

BUSENUR BAŐARAN

EPISTEMIC OR INTERPERSONAL? CHILDREN'S SELECTIVE TRUST IN OTHERS

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EPISTEMIC OR INTERPERSONAL?
CHILDREN'S SELECTIVE TRUST IN OTHERS

A Master's Thesis

by
BUSENUR BAŐARAN

Department of Psychology
İhsan Dođramacı Bilkent University
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Duru, this thesis is dedicated to you. Thank you for bringing joy to my life.

EPISTEMIC OR INTERPERSONAL?
CHILDREN'S SELECTIVE TRUST DECISIONS IN OTHERS

The Graduate School of Economics and Social Sciences
of
İhsan Doğramacı Bilkent University

by

BUSENUR BAŞARAN

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By Busenur Başaran

I certify that I have read this thesis and have found that it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Arts in Psychology.

.....
Jedediah W. P. Allen
Advisor

I certify that I have read this thesis and have found that it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Arts in Psychology.

.....
Hande Ilgaz
Examining Committee Member

I certify that I have read this thesis and have found that it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Arts in Psychology.

.....
F. Cansu Pala
Examining Committee Member

Approval of the Graduate School of Economics and Social Sciences

.....
Refet Soykan Gürkaynak
Director

ABSTRACT

EPISTEMIC OR INTERPERSONAL? CHILDREN'S SELECTIVE TRUST DECISIONS IN OTHERS

Başaran, Busenur

MA., Department of Psychology

Advisor: Asst. Prof. Jedediah W.P. Allen

March, 2023

Much of children's learning about the world, particularly early in life, depends on what others say to them. Despite the clear benefits of learning from others, people sometimes may offer inaccurate information either due to the lack of competence or the motivation to deceive. Fortunately, an amassing body of research shows that children are not completely credulous in their learning decisions. Instead, children are selective in whom they prefer to learn from (e.g., preferring accurate over inaccurate or nice over mean informants). Although there is ample evidence that children engage in selective learning strategies that enable them to distinguish reliable sources from unreliable ones, the cognitive basis for this selectivity is still a puzzle. The mechanisms behind selective trust are primarily couched in terms of accepting testimony as inductive evidence and children's trust as a rational inference

from the evidence. However, there are relevant interpersonal considerations that affect whom children prefer to learn from as well as whom they choose to play with. For example, children may sometimes attribute more knowledge to one informant but still choose to share, play, or affiliate with the other. The current study, therefore, was designed to investigate whether particular conditions (e.g., an informant who is smart but mean) affect children's trust preferences differently depending on the task. In the familiarization trials, 5- to 7-year-olds ($N = 134$) were shown a pair of competent informants but in different domains (i.e., nice but inaccurate vs. mean but inaccurate informant). In the test trials, children were asked to choose between the informants for two tasks that either demanded epistemic or interpersonal considerations. The results suggest that 7-year-olds' decisions to learn from and practical decisions to share with an informant changed as a function of an informant's characteristics relevant to the given tasks. However, 5-year-olds' epistemic trust was weakened by interpersonal faults (i.e., whether the agent was nice or mean). This indicates that interpersonal violations of trust may constitute a more serious type of agent failure that is prone to be generalized by children across different domains.

Keywords: selective trust, benevolence, competence, alternative interpretation

ÖZET

EPİSTEMİK Mİ KİŞİLER ARASI MI? ÇOCUKLARIN BAŞKALARINA SEÇİCİ GÜVEN KARARLARI

Başaran, Busenur

Yüksek Lisans. Psikoloji Bölümü

Tez Danışmanı: Dr. Öğretim Üyesi Jedediah W.P. Allen

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Çocukların dünya hakkında öğrenmelerinin çoğu, özellikle erken yaşlarda, başkalarının onlara ne söylediğine bağlıdır. Başkalarından öğrenmenin bariz faydalarına rağmen, insanlar bazen yetersiz bilgi ya da aldatma motivasyonu nedeniyle yanlış bilgiler sunabilir. Neyse ki çok sayıda araştırma, çocukların öğrenme kararlarında tamamen kandırılabilir olmadıklarını gösteriyor. Bunun yerine, çocuklar kimden öğrenmeyi tercih edecekleri konusunda seçicidirler (örneğin, yanlış bilgi kaynağını doğru bilgi kaynağına veya iyi bilgi kaynağını kaba bilgi kaynağına tercih etmek). Çocukların güvenilir kaynakları güvenilmez olanlardan ayırt etmelerini sağlayan seçici öğrenme stratejileri kullandıklarını gösteren çok sayıda kanıt olmasına rağmen, bu seçiciliğin yansıttığı bilişsel temel hala bir bilimcedir. Seçiciliğin ardındaki mekanizmalar, başlıca başkalarının sunduğu bilgiyi kanıt olarak

kabul etme ve çocukların seçici güveninin bu kanıttan rasyonel çıkarım yapabilmeleri olarak yorumlanmıştır. Ancak, çocukların kimden öğrenmeyi tercih ettikleri kadar kiminle oyun oynamayı seçtiklerini etkilemeye kadar birçok seçiminde kişiler arası etmenler de vardır. Örneğin, çocuklar bazen birine daha fazla bilgi atfedebilir ama yine de diğeriyle paylaşmayı, oynamayı veya sosyal ilişki kurmaya seçebilir. Bu nedenle, mevcut çalışma belirli koşulların (bilgili ama kötü bir modelin) çocukların güven tercihlerini onlardan istenen göreve bağlı olarak farklı şekilde etkileyip etkilemediğini araştırmak için tasarlanmıştır. Alıştırma denemelerinde, 5 ve 7 yaş arasındaki çocuklara farklı alanlarda yetkin (biri bilgili ama kötü niyetli ve diğeri bilgisiz ama iyi niyetli) iki tane model gösterildi. Test denemelerinde, çocuklardan epistemik ve kişilerarası değerlendirme gerektiren iki farklı görev için modeller arasında seçim yapmaları istendi. Sonuçlar, 7 yaşındaki çocukların bir modelden bilgi öğrenmeye yönelik kararlarının ve bir modelle kaynak paylaşmaya yönelik pratik kararlarının onlardan istenen görevin türüne göre değiştiğini göstermektedir. Bununla birlikte, 5 yaşındaki çocukların epistemik güveni, kişiler arası hatalardan (yani modelin iyi niyetli veya kötü niyetli olması) dolayı etkilenmiştir. Bu, kişiler arası güven ihlallerinin, çocuklar tarafından farklı alanlara genelleştirme eğiliminde olduğunu ve bu tür ihlallerin daha ciddi bir hata türü oluşturabileceğini gösterir.

Anahtar Kelimeler: seçici güven, yardımseverlik, yetkinlik, alternatif yorum

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CHAPTER I

INTRODUCTION

Children are often dependent on the testimony of others to learn about and participate in various social and cultural practices (Harris et al., 2018). Testimony enables children to have information about unobservable phenomena such as cultural rituals, scientific facts, and historical events that are either difficult or impossible to learn independently. Hence, testimony opens up knowledge beyond first-hand experiences, and such type of learning involves significant implications for understanding both how children evaluate claims as well as whom they decide to learn from. Recent meta-analyses that investigated children's testimonial learning indicated that children are not credulous learners. Instead, children are sensitive to various cues for whether an information source is likely to be reliable (Sobel & Finiasz, 2020; Tong et al., 2020). These meta-analyses also confirm that by the preschool years, children are able to monitor the potential sources of information on two broad dimensions: benevolence and competence. All else being equal, they prefer to accept information from agents who are perceived as more moral and knowledgeable.

Although there is agreement about children's selective learning during preschool, there is little consensus about the cognitive mechanisms underlying the development of such selectivity (Heyes, 2012; Hermes et al., 2018a; Poulin-Dubois & Brosseau-Liard, 2016). One general approach presupposes that children's selective learning decisions are an indicator of a rational process that takes into account evidence about the likelihood of an agent to provide truthful information (Sobel & Kushnir, 2013). However, this *evidential* view is committed to a conflation between two distinct but potentially related processes involved in learning from others (Koenig et al., 2021; Pesch et al., 2018). Once children endorse information from an agent, they do not only learn new information but also trust the agent to have offered accurate testimony. Hence, testimonial learning necessitates the consideration of both learning from other people and placing trust in them.

The current study aimed to investigate the nature of the relationship between epistemic trust (learning from others) and interpersonal trust (placing trust in others). Thus, this work has the potential to offer a new way to understand children's testimonial learning when presented with more complex agents as well as the relevance of being asked to evaluate informants for various decisions. Toward that end, children were confronted with two agents who differed on two dimensions: one agent was nice but less knowledgeable, and the other agent was mean but more knowledgeable. Thus, the interpersonal and epistemic characteristics of agents were pitted against each other. After giving information about these two agents, children were asked two types of test questions: an epistemic question that required children to monitor who was more knowledgeable about the location of hidden objects and an

interpersonal question that required children to monitor who was nicer for sharing limited resources. Hence, the current study aimed to tap into different types of appraisals in order to capture whether children's selectivity in epistemic judgments is also seen for more practical decisions that are in line with the demands of a social situation.

In Section 1.1., the historical background for selective trust research will be introduced, and the canonical trust paradigm will be explained so as to introduce how children's selectivity is often assessed. In Section 1.2., in order to present what type of results have emerged so far, a set of empirical studies will be given. The rationale behind presenting different empirical studies will be to show that children's selective learning decisions tend to differ based on the social situation that children find themselves in. In Section 1.3., various theoretical accounts for the cognitive basis of such selectivity in learning will be introduced. The theoretical accounts will be divided into three groups (i.e., rich, lean and middle ground accounts) according to their core assumptions to explain the cognitive mechanisms responsible for children's selective learning decisions. In Section 1.4., in order to offer a more comprehensive understanding of the empirical findings, an alternative framework to the interpretations of the previous theoretical accounts will be presented. It will be claimed that this alternative approach captures both dimensions of selective trust. In Section 1.5., the rationale behind the current study will be given so as to address the missing gaps that arise from the previous empirical studies.

