Petra et al., 2022).

3.4.1. Method

We received informed parental consent for a sample of 196 children, ages 9- to 11-years old (Mage = 124.18 months, SD = 7.25; 106 girls). In all, 113 were enrolled in monolingual schools from Northeast Romania, whereas the other 83 children attended a bilingual German- Romanian school program where they spoke German.

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[4] The content of this sub-chapter represents the manuscript: Interpretive diversity understanding, parental practices, and contextual factors involved in primary school-age children's cheating and lying behavior, published by Prodan, N., Moldovan, M., Cacuci, S. A., & Visu-Petra, L., in the year (2022), in the journal: *Journal of Investigation in Health, Psychology and Education*, *12*(11), https://doi.org/10.3390/ejihpe12110114

We devised a more ***complex version of the temptation to resistance paradigm (TRP)*** in order to advance our understanding of 9-to-11-year-olds' ability to tell complex lies. The Preference Task, a modified version of the Trivia Game (Talwar & Lee, 2008), was developed to elicit children's cheating, lie-telling behaviors, and semantic leakage control while requiring different IDU levels (low versus high). The game contained five trivia questions and was presented in an E-Prime slide show. Children were told that for some of the questions, they would be asked to come up with plausible explanations for the given answer to win the game and obtain a desirable prize.

The game started with two "control" questions meant to accommodate children with the game's rules. These were considered control questions due to their low level of complexity, simply asking children for easy answers known as common knowledge (e.g., the capital of their country). To elicit cheating and lying, two of the questions were made up, so they were considered impossible to respond to without peeking at the correct answer because there was not a real correct answer to them (Q3 and Q5; e.g., Q3: Who discovered Tunisia? a. Alexander the Great, b. Vasco da Gama, c. Profidius Aikman). For these two questions, before the child answered each question, the experimenter excused themselves and left the room for 3 min, saying that they must take an important phone call, thus creating the opportunity for the child to cheat. If the child peeked by moving on to the slide in the experimenter's absence, they would find an impossible-to-know answer on the slide. Upon return, the confederate asked the child if they peeked at the correct answer, and then the child was invited to give their answer to the respective question (i.e., to Q3 or Q5) (Talwar & Lee, 2008).

Subsequently, we had one deceptive question with low IDU level requirements (Q3) and another one eliciting high IDU levels (Q5). For Q5, if the child transgressed by moving on to the

next slide in the experimenter's absence, they would find an impossible-to-know answer on the slide along with the justifications for the children's and their parents' answer (e.g., The correct answer is: b. Folktronica; Explanations: Children: Folktronica is the most fascinating because it is easy to dance to; Parents: Folktronica is the most fascinating one because it combines multiple genres). Those who transgressed and denied their action had to generate different plausible justifications from those found in the following slide to be credible and win the game. After giving their answers, participants were shown the last slide containing the correct answer and the justifications given by children and parents (see Figure 1 for a summary of the task).

Figure 1

The Preference Task Questions and Their Requirements to Know the Correct Answer to Each of Them

No.	Trivia question	Cheating	Lying	Semantic leakage control	IDU
Q1 – control question	Which of the following is the capital city of Romania? a. Bacau b. Timisoara **c. Bucharest**				
Q2 – control question	A group of children and their parents were asked by researchers which of the following animals was the most intelligent? a. Cockroach **b. Monkey** c. Goose				
Q3 – deceptive question	Who discovered Tunisia? a. Vasco da Gama b. Edward Bipley **c. Profidius Aikman**	✖	✖		
Q4 – control question with IDU	A group of children and their parents were asked by researchers which of the following animals was the loveliest to have? a. Koala **b. Dog** c. Duck Explanations for children? Explanations for parents?				✖
Q5 – deceptive question with IDU	A group of children and their parents were asked by researchers about what kind of music do they think is the most fascinating? a. Agrotech **b. Folktronica** c. Neurofunk Explanations for children? Explanations for parents?	✖	✖	✖	✖

This new paradigm allowed us to ***capture children's variability in cheating, lie-telling, and semantic leakage control***, adhering to a more ***fine-grained perspective on dishonest profiles***. This aligns with the recent individual-level analysis of dishonesty coming from adult samples (Muñoz Garcia et al., 2023; Pascual-Ezama et al., 2020). Across the two occasions, children had to decide whether to peek at the correct answers of the "impossible" questions and if to lie or not about doing so. If they decided to lie, we also assessed the extent to which they were able to maintain the lies through subsequent explanations.

Interpretive Diversity Understanding (IDU) was independently assessed as well using the Droodle Task (Lalonde & Chandler, 2002), which taps into children's ability to understand that people exposed to the same stimuli can construct diverse interpretations due to their previous beliefs, attitudes, and knowledge (ToMi) (Carpendale & Chandler, 1996; Pillow & Mash, 1998) and the Constructivist Theory of Mind Interview (Weimer et al., 2017), which was meant to assess children's capacity to reason about how a person is making sense of a situation depending on the mental processes involved and how children understand the inner workings of some cognitive processes such as Inference, Memory, Comparison, Comprehension or Planning (ToMc).

Children's perception of their parents' behaviors was assessed using the Romanian version of EMBU – A (Paloș & Drobot, 2010), an adaptation of the EMBU (Perris et al., 1980), whereas ***bilingual education*** was considered based on children's school programs. Lastly, to register children's ***socioeconomic status*** two proxies were used: the household income and parental highest level of education achieved.

3.4.2. Results and Conclusions

Results showed that out of 196 participants, 80 (40.8%) peeked at least once at the "impossible" answers of the game. Among children who peeked at least once, 85% of them lied

about doing so. Lastly, within the sample of children who denied their transgressions (n = 68), more than half of them (58%) proved semantic leakage control at least once.

Our results offered, for the first time in the literature, empirical support for theoretical accounts arguing the involvement of *interpretive diversity understanding* (IDU) in children's sophisticated deception (Moldovan et al., 2020; Walczyk & Fargerson, 2019). We showed that different components of IDU, such as children's understanding upon the cognitive processes of memory, comprehension, comparison or planning significantly predicted children's decision to cheat (positive relation with ToMc Comparison score) and lie (positive relation with ToMc Memory score and native relation with ToMc Comprehension score), as well as their ability to maintain their lies (positive relation with ToMc Planning score). This provides ***empirical support for the developmental model of children's deception proposed by Walczyk and Fargerson (2019) – ADCAT***, positing that higher-order ToM may allow children to anticipate the contexts in which deception is profitable and the elaborate plausible lies.

We also found that some components of IDU (the ToMc Comprehension score) mediate the relation between bilingual education and children's lie-telling (*b* = .562, CI 95% [0.018; 1.550]), ***bridging the disparate literature on the relation between ToM and bilingualism on the one hand*** (Goetz, 2003), ***and the research on bilingualism and deception on the other hand*** (Suchotzki & Gamer, 2018). Lastly, children's propensity to cheat and lie was positively associated with parental practices (e.g., *parental rejection*) and socioeconomic status proxies (e.g., *income - b* = 0.25, Wald = 12.54, *p* = .001, OR = 2.64 *and maternal education - b* = 0.34, Wald = 5.08, *p* = .023, OR = 5.11), thus ***contributing to our understanding of how certain proximal (social agents) and distal contextual factors (financial welfare or education) are associated with children's self-benefitting deceptive behavior in middle childhood***.

THEORETICAL AND METHODOLOGICAL CONTRIBUTIONS

The overarching aim of the current thesis was to investigate the interrelations between individual and contextual factors and school-age children's self-serving dishonest behavior across different competitive settings. To this end, ***we addressed distinct types of dishonest behavior*** in ***longitudinal*** and ***cross-sectional designs*** focusing on children's strategic deception to conceal relevant information or mislead others for personal gains. Building on previous and current findings, we proposed a ***new theoretical framework*** for the relatively understudied forms of children's deception (e.g., second-order deception) and shed some light on their socio-cognitive correlates. Throughout the current investigations, we focused on ***individual*** (baseline cognitive processes, theory of mind, executive functions, and internalizing symptoms) and ***socio-environmental factors*** (parental practices, peer relationships, socioeconomic status, and bilingual education) predicting children's self-serving dishonesty in middle childhood. Based on these intricacies and previous theoretical accounts, we advanced a ***new integrative model of children's self-serving dishonesty in middle childhood*** that bridges together a part of the individual and contextual factors associated with their propensity and proficiency to be dishonest.