1.1. Selective Trust

Testimony is one of the most important sources of information available to humans. The ability to learn from what others say enables humans to obtain information faster than if they were exclusively dependent on their own experience. Given the limited experience of young children in the world, they are particularly prone to learn from the testimony of those around them (Harris et al., 2018). While some information is derived from testimony because it is too difficult or impractical to learn on one's own (e.g., what the distance is between the sun and the earth); other information is impossible to learn individually because it is socially constituted (e.g., words as arbitrary conventions). Finally, some information is extremely dangerous to learn on one's own (e.g., which fruits are safe to eat).

Despite the benefits testimony provides to children, there is also a major challenge in that not every individual is a reliable source of information. Others sometimes convey inaccurate information when they might lack knowledge, make mistakes due to ignorance, or have deceptive intentions. Therefore, the risk of being misinformed raises a critical question: To what extent do young children differentiate between reliable and unreliable sources of information? A plethora of research investigating how children learn from others has demonstrated that even preschoolers, if not before, engage in critical strategies that help them differentiate between trustworthy testimony and misleading testimony and display a preference for reliable sources (Koenig & Sabbagh, 2013; Mills, 2013). The critical ability of children to choose one source over the other when they decide whom to learn from has been termed selective trust.

There is a canonical trust paradigm that is frequently adopted in research to assess the selective learning decisions of children. In the typical procedure, children are presented with two informants (e.g., adults on video or animated puppets) who offer conflicting names for common objects (Koenig et al., 2004). One informant demonstrates consistent accuracy in labeling the given objects, whereas the other informant shows consistent inaccuracy in labeling them. For instance, the former may correctly label a key *a key*, and the latter may incorrectly label a key *a car*. Children are then presented with a test phase in which they are invited to say which informant they would like to ask for the name of a novel object. Each informant then provides conflicting names for the same novel object, and children are asked to say what they think the name of the novel object is. Their choice is taken to endorse information from one of the informants.

The results of this research indicate that preschoolers are indeed able to distinguish an accurate source of information from an inaccurate one in circumstances where the cue for accuracy is straightforward. Specifically, 4-year-olds preferred to ask the previously accurate informant for the names of novel objects and endorsed the names provided by the accurate informant at a level above chance. In this original study, there was not a systemic preference from 3-year-olds for the accurate informant, but later research showed that once 3-year-olds were given more familiarization trials, they were also able to trust the accurate informant over the inaccurate above the chance level (Corriveau et al., 2009; Koenig & Jaswal, 2011; Pasquini et al., 2007). Although it is clear that young children are not entirely indiscriminate or credulous in their preference for sources of information, the cognitive basis for selective social

learning is still unclear. A focus on theoretical accounts to solve this issue will be presented later in this chapter. Before that discussion, different types of empirical studies will be presented so as to clarify some of the findings that will need to be incorporated into any theoretical explanation.

1.2. Empirical Overview

In order to demonstrate that children's selective learning decisions are relative to the type of situations they are confronted with, two different sets of studies on trust will be introduced. This will make clear why it is not theoretically straightforward to account for the cognitive process underlying selective trust. In the first set of studies, children were presented with two informants who were similar to each other in terms of competence yet in *different domains* of knowledge. For example, when children were introduced to two experts from different domains (a toy expert and a food expert), children preferred the toy expert to learn the names of novel toys, whereas they preferred the food expert to learn the names of novel foods (Lucas et al., 2013). In another study, children were presented with two knowledgeable informants on the different aspects of toys (Kushnir et al., 2013). While one informant was consistently accurate in labeling familiar toys but unable to fix broken toys, the other informant was consistently able to fix the broken toys but inaccurate in labeling familiar toys. Accordingly, children trusted the toy labeler to learn the names of novel toys, and they trusted the toy fixer to repair the toys. In a separate study in which children were introduced to two informants (an eagle expert and a bicycle expert) with different expertise, they similarly endorsed the claims of the relevant expert above chance (Landrum et al., 2013). These studies indicate that children can differentiate between

various epistemic cues and make their decisions accordingly. That is, children infer the competency of each informant from their past behavior and its relevance in their current choice of the informant relative to the task demands.

In the second set of trust studies, children were invited to choose between two informants who were different from each other in terms of competence yet in the very *same domain*. For instance, when children were presented with familiarization trials in which they witnessed one informant who was able to successfully lift an object, whereas the other informant failed to lift the given object, children anticipated that the stronger informant would also be smarter and nicer than the weak informant (Fusaro et al., 2011). In a separate study, children were introduced to two informants and monitored that one was consistently accurate while labeling ordinary objects and the other was consistently inaccurate while labeling the same objects (Brosseau-Liard & Birch, 2010). Children later predicted that the previously accurate informant would also be more prosocial than the inaccurate informant. In a final study, children were presented with three pairs of stories where two characters in each of the stories were given contrasting trait labels: nice versus mean, smart versus not smart, and honest versus dishonest (Lane et al., 2013). Children were then asked to evaluate the story characters on different dimensions (e.g., object labeling, box content, affiliation). It turned out that children preferred to ask nice, smart, and honest informants for novel object names and contents of a box as well as to be friends with them. These studies indicate that children prefer the competent informant not only for the tasks relevant to the specific domain of competence the informant performed but also for unrelated tasks or domains. That is, they form a halo-like profile of a

‘better’ agent in a global sense and endorse the positive agent for a broad range of future tasks beyond their specific competence.

It should be noted that children do not always display such a pattern of halo-like generalizations. Given that epistemic cues indicate the potential knowledge level of informants, they should be *primary* (i.e., possibly more relevant) for learning problems. Whereas interpersonal cues that indicate the social status or personality of informants should be *secondary* for learning problems. In fact, children do not necessarily draw halo-like inferences about informants once epistemic cues are made available. For example, when preschoolers were presented with two informants where one was a familiar teacher, and the other was an unfamiliar teacher, they all asked for and endorsed the information from the familiar teacher (Corriveau & Harris, 2009). However, once they saw that the familiar teacher was inaccurate in labeling everyday objects and the unfamiliar teacher was accurate, 4- and 5-year-olds switched their preference and selected the unfamiliar informant to learn the names of novel objects. Similarly, when children were introduced to two informants, of which one was a native speaker of English, and the other was an accented speaker, children initially displayed a selective trust in the native speaker to learn the names of novel objects (Corriveau et al., 2013). Yet, 4- and 5-year-olds modified their initial trust in the native informant once they learned the native speaker was inaccurate in labeling the common objects. This implies that when older preschoolers are confronted with conflicting epistemic and interpersonal cues in a learning situation, they are able to use the more relevant accuracy cue. That is, they consider which type of cues is more

relevant to the learning task, and thus they restrict their generalizations to the epistemic domain.

Besides the learning situations in which children place greater value on *primary* (epistemic) cues over *secondary* (interpersonal) cues, there is another factor that affects their halo-like pattern of preference, which is an inaccuracy avoidance (i.e., negativity) bias. For instance, when children learned that one informant was knowledgeable about dogs and the other was neutral (i.e., neither expert nor inexperienced), they chose the expert one to learn the names of novel dogs but did not show a preference for either of them to learn the names of novel artifacts (Koenig & Jaswal, 2011). However, when they were confronted with two informants, of which one was inexperienced about dogs and the other was neutral, all 3- and 4-year-olds trusted the neutral informant over the inexperienced for learning both novel dog names and artifacts. Likewise, in a different study, children were presented with a pair of accurate versus inaccurate informants, inaccurate versus neutral informants, or accurate versus neutral informants. The results showed that 3-year-olds were selective in their preference for the accurate and neutral informants presented with the inaccurate ones (Corriveau et al., 2009). However, they did not prefer the accurate informant presented with the neutral one above chance. This implies that children's avoidance of the inaccurate informant affected their preference for either accurate or neutral informant instead of specifically choosing them. Hence, halo-like generalizations may not always occur unless there is an informant who signals clear incompetence or malevolence in terms of past behavior.

On the whole, children's trust decisions are likely to differ as a function of the learning situation they are presented with. Namely, when children are confronted with a learning situation in which they are supposed to choose between two competent informants based on the domain of expertise, their answers seem to reflect sensitivity to the relevant cue. They ascribe the specific epistemic competence to each informant and make their decisions based on the relevance of their expertise to a given question (e.g., learning the names of novel bird names versus vehicle names). Thus, they do not show halo-like generalizations from one domain of expertise to irrelevant domains. However, when children are confronted with a learning situation in which they are supposed to choose between two informants differing in overall competence, whether it be epistemic (e.g., accurate versus inaccurate) or interpersonal (e.g., nice versus mean), the picture is less clear. While children are likely to show halo-like generalizations if one informant is globally more competent than the other and choose the competent informant for both learning and practical tasks, a developmental pattern emerges once children are presented with a situation in which two different types of cues are pitted against each other (e.g., nice-inaccurate labeler versus mean-accurate labeler). That is, older preschoolers around 4 years of age seem to weigh epistemic characteristics more than younger children when presented with a learning situation (Tong et al., 2020). They particularly choose the accurate informant over the inaccurate one rather than showing halo-like generalizations. This type of flexibility indicates that older children understand that who is reliable can be situational (i.e., task dependent). Nevertheless, this age difference does not account for the conflicting findings (i.e., being selective versus showing halo-like generalizations) by itself and only provides a description of the

task performances across the age groups. Therefore, the nature of the processes behind selective trust ought to be conceptually examined so as to explain how children's performance classified as selective is accomplished.