To achieve the underlying theoretical goal of the current thesis, we developed ***new experimental testing paradigms*** in order to ***ecologically access children's different levels of dishonesty in various motivational settings*** (e.g., misleading an adult or familiar/unfamiliar peers for personal gain). Lastly, the practical standpoint of the thesis was set out to advance the understanding of children's ability to withhold evidence by ***keeping a secret*** and ***validate a memory-based paradigm*** meant to discriminate between knowledgeable and unknowledgeable children.

4.1. Theoretical Contributions

Study	Aim	Main theoretical contributions
Study 1	Longitudinally test children's secret-keeping in the RT-CIT and the socio-cognitive factors involved	- Validate the ***Orienting Response theory in school-age children*** by demonstrating the differential orienting response toward familiar stimuli in knowledgeable children
Study 2	Assess children's elementary second-order deception and its socio-cognitive correlates	- Nuanced perspective on ***second-order deception***, distinguishing between ***elementary vs. second-order deception*** - Contribute to understanding the importance of ***theory of mind and intent for deceptive behavior*** and how this could assist children's moral development. - Advance the understanding of ***EFs' involvement in second-order deception*** and how they overlap in middle childhood.
Study 3	Investigate children's deception toward peers and their socio-cognitive skills	- Provided preliminary evidence on children's ***social peer preferences*** from early school-age years and their increasing ***understanding of the importance of honesty*** in peer relationships - Advance the understanding of how ***higher-order socio-cognitive skills assist children's sophisticated deceptive strategies***
Study 4	Test the association between advanced ToM, contextual factors, and children's advanced verbal deception	- Contribute to the ***theoretical underpinnings of children's advanced verbal deception and ToM*** by demonstrating how understanding different mental processes is associated with children's cheating, lie-telling, and semantic leakage control. - Provide support for our ***new integrative model*** on the individual and contextual factors of ***children's self-serving dishonesty in middle childhood (overall theoretical contribution of the current thesis).***

4.2. Empirical Contributions

Study	Type of dishonest behavior	Testing paradigm	Individual and/or contextual factors	Age range	Main conclusions
Study 1	Secrecy	RT-CIT	Baseline processes, ToM, EFs, internalizing symptoms	8-11 (T1) and 9-12 years (T2) (N = 194)	- The presence of the CIT effect in knowledgeable children - Processing speed negatively associated with response latency
Study 2	Elementary second-order deception	Hide-and-seek	First- and second-order ignorance, EFs	8-10 years (N = 101)	- Second-order ignorance and working memory positively predicted children's elementary second-order deception - The presence of a habituation effect in children's truth-telling to deceive
Study 3	First- and second-order deception	Hide-and-seek	ToM, EFs, and peer relationships	6-8 years (N = 75)	- Children's willingness to deceive unfamiliar peers more than familiar ones - Children's truth-telling to deceive is significantly associated with second-order ToM and EFs
Study 4	Advanced verbal first-order deception	Resistance to temptation	Interpretive diversity understanding, parental practices, socioeconomic status, and bilingual education	9-11 years (N = 196)	- Cheating, lying, and semantic leakage control predicted by different mental processes understanding (IDU) - Some components of IDU mediated the relation between bilingual education and lie-telling - Parental rejection and socioeconomic status proxies significantly predicted children's cheating and lie-telling propensity