1.3. Theoretical Accounts

1.3.1. Rich Interpretation

Despite the empirical evidence that suggests children are selective from whom they learn, what such selectivity in learning builds on is unclear, and it currently receives broad interest. Given the mixed findings, there is considerable disagreement between theoretical accounts on the mechanisms underlying selective trust. There are two versions of a rich theoretical interpretation of selective trust development. Although they differ from each other with respect to the specific mechanisms they argue for, both interpretations assume a cognitively complex base for the development of selective trust. Both approaches also seem to require an innate foundational base upon which selective trust develops later. According to one of the rich interpretations, children possess precursor cognitive abilities that are domain-specific and higher-order, and such abilities enable children to show selective learning (Poulin-Dubois & Brosseau-Liard, 2016; Crivello et al., 2018; Crivello & Poulin-Dubois, 2019; Crivello et al., 2021; Kuzky et al., 2020). It is argued that the theory of mind (ToM), which is construed as the ability to acknowledge that others have different mental perspectives than that of one's own (i.e., desires, beliefs, intentions), explains being a selective learner. In particular, a source of information who repeatedly makes blatant errors in labeling common objects might prompt children to ascribe ignorance to the inaccurate informant while they attribute knowledge to the

accurate informant. Thus, children who recognize the variability in the knowledge level of informants and make subsequent inferences should be able to infer that the knowledgeable informant would provide reliable information in the future. Children may also draw specific trait inferences from the previous history of (in)accuracy. They may infer that the inaccurate informant intends to be deceptive because of the unconventional way of labeling objects and therefore is a poor source of information, which, in turn, should be avoided. Hence, this interpretation necessitates a cognitive foundation (i.e., ToM) that enables children to make relevant mental state inferences based on the past behavior of informants. As a result of this presumption, children's selective trust performance is only accounted for by cognitively rich conclusions.

The second version of the rich interpretation claims that selective learning from others is rooted in similar cognitive mechanisms (i.e., rational inference) that are also responsible for causal learning in general (Sobel & Kushnir, 2013). It is argued that the similarity between the two types of learning is not coincidental. Instead, both forms of learning necessitate being selective about observed evidence, irrespective of whether it be evidence for the reliability of testimony or evidence for causal relations. Therefore, the similarity in such everyday learning signals the presence of a shared psychological mechanism (i.e., rational inference from evidence). According to this account, in the absence of any information about the potential knowledge level of informants, children use their baseline knowledge (e.g., age, familiarity, accent) to make reliability judgments about different sources of information. Thus, their existing conceptual knowledge constitutes the base for how to evaluate informants. After they observe both informants in a learning environment in which

one is knowledgeable, and the other is ignorant, children now interpret the new evidence, revise their existing theories, and form novel beliefs about the informants as a function of the relative level of (in)accuracy. It is important to note that their inference is not solely based on the knowledge level of informants but also on children's general knowledge about kinds (e.g., specific domain of expertise such as food expert versus toy expert) and knowledge about psychological states (e.g., situational constraints such as a blindfold on the eyes). Hence, this view suggests that developmental differences in selective trust can be accounted for by developmental differences in conceptual knowledge of both the social and physical worlds.

Although this account does not presuppose a base as cognitively rich as the previous one, it still necessitates a starting state that makes the development of the background conceptual knowledge possible, which in turn enables children to be selective learners. However, it entails that selective trust that requires knowledge in the first place cannot function without any knowledge at all. As a result of this presumption, it also endorses cognitively rich conclusions about children's performance.

1.3.2. Lean Interpretation

Given that nonhuman animals that do not possess complex cognitive abilities also show selective learning, higher-order cognitive skills such as ToM do not seem to be necessary (Heyes, 2012, 2016a, 2016b, 2017). Rather, this approach suggests that selective learning relies on cognitive functions that are domain-general and lower-order (i.e., cognitively lean). The mechanism behind selective social learning is argued to be domain-general because the processes behind it operate likewise for both asocial and social sources of information. Different from the previous rich

accounts, this account can be characterized as lean because it does not require any specific cognitive skills; instead, associative processes enable simple behavioral strategies to development that account for selective learning. This account asserts that associative learning mechanisms that are mediated by learned predictiveness may explain children's selective trust performance. Learned predictiveness can be broadly construed as the accuracy of a stimulus to predict action-outcome relations. Specifically, learning of the relation between action and outcome relations arises more readily if a stimulus repeatedly results in the same outcome. As there is more attention directed to stimuli that elicit higher predictability relative to lower predictability, an attentional bias eventually occurs for the predictive stimuli. In turn, this attentional bias accelerates the rate by which the association is learned between different stimuli pairs. In the same vein, children pay less attention to and thus learn less from the inaccurate informant because the association between a given everyday object and the name is not predictive. That is, the inaccurate informant provides a name that does not accurately predict the given object. Children pay less attention to and thus learn less from the inaccurate informant as a result of lower predictiveness. Although the rich accounts indicate that selective learning is driven by deliberate efforts to apply rational learning strategies, the lean account here argues that children do not need to make inferences about an (in)accurate informant as knowledgeable or ignorant. Hence, this account does not speculate on how children perceive an inaccurate agent when the agent provides incorrect information. Instead, the lean account suggests that it is the non-predictiveness of the testimony rather than the unreliability of the inaccurate informant that matters.

1.3.3. Middle Ground Interpretation

A middle ground account proposes a dual-process explanation involving both simple behavioral associations and rational inductive inferences to account for selective learning (Hermes et al., 2015, 2018a, 2018b). This account aims to reconcile why children seem to display sophisticated reasoning when deciding whom to learn from in some situations, but they also seem to lack such sophistication and perform halo-like generalizations in other situations. In order to reconcile conflicting empirical findings, this middle ground account appeals to two qualitatively different mechanisms. It argues that children early in development rely on Type I processes that operate relatively inflexibly but are rather fast, automatic, and implicit. Furthermore, of that kind reasoning does not require cognitive resources and operates on associative mechanisms and heuristic judgments (i.e., default strategies such as the preference for a strong agent over a weak one for all tasks) instead of inferential processes. Thus, Type I processes relate the middle ground account to the lean account of selective learning. Eventually, Type II processes that operate flexibly and consciously but are rather slow develop, and this reasoning rests heavily on general cognitive resources (e.g., working memory, executive functions). Hence, Type II processes relate the middle ground account to the rich accounts of selective learning. It is argued that when Type II processes emerge later in development, they do not immediately replace Type I processes. Instead, the simpler but less demanding former reasoning and the sophisticated but more effortful latter reasoning continue to exist together in the cognitive repertoire. Importantly, which type of processes would intervene in any given child or situation depends not only on the availability of sufficient cognitive resources or background conceptual knowledge but also on the

demands of a situation. The presence of a more complex situation (e.g., two informants with a positive past behavior in different domains) is supposed to motivate the use of more sophisticated reasoning because simpler heuristic judgments appear insufficient to favor one informant. Although the middle ground account takes the form of eclectic resolution to the opposite sides of the debate, it still fails to address the underlying issue for social learning: commitment to an evidential view that ignores interpersonal considerations in trusting others.

1.4. New Approach

The various theoretical accounts that differ from each other to explain the cognitive mechanisms behind selective trust were introduced. Although these accounts are different in their assumptions about the nature of mechanisms, they all share a common assumption. They treat children's early failures to prefer an accurate informant or halo-like generalizations to irrelevant domains as indicating credulous trust. That is, children start their lives believing things despite contrary evidence (e.g., history of inaccuracy), and this type of trust shifts to be selective once advanced cognitive resources or behavioral rule strategies are available. Hence, the prevailing assumption underlying given accounts is that selective trust is largely an evidential process that comes online around age 4. From the perspective of the rich accounts, children learn to monitor evidence and make inferences about the likelihood of an informant having truthful information. From the perspective of the lean account, children develop an attentional bias toward an accurate informant due to the high predictiveness of input-output relations, but this bias still occurs in response to information (i.e., evidence) provided by the informant. Finally, from the

perspective of the middle ground account, it combines two already evidential accounts and argues for both low-level associative and high-level inferential strategies. The alternative approach that is presented here suggests that such premises run into two major problems and thus conflate distinct processes involved in learning from others (Koenig et al., 2021; Pesch et al., 2018). In this section, the potential problems with the evidential accounts are clarified. In short, they accept testimony exclusively as any kind of evidence and largely exclude a significant dimension: the interpersonal reasons that children have for trusting others.

For the evidential view, the testimony of others can be construed as a task in which children need to determine the competence of an informant as well as to what extent testimony is consistent with their own existing beliefs. If this is how testimony is considered, then it is natural to treat the developmental task that faces children as one of learning to be responsive to given evidence about the predictability of testimony. According to this perspective, children ought to use their background conceptual knowledge coupled with sophisticated cognitive mechanisms to make relevant reliability attributions. The first problem with the evidential accounts of selective trust arises here in that such accounts automatically force a discontinuity thesis (Koenig & McMyler, 2019; Koenig et al., 2021). Children are characterized as credulous learners who fail to grasp the epistemic requirements for knowledge acquisition. It is only after children develop the necessary knowledge or advanced cognitive skills that they shift from believing what they are told to being selective consumers of testimony. Although evidential accounts seem to take the development of cognitive skills as the link between children's early credulity and later selectivity,

they do not elaborate on how credulity develops into selectivity. Thus, the problem here is an incomplete explanation to account for selective trust such that these accounts push credulous trust back to early periods in ontogeny, suggesting that cognitive skills are not there yet. However, once they offer the development of cognitive skills as constitutive of selective trust, they cannot explain the emergence of selective trust. Rather, they only provide descriptive claims about when children end to show credulous trust and when they begin to monitor evidence.

The second problem is that the evidential arguments do not shed light on interpersonal reasons children have for believing the testimony of others (Koenig & McMyler, 2019; Koenig et al., 2021). Learning from testimony is taken as detecting and avoiding the risk of misinformation. This emphasis on risk or error recognition leads the evidential accounts to frame the task that faces children as (1) requiring positive reasons, such as benevolence and competence, to accept testimony, and (2) requiring negative reasons, such as malevolence and incompetence, to reject testimony. Namely, the epistemic task is to decide whether there is sufficient evidence to believe or not to believe an informant. Thus, such evidential accounts reduce learning from others to making probabilistic inferences from a host of evidence. An inevitable consequence of this reductionism is that others become mere instruments that gather and transmit knowledge, and eventually, learning from others does not involve trusting others as social agents at all. Children assess evidence about testimony in much the same way they do about the other forms of information sources that are impersonal in nature. However, children not only appeal to epistemic cues for protection from being misinformed but respond to much broader

considerations (e.g., moral or interpersonal) than the evidential accounts would recognize. Given that testimony is irreducibly a social act that is intentionally given to communicate information, it seems problematic to treat it as a fingerprint left at the scene of an impersonal crime.

Although it is not possible to deny that children monitor evidence or cues in order to assess the truth value of any given testimony, evidence such as prior (in)accuracy can be only one type of information that children consider among others (Koenig & McMyler, 2019; Koenig et al., 2021). That is, prior (in)accuracy may probabilistically signal the predictiveness of future claims, but it does not determine the reliability of an agent by itself. Hence, the alternative approach here aims to turn the spotlight on interpersonal considerations at play so as to demonstrate the other central but less investigated aspect of selective learning: testimony does not only serve for the mere transmission of information but enables people to deliberately present their ideas or beliefs; to make interpersonal commitments to each other; to clarify their potential disagreements and to jointly arrive at conclusions, which are all in the interest of mutual regard. Thus, testimony involves distinctive characteristics of human nature far beyond the recognition of mere accuracy. In believing the testimony of others, it is taken for granted that they take responsibility for what they offer, that they put faith in their report, and that what they offer is actually the case. Accordingly, these presumptive commitments and mutual regards essentially entail epistemic and interpersonal obligations. That said, the alternative account defends an inclusive thesis that places value on a host of different considerations (epistemic and interpersonal) as legitimate reasons to accept testimony. The primary motivation is

that this focus on distinct appraisals of trust captures both dimensions (learning from others and placing trust in others) involved in testimonial learning.

The gist of this alternative approach is that testimonial learning requires one to be responsive not only to indications that give clues on epistemic competence or knowledge level but also to considerations that testimony is irreducibly a social act in the first place. Hence, testimonial learning not only operates by tracking the signs of incompetence but also depends upon mutual understanding of a social situation, recognizing those who offer up their beliefs and ideas, are ready to cooperate, and fulfill their commitments. Once we place trust in others, it is not only the epistemic predictiveness of claims that protect us but also the responsibilities that informants hold as participants of a shared reality protect us. In the current study, the aim is to explicate the nature of trusting someone and thereby uncover the role of trust as a holistic concept. Accordingly, two different types of trust that are potentially distinct but operate jointly in the evaluation of others are put forward: *epistemic trust* could be construed as the trust guided by assessments of how knowledgeable or competent someone is, and it is sensitive to cues that indicate potential knowledge level (e.g., past accuracy, confidence) of someone; *interpersonal trust*, on the other hand, could be construed as the trust guided by assessments of how benevolent someone is, and it is sensitive to cues that indicate cooperative behavior (e.g., apologies, promise-keeping).

Given that learning from others involves a distinctively interpersonal type of trust, the developmental task that faces children is not categorically the same as that of

learning to be responsive to evidence that signals the predictiveness of impersonal sources. Instead, the task involves learning to acknowledge interpersonal dynamics embedded in the process of how testimony is addressed from one social agent to the other. Far from displaying credulous trust early in ontogeny, children develop an increasingly sophisticated shared understanding of such dynamics as they participate in social exchanges through childhood. That said, interpersonal trust may have much broader implications for evaluating the reliability of others from the very beginning. For instance, when presented with informants who differ in moral characteristics, children's halo-like generalization may not necessarily reflect their lack of cognitive sophistication. Instead, such generalizations may reflect greater value on signs of good intentions or mutual regard. It is not a coincidence that children experience more difficulty when asked to choose the relevant informant if they know the knowledgeable informant is somehow less morally reliable (e.g., Johnston et al., 2015). Age differences that emerge among preschoolers when interpersonal and epistemic cues are pitted against each other may also support the idea that interpersonal information about a source may be more challenging for younger children to inhibit, and therefore they show halo-like generalizations for the moral informant, even if the situation demands epistemic competence (i.e., object labeling task). Hence, interpersonal trust is never left behind; instead, children may learn to differentiate epistemic trust out of interpersonal trust (e.g., attachment) because they appreciate that who is reliable does not always depend on the agent but also on the nature of social situations (i.e., type of tasks). In other words, children learn to appreciate the reliability of informants in relation to the type of social situation instead of decontextualized judgments.

The emerging problem at this point is that it seems not likely to tap into both epistemic and interpersonal considerations unless the canonical paradigm is modified. It is potentially a problem because we are prone to misinterpret findings if we only change informant characteristics but keep the social situation the same in which children are asked to choose between one of the informants to learn the names of objects. Although it is a type of social situation, in essence, it simply demands one type of decision (i.e., an epistemic task). Only after a distinction between epistemic and practical decisions behind trusting others is raised, this might account for why children are willing to endorse information from an agent despite ill intentions but reluctant to share with the same agent (Ridge et al., 2018). Indeed, there are some situations in which it would make sense to endorse someone in spite of their interpersonal flaws and to mistrust someone in spite of their knowledge. Therefore, in the current study, children were presented with situations in which agents differed from each other on two dimensions. Specifically, the moral and epistemic characteristics of agents were put into conflict, and then children were asked to make judgments of these agents for both learning decisions and practical decisions. Such modifications would, in turn, pave an alternative way to evaluate whether children's epistemic trust in their learning decisions is reflected in other, more interpersonal judgments in line with situation demands or whether one type of trust outweighs the other given its broader indications for agent reliability.

In support of such a modification of the canonical trust paradigm, some recent research documented how interpersonal and epistemic reasons affect the types of decisions children are asked to make differently and suggested a set of dissociated

judgments of others based on the demands of a given situation. In one study, 4- to 5-year-olds were presented with either an in-group member behaving antisocially or an out-group member behaving prosocially toward them in that the in-group member was unwilling to share a given source with the child, whereas the out-group member was happy to split the source in half (Hetherington et al., 2014). Interestingly, the antisocial behavior of the in-group member significantly affected children's willingness to share with and explicit preference for the in-group member, but their decisions to learn new information from the in-group member were unmoved. It was examined in another study how interpersonal violations of trust, particularly the failure of an agent to keep a promise, impact practical decisions to share with that agent, distinct from learning decisions (Pesch & Koenig, 2018). Despite that 4-year-olds were indiscriminate in their preference to learn from either agent, their willingness to share with an agent was reduced when the agent failed to keep a promise. Taken together, both studies indicate that children's epistemic and interpersonal decisions might stem from distinct appraisals about agents such that their decisions to learn are responsive to epistemic attributes, while practical decisions (e.g., sharing, waiting, helping) are responsive to interpersonal attributes. This, in turn, provides preliminary evidence for distinguishing the different types of trust in designs to better understand the relation between them.

1.5. Current Study

The more recent studies paved an alternative to the canonical trust paradigm and shifted the focus to include multidimensional agents that involve both learning and practical decisions. For instance, it could be suggested that in certain situations,

children might attribute knowledge or expertise to an agent but might still be willing to affiliate, share, or play with another (Ridge et al., 2018). Therefore, the particular cases (e.g., an agent who is mean but smart) that elicit distinctive kinds of reasoning may help to better understand the varieties of trust without reducing such decisions to evidential considerations. However, this nuanced understanding is not likely to be captured unless research designs include trials that enable children to consider both practical and epistemic evaluations. Toward that end, the current study aimed to explicate both the interpersonal and epistemic considerations that feature in children's judgments of others in order to offer a more holistic picture of how children learn from and place trust in others.

Children who were 5- to 7-year-olds were recruited for this study. The target age range was set considering a large body of research that revealed that 5-year-old children are able to make relevant trust decisions depending on the purpose of the situation when they are explicitly given information about the characteristics of informants (e.g., Lane et al., 2013; Mascaro & Sperber, 2009; Vanderbilt et al., 2011). Furthermore, this study included children up to 7-year-olds to investigate whether there is a developmental pattern in such selectivity when children need to infer characteristics of the informants from their past behavior rather than it being explicitly given.

A modified version of the canonical selective learning paradigm was used in order to introduce the epistemic characteristics (either accurate or inaccurate) of the puppets (Birch et al., 2020; Brosseau-Liard et al., 2014; Hermes et al., 2018). The traditional

paradigm in which one informant makes blatant errors while the other gives correct names in labeling familiar objects was not used because of some theoretical concerns. Given that the aim of the competence characteristic introduced was to indicate the epistemic reliability of the puppets, the inaccurate puppet was supposed to be regarded as inaccurate instead of bizarre or globally incompetent, which may be how children perceive adult informants when they incorrectly label familiar objects (Lucas & Lewis, 2010). Therefore, the inaccurate informant was presented as less knowledgeable about a specific domain in this version of the paradigm, while the accurate informant was presented as more knowledgeable about the same domain.

The first research question concerns whether children make halo-like generalizations when provided with only one type of information, epistemic or interpersonal information about agents. The literature has shown that when there is limited available information about agents, such knowledge leads children to draw broad generalizations of that characteristic across different tasks (Hermes et al., 2018; Johnston et al., 2015; Lane et al., 2013). Hence, it was hypothesized that children would choose the same puppet (either nice or accurate) for both types of test tasks: the hidden object task and the resource allocation task.