LIMITATIONS, IMPLICATIONS, AND CONCLUSIONS

Despite its essential contributions to the literature, the current thesis presents some limitations that need to be acknowledged. First, a ***methodological*** cautionary note must be mentioned, given that we adapted or developed new testing paradigms to assess children's dishonesty in all the studies of the current thesis. Even though the new tasks improved the ecological validity of assessing children's dishonest behavior, we acknowledge that we did not address their ***convergent validity***. Future research should tap into this aspect by using the new tasks along with other, more established, measurements of the same constructs to replicate our findings. Second, we used relatively ***limited age ranges*** (Study 3 and 4), which led to little variation in children's socio-cognitive development. Therefore, it was less likely to capture the age-related changes in children's deceptive behavior and their socio-cognitive skills. However, we chose these age groups based on our specific focus on middle childhood in order to capture the interrelations between children's dishonesty, individual, and contextual factors in this important developmental window. More longitudinal studies are needed in order to allow for causal inferences of the relations we obtained between individual and contextual factors and children's self-serving dishonesty in middle childhood.

We proposed an integrative model of children's self-serving dishonesty that unifies some of the most relevant individual and contextual factors associated. Nevertheless, we acknowledge that we did not empirically test all its components (e.g., advanced second-order deception). At this stage, we provided a theoretical distinction between elementary and advanced second-order deception that has to be empirically validated by future research. Furthermore, we recognize the importance of other predictors for children's dishonesty in middle childhood that we did not test, as well as other important dishonest outcomes that need further investigation. With regard to

predictors, previous research stressed the importance of ***culture*** as one of the most influential contextual factors for children's internalization of honesty and the propensity of their lie-telling behavior (Lee & Imuta, 2021; Tong et al., 2023), emphasizing the need for more cross-cultural studies. Other individual predictors, such as ***intelligence or self-awareness*** (Ding et al., 2019; Talwar & Crossman, 2011), are also relevant for children's dishonesty and need further investigation. In terms of potential outcomes, it would be theoretically and methodologically important to address children's self-serving dishonesty in other social settings, such as ***telling a lie for reputational gains***. Lastly, since children's dishonesty is more socially oriented with increasing age, investigating their propensity and proficiency to deceive for ***prosocial*** reasons in conjunction with essential individual and contextual factors may also be very important for understanding their increasing ability to navigate the social environment adaptively. Other common limitation of dishonesty research that applies to the current thesis is the ***ethical difficulties*** raised by assessing school-age children's dishonesty (Fisher, 2005). Because we addressed this socially controversial behavior, providing participants with full debriefings regarding the studies' objectives and methodology was more challenging. We could not specifically explain every aspect because we wanted to preserve our data's scientific validity. This is known in the literature as the *methodological paradox* of studying dishonesty in child samples (Fisher, 2005).

Despite its limitations, the current thesis' results have significant implications for understanding children's dishonesty in middle childhood and the individual and contextual forces shaping it, informing practice in several areas. Notably, the fact that we provided the first empirical validation for the re-administration of RT-CIT across two time points can inform practitioners working with children in legal contexts about the possibility of using this tool to assess children's

knowledge in specific settings (Study 1), with broader implications for the ***investigative interviewing of vulnerable witnesses*** (children).

Emphasizing the importance of ***intent*** instead of the truth value of individuals' statements when judging deception holds important implications for ***children's moral reasoning and behavior***. We pinpoint the importance of understanding and evaluating others' intentions when making inferences about their behavior (e.g., told with deceptive intent, the truth can become manipulative). Training children's ***understanding of intention*** and its impact on others' behaviors can assist their ***moral development and epistemic vigilance*** (Ding et al., 2022) and inform educators how to facilitate it.

We also addressed socio-environmental factors' importance, demonstrating that caregivers and peers may influence children's propensity and proficiency to act dishonestly. This could ***inform educators and parents about their role in shaping children's path to honesty and morality*** since a growing body of research has demonstrated that parental practices modulate children's dishonesty (Eguaras et al., 2020; Talwar & Crossman, 2022). Moreover, for the first time in the literature, we experimentally showed children's lower propensity to deceive a familiar peer than an unfamiliar one. Even though this is just preliminary evidence that needs replication, our findings emphasize ***the importance of peer relationships*** from early school years. This could enrich honesty-promoting strategies by assisting children in building strong and positive peer relationships that may, in turn, discourage their reliance on dishonesty for self-serving goals.

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