The second research question asks whether children flexibly weigh epistemic and interpersonal considerations in accordance with the purpose of a social situation when making selective trust decisions. More specifically, it was aimed to understand: (1) Do children understand that an agent's history of accuracy indicates an epistemic

competence about the informant and hence infer that the past accuracy is only relevant for decisions in learning situations? (2) Do children understand that an agent's history of benevolence indicates an interpersonal competence about the informant and hence infer that the past benevolence is only relevant for decisions in practical situations? Some recent research has shown that when children are presented with conflicting information about agents (e.g., strong but inaccurate agent versus weak but accurate agent), children are able to display some flexibility in their decisions to choose the relevant informant for a given task (Hermes et al., 2018; Miyoshi & Sanefuji, 2022). Therefore, it was hypothesized that children would choose the accurate but mean informant for the hidden object (i.e., learning) task and choose the nice but inaccurate informant for the resource allocation (i.e., practical) task.

The third research question concerns whether children's flexibility to switch to the most relevant cue depends on age. It has been demonstrated that EF is related to children's trust decisions. Preschoolers are likely to trust an agent in the absence of competing information coming from another agent, even if that agent was proven to be highly unreliable in the past (Jaswal et al., 2010). However, it has also been shown that preschoolers may overcome such an uncritical bias to endorse particular testimony if they have strong competing information like first-hand experience about the inaccuracy of the testimony, and the degree to which children do so is significantly related to their developing EF skills (Jaswal & Pérez-Edgar, 2014; Jaswal et al., 2014). Therefore, children's use of flexible strategies of trust may be linked to their EF in that advanced EF skills may enable them to inhibit halo-like

generalizations as a primary response or to identify the relevant characteristic for a given task and switch from one cue to the other across tasks in line with the demands of each situation.

The relation between children's preference for reliable informants and the development of social understanding is somewhat unclear (e.g., DiYanni et al., 2012; Pasquini et al., 2007). Nevertheless, it was included as the other potential cognitive factor on children's trust decisions in that advanced ToM abilities might help them make relevant mental-state inferences considering the behavior of agents, such as reasoning that the agents intend to be deceptive or informative, and thus they may decide to avoid ignorant or deceptive ones accordingly. Hence, it was hypothesized that there would be an age difference in flexibly switching to the most relevant cue such that older children would choose the relevant informant more often. Such age differences, in turn, would be accounted for by differences in the development of EF and ToM. Accordingly, three subquestions follow the third research question about the age effect: (1) Does ToM accounts for age effects? (2) Does EF accounts for age effects? (3) Does interaction between ToM and EF account for age effects?

The fourth and last research question concerns whether there is an order effect for the type of trust (i.e., the order in which children learn about a puppet's competence or benevolence). The order in which children first learned whether the informants were nice versus mean or accurate versus inaccurate was counterbalanced in this study because, in the past literature, children were frequently presented with social cues first and then learned about competing epistemic cues about the informants.

However, it should be noted here that the type of failure violated in each cue might be different in nature (Bickhard, in prep). That is, when an informant gives incorrect information about the animals (e.g., dolphins live on the ground), the inaccurate informant breakdowns the convention of the game (i.e., stating facts about animals) because it is not how the child characterizes the situation. Although there is no apparent reason why that violation occurred, it can be repaired because this type of violation relatively indicates some sort of incompetence. However, ill-intentions cannot be addressed in the same way because it is the whole sociality of an informant that is put into question and requires a different kind of repair (e.g., apology, sanction, criticism) that is not provided in the paradigm. Given that the interpersonal type of violation would be a more serious failure difficult to forgive for children, it was hypothesized that children would choose the nice informant for both test tasks when benevolence information comes first (i.e., the subsequent accuracy of the mean informant would not succeed to repair the previous moral failure of the informant).

CHAPTER II

METHOD

2.1. Participants

Data were collected from a total of 134 children ranging in age from 5 to 7 years ($M = 78.60$, $SD = 7.87$, 65 boys). All children were native Turkish speakers. The sample size was estimated based on previous studies with similar designs (e.g., Hermes et al., 2018). All participants were recruited from a single public school located in Ankara, which is the capital city of the Republic of Turkey. There were 43 5-year-olds ($M = 69.33$, $SD = 2.14$, 21 boys), 48 6-year-olds ($M = 78.67$, $SD = 3.08$, 23 boys), and 43 7-year-olds ($M = 87.86$, $SD = 2.59$, 21 boys). None of the children were excluded from the study for any reason. Parent-reported education and income level indicated mostly a middle socioeconomic status sample. In terms of education level, 59% of the parents reported that they had at least a university degree. In comparison, 30% of them reported a high school degree, and 11% reported a lower degree. In terms of income level, 32% of the parents reported earning more than 15.000 Turkish Lira per month. Whereas 42% of them reported earning between 7.000 and 15.000 Turkish Lira, and %26 reported earning less than 7.000 Turkish Lira. Of these parents, 53% evaluated their monthly income level as average. The

approval of the current study was obtained from a Human Research Ethics Committee at Bilkent University and the Ministry of National Education.

2.2. Procedure

Data collection was conducted in person. After the approval of the Ethics Board and Ministry of National Education, the school principal of the public school was contacted to execute the study in the school. Upon the willingness of the administrator to conduct the study, class teachers were contacted to distribute written informed consent forms that included the study description and what both parents and children would be expected to do if they were willing to participate in the study. If the parents agreed to have their children participate in the study and signed the consent form, they were asked to fill out a demographics form and a parent report measure of social understanding of children. Children whose parents signed the consent form were contacted and asked whether they were willing to play a fun game in which they would be shown some videos and then asked some questions. Once the child was willing to play the game, the primary researcher and child went to a quiet room reserved for the individual testing of each child, with a test session lasting approximately 35 minutes. The child was invited to sit at a table across from the laptop screen. Visual stimuli were presented to children on a MacBook Air 13-inch laptop screen that was placed on the table. Audio stimuli were played from the same computer speakers, which were set to the highest volume. Each test session was recorded to maintain reliability, and the fact that the test sessions would be recorded was stated both on the relevant permit and informed consent forms. An undergraduate research assistant who was blind to the hypotheses of the study coded

a random subset of 20% ($N = 27$) of the participants after watching the recorded videos. Another two research assistants coded the whole data separately. If there was any mismatch between the documents of the two coders, they informed the primary researcher, and all solved the discrepancies on consensus.

Children were again asked to provide verbal assent while on the record and informed that they were free to stop playing the game at any time without consequences. They were reminded that they should watch each video carefully and that they would be asked questions afterward. The procedure was divided into five phases. The five phases were (1) initial induction phase (2) first test phase (3) updated induction phase (4) second test phase and (5) EF tasks. The study followed a within-subjects design. Each child participant was exposed to five phases in the same order. However, it was counterbalanced among the participants whether they first learned about the past accuracy or the benevolence of two informants across the induction phases. During the initial induction phase, children only learned whether the informants were nice versus mean, and in the subsequent test phase, they were asked to share limited resources with or endorse the location of a hidden object provided by one of the two informants based on one characteristic alone. During the updated induction phase, children learned whether the same informants were either accurate or inaccurate, and in the following test phase, they were again asked to share limited resources with or endorse the location of a hidden object provided by one of two informants based on knowledge about both characteristics now. Hence, each induction phase was followed by a test phase involving the same tasks. Children were lastly presented with three commonly used EF tasks as an assessment of working memory, mental

flexibility, and inhibitory control. Once the study was over, they were thanked for their participation and given a token as a way of appreciation.

2.3. Materials

2.3.1. Parent Measures

2.3.1.1. Demographics Form

This form consisted of fifteen multiple choice questions to collect baseline demographic information on parents and children. The questions asked the parents about their age, education level, partner age, partner education level, the number of children in the family, monthly household income, income evaluation, and family structure.

2.3.1.2. Children's Social Understanding Scale (CSUS)

This scale was developed as a parent-report measure of children's mental state understanding (Tahiroğlu et al., 2014). The scale is made up of six subscales, each emphasizing different mental state concepts: knowledge (e.g., understanding that people might differ in knowledge levels), beliefs (e.g., understanding that people may have false beliefs), perception (e.g., understanding that reality and perceptual appearance might not be the same), intentions (e.g., understanding that intentions may result in unmatched outcomes), desires (e.g., understanding that people might differ in their desires), and emotions (e.g., understanding that people may have different feelings about the same event). Each subscale included seven questions, resulting in a total of forty-two items. Primary caregivers were asked to rate their children's social understanding on a scale ranging from 1 (i.e., definitely untrue of

my child) to 4 (i.e., definitely true of my child). There was an option of “I don’t know” response. The long form of the CSUS was used in this study and filled out by the parents. The scale showed strong internal consistency, Cronbach’s alpha = .83.

2.3.2. Child Measures

2.3.2.1. Initial Induction Phase

2.3.2.1.1. Familiarization Trials

Each child participant was shown four vignettes in total. Children were first introduced to two puppet informants and asked to identify each. It was decided to use child-like hand puppets as informants in the current study to maintain a standardized procedure, which is frequently done in the relevant selective trust research (e.g., Rakoczy et al., 2009; Fusaro et al., 2011; Hermes et al., 2016). The puppets resembled each other in appearance to reduce the potential effect of subjective preference for one puppet over the other in that the only difference between the puppets was the distinctive color of the t-shirt on them. One puppet was depicted in a blue t-shirt, and the other was depicted in a red t-shirt. The color of the t-shirt was counterbalanced. Video vignettes were created after similar studies (e.g., Fu et al., 2015; Talwar et al., 2016; Xu et al., 2013). Vignettes consisted of sex-specific puppet informants such that boys were shown male puppets while girls were shown female puppets. The vignette videos were recorded in a university laboratory in which the puppets and various backgrounds were used to produce each video. As the narration was embedded in the videos, potential differences in the intonation or vocalization of the vignettes were also eliminated. The length of the videos varied from 50 to 55 seconds, while the total duration of this phase lasted approximately 10 minutes.

The interpersonal characteristics of the puppets (i.e., niceness versus meanness) were established with videos showing the two puppets engaging in lie-telling behavior for different reasons. Lie-telling behavior of each puppet informant was held constant to highlight the intention of the puppets (i.e., nice versus mean) because it was demonstrated that young children are more likely to trust an informant who demonstrates a positive outcome even if ill intentions lie behind the behavior (Liu et al., 2013). Each video consisted of three core parts: (1) an incident occurs between the puppets and their classroom friends (2) the teacher enters the classroom and asks them what has happened and (3) in half of the videos, one puppet tells a prosocial lie to protect its friend and takes the blame on the self, and in the other half of the videos, the other puppet tells an antisocial lie and put the blame on its friend even if it was responsible for committing a transgression.

2.3.2.1.2. Endorsement Trials

Once children watched each video, they were presented with five questions. Children were first asked two control questions to ensure that they comprehended what happened in the videos. Specifically, they were asked to identify which character committed the transgression and what the protagonist said about the incident to the teacher. If children answered either question incorrectly, the video would be shown again, but all children had already answered both comprehension questions successfully. They were then asked to identify whether the verbal statement of the protagonist was a truth or a lie. Their response was coded as incorrect unless they labeled both vignettes as lies. Children were subsequently asked a moral evaluation

question in which they were asked to rate how morally ‘good’ or ‘bad’ the statement of the protagonist was on a 7-point scale (Fu et al., 2007; Cheung et al., 2015; Vendetti et al., 2019). The scale was made of visual aids in which seven emoji faces changed from a dark red and very upset facial expression (i.e., very, very bad) to a dark green and very smiley expression (i.e., very, very good). The most negative end of the scale was scored as -3, while the positive end was scored as 3. Children were then presented with a motivation question and asked to explain the motivation behind why the protagonist told what she did. Finally, they were asked to make a judgment about the trustworthiness of the protagonist in two different situations: promise-fulfillment and secret-keeping. These judgments were done on a 5-point scale, varying from a dark red face (i.e., definitely no) to a dark green face (definitely yes). In the same vein, the most negative end of the scale was scored as -2, while the positive end was scored as 2.¹

2.3.2.2. Test Phase

After which puppet was nice or mean was established in the induction phase, children were presented with three manipulation check questions. The expectation in asking these questions was that children recognized that the informants were either nice or mean during the induction phase. Specifically, they were asked, “Now, I want you to think very carefully! (1) Who was good at protecting her friend from punishment? (2) Who was not so good at protecting her friend from punishment? and (3) Who was better at protecting her friend from punishment?” Then, the

¹

Although the canonical procedure was adopted from the relevant literature to induce the benevolence level of the puppets, children’s scores on these questions were not included in the subsequent analysis, given that this part of the experiment is only in the role of an induction phase.

experimenter moved to the first test phase consisting of two types of tasks (i.e., the hidden object task and the resource allocation task) that demanded different considerations. Standard measures of selective trust and prosocial behavior were used to test for differences in social learning and practical decision making. Specifically, children's epistemic trust preferences were assessed with the hidden object task (Hetherington et al., 2014; Nurmsoo & Robinson, 2009; Pesch & Koenig, 2018). This test task was specially chosen instead of the other two widely used epistemic tasks, which are novel object function or label endorsement because previous conventional violations would guide the preference of children in these tasks, and thus they would be more likely to generalize prior failures (i.e., lying to a teacher) to a new domain even though it is essentially a learning domain in a broader sense (Ganea et al., 2011). Therefore, claims about hidden object locations indicate a more pure way of measuring epistemic decisions considering its episodic nature. In contrast, children's interpersonal practical decisions were assessed with the resource allocation task. This task is often used to assess general positive regard for an informant (Chernyak & Sobel, 2016; Moore, 2009; Pesch & Koenig, 2018). The total duration of this phase lasted approximately 5 minutes.

2.3.2.2.1. Hidden Object Task

Children were presented with an image of an object (e.g., a rubber duck) and told, "The first hidden object is this rubber duck. I wonder where it is hidden!" Children are then shown a still image of the two puppet informants with equal sizes but different colors in front of each and are told that "I bet the puppets can help us find out where the hidden object would be. Let's ask them!" The puppets then made

conflicting claims about which box the object was in. For instance, one puppet said, “I think the rubber duck is in the orange box.” The other said, “I think the rubber duck is in the green box.” After the conflicting claims about the location of the object, children were asked to endorse one of the locations. Children completed two trials, and each one included a different set of colored boxes and a different hidden object. Their responses were coded dichotomously. They received a ‘0’ if they endorsed the mean puppet, whereas received a ‘1’ if they endorsed the nice puppet. A total score was calculated across two trials ranging from 0 to 2.

2.3.2.2.2. Resource Allocation Task

Children were presented with a still image of the two puppet informants with two cups in front of them. They were then shown five identical stickers and told that “Here are five stickers for you to share. How many stickers should this puppet get, and how many stickers should this puppet get? You can share with them however you want.” Children were encouraged to distribute all five stickers between the puppets if they were reluctant to give more to one of the puppets. They completed two trials, and each trial included a different set of equally charming stickers. Their responses were similarly coded dichotomously. They received a ‘0’ if they shared more stickers (i.e., three or more) with the mean puppet, whereas received a ‘1’ if they shared more stickers with the nice puppet. A total score was calculated across two trials ranging from 0 to 2.

2.3.2.3. Updated Induction Phase

In this phase, each child participant was shown a total of eight videos that included the same puppets from the initial induction phase. Before the videos were shown to children, they were first asked to remind the experimenter of the identity of the puppets so that it was assured whether children correctly recognized the puppets. All videos varied from 3 to 5 seconds in length, and the total duration of this phase lasted approximately 10 minutes. The modified version of the canonical selective learning paradigm was used, which similarly consisted of two blocks: familiarization trials and endorsement trials.

2.3.2.3.1. Familiarization Trials

Children were shown four familiarization trials. Each trial involved one picture of an animal that is familiar to young children (dolphin, giraffe, monkey, rabbit). Children were then shown the still images of the two puppets side by side on the screen. For each animal picture, the experimenter told the child that the two informants would tell them about where they live or what they like eating. In half of the videos, the puppets communicated facts about habitat, and in the other half, they talked about diet. For instance, the experimenter said, “Let’s hear what they say about where dolphins live.” The experimenter then played the videos in which ‘the mean puppet’ was depicted while stating an accurate fact that “Dolphins live in the water.” In contrast, the other video showed ‘the nice puppet’ while stating an inaccurate fact that “Dolphins live in the ground.” This procedure was repeated across four familiarization trials, with the previously mean puppet being consistently accurate and the previously nice puppet being consistently inaccurate while giving

information about the animals. Hence, children now learned the other characteristic of the puppets in this phase, and in this way, two cues (interpersonal and epistemic) were pitted against each other before the second test phase. That is, the previously nice puppet became inaccurate, and the mean puppet became accurate.

2.3.2.3.2. Endorsement Trials

Children were presented with four trials. Each trial involved one picture of an animal that is likely to be unfamiliar to children (echidna, pangolin, tapir, wombat). Children were then shown the still images of the two puppets side by side on the screen. For each animal picture, the experimenter told the child that “I have never seen this animal before, but I bet they can help us learn its name. Do you know what this animal is called?” Thus, it was double-checked that the animal was novel prior to playing the videos. Children were then assured that it was okay to say that they did not know the name of the animal so as not to cause any distress to them. If children claimed to know what the animal was called, the experimenter said, “Actually, I don’t think that’s what it’s called. However, many children don’t know the name of this animal, so don’t worry if you don’t either.” Once children indicated the animal was novel, the experimenter said, “Let’s ask them what this animal is called!” The experimenter played the videos in turn, and both informants provided non-sense novel names for the animals. For instance, one informant said, “It’s called a dosa.” and the other informant said, “It’s called a koba.” After each pair of the videos, the experimenter repeated what each puppet said and asked children the endorse question, “This puppet said it’s called a dosa, and this puppet said it’s called a koba. What do you think it is called?” Their response was coded as correct if they endorsed

the name provided by the informant, who was accurate in the familiarization trials while giving information about the familiar animals.²

2.3.2.4. Test Phase

At the end of the updated induction phase, children were asked three manipulation questions similar to the former test phase. The expectation in asking these questions was that children recognized that the informants were either accurate or inaccurate during the updated induction phase. Specifically, they were asked, “Now, I want you to think very carefully! (1) Who was good at knowing about the animals? (2) Who was not so good at knowing about the animals? and (3) Who was better at knowing about the animals?” Following the manipulation check questions, two memory check questions were asked to children before moving to the second test tasks in order to make sure children correctly remembered what is distinctive about each informant, and thus their preferences in the test tasks would be a reflection of this nuanced understanding. They were asked, “You’re doing great! I want you to think very carefully for the last time. (1) Was this puppet good at or not so good at protecting her friend from punishment? and (2) Was this puppet good or not so good at knowing about the animals?”

Following the manipulation and memory check questions, the experimenter moved to the test tasks (i.e., the hidden object task and resource allocation task). The procedure was the same as the former test phase; each test task included two trials. However,

²

The canonical procedure was similarly adopted from the relevant literature to induce the knowledge level of the puppets; however, children’s scores on these questions were not included in the subsequent analysis, given that this part of the experiment is only in the role of an induction phase.

the coding of them was different from the former test phase because after the updated induction phase, children had knowledge about two characteristics of the informants, and thus they were expected to choose an informant depending on the purpose of the situation presented within the tasks. For instance, in the hidden object task, children received a '0' if they chose the inaccurate (but nice) informant and received a '1' if they chose the accurate (but mean) informant. Thus, a total score ranged from 0 to 2. In contrast, in the resource allocation task, they received a '0' if they chose the mean (but accurate) informant and received a '1' if they chose the nice (but inaccurate) informant. Hence, a total score ranged from 0 to 2.

2.3.2.5. Executive Function Tasks

2.3.2.5.1. Backward Word Span Task (BWS)

The backward word span task was used to assess the working memory skills of children (Carlson et al., 2002). This task is considered a measure of working memory, while the forward word span task is considered a measure of short-term memory (Alloway et al., 2006). The task was verbally presented to children. They were asked to repeat the words in reverse order. The experimenter explained how to repeat the words backward with an example and then provided children with two practice trials. Children received feedback if they made a mistake while repeating the words backward in the practice trials such that they were corrected and given another try to answer the trials correctly. The task was terminated when children failed to correctly repeat the practice trials after two attempts, and they received the lowest score. Children were reminded that they were supposed to repeat the words always in reverse order prior to the beginning of test trials. The test trials started with a two-

word span, and it was increased with each success of children until children failed to repeat both trials of a given span size incorrectly. The maximum length was made of an eight-word span, but it is important to note that no child was able to pass more than a four-word span. No feedback was provided after the test trials. Children received '0.5' points after each successful trial. A total BWS score was given to children to indicate the total number of correct trials in each span size, and thus the total score ranged from 0 to 8.

2.3.2.5.2. Dimensional Change Card Sort Task (DCCS)

The dimensional change card sort task was used to assess the cognitive flexibility of children (Zelazo, 2006). The adapted version of the task to online administration on Qualtrics Survey Software was run. Children were first shown two types of images (i.e., boats and rabbits), both of which could be sorted relative to two dimensions: shape or color. In the pre-switch phase of the task, children were shown an image in the middle of the screen and were instructed to sort it according to one of the dimensions. The order of which dimension was administered first was counterbalanced within the participants, and the same type of card was not presented consecutively for more than two trials. For instance, if the dimension was color, children were first introduced to the sorting rule and then instructed to choose the image that had the same color as the trial image located at the center of the screen. Children completed two practice trials in which feedback was provided if needed. Once they got the practice trials correctly, they continued onto the pre-switch test trials (six in total). The experimenter repeated the rule for sorting images after each trial. However, no corrective feedback was provided.

After the pre-switch trials, the post-switch phase started, and children were informed that they were going to play a new game, and now they had to sort the cards in accordance with the other dimension (e.g., shape). Children completed six trials in total: however, the sorting rule was not repeated in the post-switch trials. Children who successfully answered at least five of the six trials moved on to the border phase. In the subsequent border phase, children were told they needed to sort according to the shape rule if they saw a black border on the screen and the color rule if there was no border. After two practice trials, the experimenter proceeded to the border test trials consisting of twelve trials in total. The experimenter also repeated the border rule in each trial. Children received a ‘1’ point after each correct completion of a trial. A total DCCS score was given to children to reflect the total number of successful test trials, and thus the total score ranged from 0 to 24.

2.3.2.5.3. Happy-Sad Stroop Task (HS)

The happy-sad task was used to assess the inhibitory control skills of children (Lagattuta et al., 2011). This task was also presented online using Qualtrics Survey Software. Children were either shown a yellow smiley cartoon regarded as a ‘happy’ face or a yellow frown cartoon regarded as a ‘sad’ face on each test trial. Before the test trials started, children were first asked to label whether a given cartoon face was happy or sad. They were then told, “Now, we’re going to play an opposite game. In this game, you should say ‘happy’ when you see a sad face, but you should say ‘sad’ when you see a happy face.” Children were given two guided practice trials to make sure they comprehended the rule. In the guided trials, children were told, “When you see a happy face, what will you say?” Following the guided trials, they were given

four practice trials and received corrective feedback if needed. If children failed to give a correct answer in at least one trial, they had to complete the four practice trials all over again. The task was terminated if they failed to provide a correct answer more than two times in the practice trials. Upon the successful completion of the practice trials, children moved on to the test trials consisting of twenty trials in total. The stimuli were given in pseudo-random order. Their answers were considered correct or incorrect depending on the first word they said, such that if a child said happy first and then corrected the answer when shown a happy face, the answer of the child was counted as wrong. No feedback was provided after the test trials. Children received a '1' point after each correct answer. A total HS score was given to children to indicate the total number of correct trials in each test trial, and thus the total score ranged from 0 to 20.

CHAPTER III

RESULTS

3.1. Preliminary Analyses

All data analyses were conducted on SPSS 25 (IBM Corp., 2017). A preliminary analysis showed no significant effect of the t-shirt color on puppets or sex on children's performance, and therefore the data were collapsed on them. However, an omnibus ANOVA in which children's test scores in the first and second test phases were combined revealed that children's preferences for the relevant agent varied with age. Therefore, age was considered a variable in the further analyses. It is important to note here that seven children failed one memory check question that was asked before the second test phase, but no children failed both questions. Analyses were run both with and without the data of children who failed to answer two check questions correctly, and none of the results significantly differed. That said, the subsequent results included the data of all children similar to previous selective trust studies (e.g., DiYanni et al., 2022).

3.2. Analysis Plan

The analyses were divided into four sections in line with the main research questions. Mixed ANOVAs were planned to run in order to investigate research questions, and preliminary assumption testing was conducted to check for normality, homogeneity of variance, sphericity, linearity, and univariate and multivariate outliers³, which revealed no serious violations. In the first test phase, it was investigated **(1)** whether children chose an accurate or nice puppet for both test tasks above the chance level. Accordingly, one-sample t-tests were conducted. Once it was ensured that children's preference for the accurate or nice puppet was above chance, a 3 (Age Group: 5-year-olds, 6-year-olds, and 7-year-olds) X 2 (Task Type: Hidden Object and Resource Allocation) mixed ANOVA was run to examine whether their preference for the accurate instead of the inaccurate (or nice instead of the mean puppet) significantly differed across age groups or test tasks.

In the second test phase, it was investigated **(2)** whether children chose the accurate (but mean) puppet for the hidden object task and the nice (but inaccurate) puppet for the resource allocation task above the chance level. Therefore, one-sample t-tests were conducted. After it was maintained that their choice of the relevant puppets significantly differed from chance, a 3 (Age Group: 5-year-olds, 6-year-olds, and 7-year-olds) X 2 (Task Type: Hidden Object and Resource Allocation) mixed ANOVA was conducted to examine whether their preference for the relevant puppets differed across age groups or test tasks.

³ Outliers were checked according to Tabachnick and Fidell's (2018) criteria, which accepts outliers as standardized residual values less than -3.29 or more than 3.29.

Next, it was investigated (3) what explains the potential age effect in children's flexible preference for the relevant puppet. Accordingly, zero-order Pearson correlations were conducted to assess the relation between their scores on the Hidden Object and Resource Allocation tasks in the second test phase, CSUS scores, and EF scores, as well as Sex, Age, and Socioeconomic Status. Once the correlation of each variable with the other variables was obtained, regressions were run to analyze whether either cognitive variable would predict age differences. Lastly, a 2 (Induction Order: Interpersonal First and Epistemic First) X 3 (Age Group: 5-year-olds, 6-year-olds, and 7-year-olds) X 2 (Task Type: Hidden Object and Resource Allocation) mixed ANOVA was run to examine (4) whether the order in which children learned about the benevolence or knowledge of the puppets affected their choice of the relevant puppet in the second test phase.

3.3. First Research Question

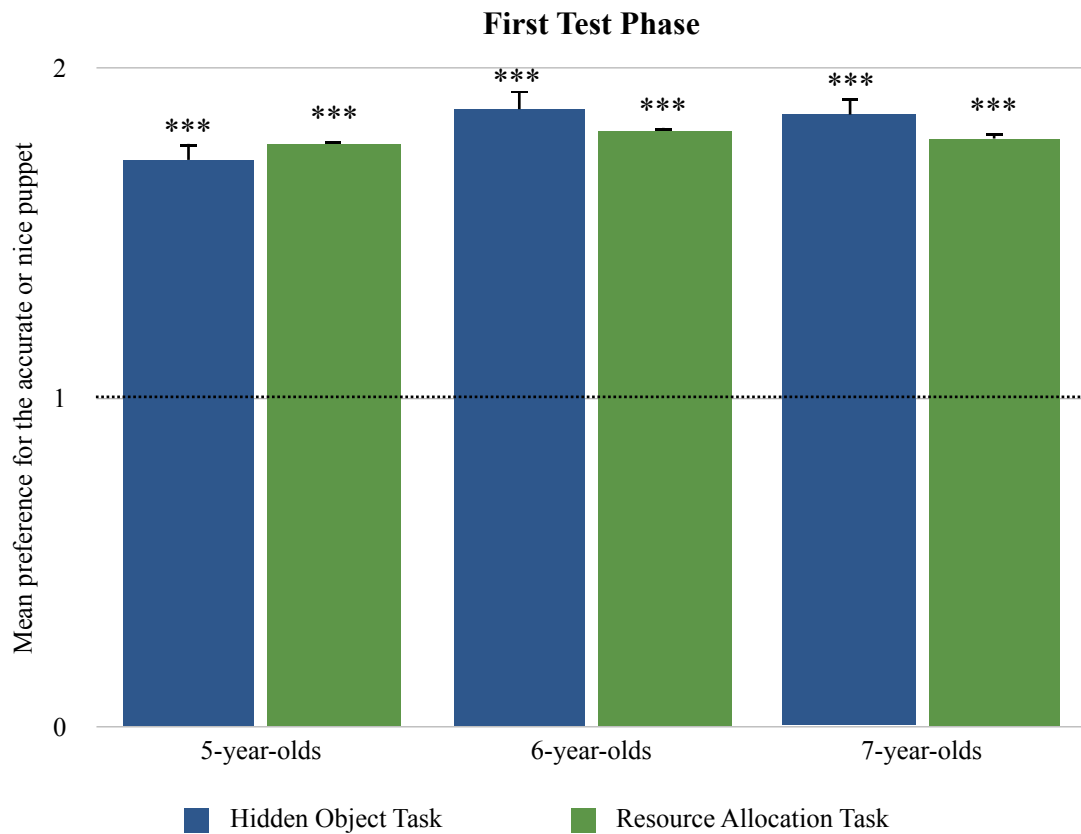
Do children make halo-like generalizations when provided with only one type of information, epistemic or interpersonal information about agents?

In order to answer the first research question, a one-sample t-test was conducted for each age group resulting in three one-sample t-tests (see Figure 1). As expected, children endorsed the nice puppet (over the mean puppet) or the accurate puppet (over the inaccurate puppet) significantly more often than chance. This preference was valid for both the Hidden Object task (5-year-olds, $t(42) = 10.42, p = .000, d = 1.59$; 6-year-olds, $t(47) = 18.14, p = .000, d = 2.62$; 7-year-olds, $t(42) = 16.09, p = .000, d = 2.45$) and the Resource Allocation task (5-year-olds, $t(42) = 11.77, p = .000, d = 1.80$; 6-year-olds, $t(47) = 14.27, p = .000, d = 2.06$; 7-year-olds, $t(42) = 12.60, p = .000, d = 1.80$).

= .000, $d = 1.92$). That is, all children drew halo-like generalizations when only epistemic or interpersonal information about agents was available.

In order to investigate whether children's halo-like generalizations differed across age groups or task types, a 3 (Age Group: 5-year-olds, 6-year-olds, and 7-year-olds) X 2 (Task Type: Hidden Object and Resource Allocation) mixed ANOVA was run. While Age Group was a between-subjects variable, Task Type was within-subjects. The dependent variables were Hidden Object and Resource Allocation scores. The results showed neither Age Group nor Task Type had any significant effect on children's choice of the accurate or nice puppet. All children, regardless of age, similarly preferred the accurate or nice puppet for the hidden object and resource allocation tasks, respectively, and thus demonstrated halo-like generalizations.

Figure 1. Children’s choice of accurate or nice puppet against chance



Note. * $p < .05$, ** $p < .01$, *** $p < .0001$

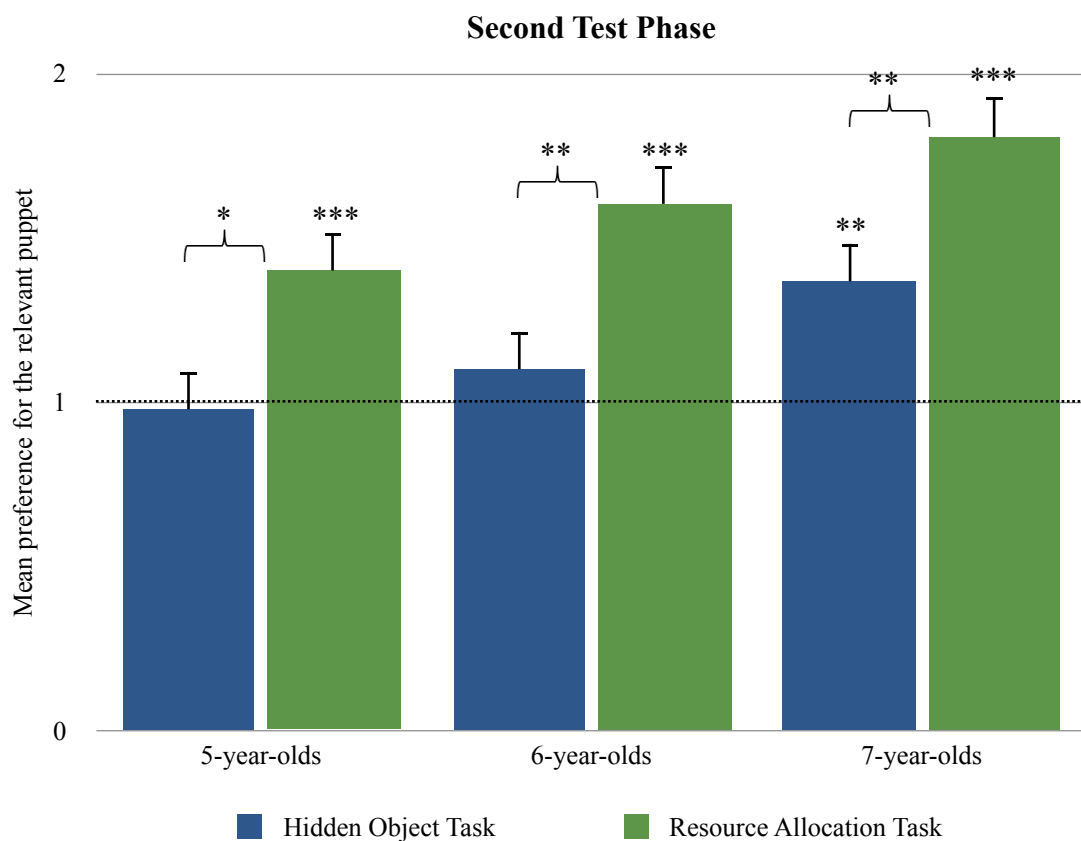
3.4. Second Research Question

Do children flexibly weigh epistemic and interpersonal considerations in accordance with the purpose of a social situation when making selective trust decisions?

In order to answer the second research question, a one-sample t-test was conducted for each age group resulting in three one-sample t-tests (see Figure 2). As anticipated, only older children flexibly weighted epistemic and interpersonal information about the puppets and chose the accurate (but mean) puppet for the Hidden Object task, whereas they chose the nice (but inaccurate) puppet for the Resource Allocation task. More specifically, only 7-year-olds were significantly able to choose the accurate

(but mean) puppet for the Hidden Object task at a rate greater than what would be expected by chance, $t(42) = 2.79, p = .008, d = 0.43$. In contrast to the Hidden Object task, all children preferred the nice (but inaccurate) puppet for the Resource Allocation task above chance, 5-year-olds, $t(42) = 3.73, p = .001, d = 0.57$; 6-year-olds, $t(47) = 6.50, p = .000, d = 0.94$; 7-year-olds, $t(42) = 11.86, p = .000, d = 1.81$. That is, children from all ages were flexible in their choice of the nice puppet to share resources, but only the older children were flexible in their choice of the accurate puppet to learn the location of a hidden object.

Figure 2. Children’s choice of relevant puppet against chance



Note. * $p < .05$, ** $p < .01$, *** $p < .0001$

In order to investigate whether children’s flexible preference decisions differed across age groups or task types, a 3 (Age Group: 5-year-olds, 6-year-olds, and 7-

year-olds) X 2 (Task Type: Hidden Object and Resource Allocation) mixed ANOVA was conducted. The results revealed that there was a significant main effect of Age Group, $F(2, 131) = 8.39, p = .000, \eta^2 = .113$, such that older children overall demonstrated more flexibility when asked to switch between different types of cues in accordance with the demands of the tasks compared to younger children. In particular, post hoc Tukey honestly significant difference (HSD) tests indicated that 5-year-olds' scores were significantly lower than 7-year-olds' scores, $p = .000$, and that 6-year-olds' scores were significantly lower than 7-year-olds' scores, $p = .041$. The results showed that there was also a significant main effect of Task Type, $F(1, 131) = 20.11, p = .000, \eta^2 = .133$, such that children overall performed better in their choice of the relevant puppet (i.e., the nice but inaccurate one) for the Resource Allocation task compared to the Hidden Object task. We followed up on this main effect of Task Type with paired-samples t-tests and compared the Hidden Object and Resource Allocation task scores of each Age Group. That said, children's performance on Hidden Object and Resource Allocation tasks significantly differed from each other for all Age Groups, 5-year-olds, $p = .040$, 6-year-olds, $p = .006$, 7-year-olds, $p = .005$. There was not a significant interaction term between Age Group and Task Type.

3.5. Third Research Question

What explains the effect of age?

In order to answer the third research question, the associations between performance on the test tasks (i.e., the hidden object and resource allocation tasks), theory of

mind, and executive functions were investigated, and zero-order correlations were conducted between all key child variables (see Table 1).

Table 1. Zero-order and age partial correlations between tasks and child variables

Variables	1	2	3	4	5	6	7	8	9
1. Sex	1	-.058	.049	-.040	-.161 ^t	.217*	-.089	-.058	-.056
2. Age		1	-.173*	.191*	.309***	-.128	.323***	.210*	.281**
3. SES	.031		1	-.118	-.162 ^t	.249**	.071	.038	-.095
4. HiddenObject	-.029		-.059	1	-.181*	-.129	.109	.175*	.299***
5. ResourceAllocation	-.150 ^t		-.067	-.256**	1	-.107	.179*	.069	.289**
6. CSUS	.212*		.220*	-.107	-.072	1	-.029	.089	.046
7. BWS	-.075		.199*	.051	.088	.013	1	.297***	.230**
8. HS	-.047		.116	.141	.005	.120	.248**	1	.414***
9. DCCS	-.041		-.003	.261**	.222*	.086	.153 ^t	.378***	1

Note. * $p < .05$, ** $p < .01$, *** $p < .0001$, ^t $p < .10$

CSUS: Children’s Social Understanding Scale; BWS: Backward Word Span Task;

HS: Happy Sad Stroop Task; DCCS: Dimensional Change Card Sort Task

Following the correlations, hierarchical linear regressions were run to investigate whether EF, ToM, or their interaction were predictive of children’s flexible performance on the second test phase trials. A preliminary analysis was conducted to ensure no violation of the assumptions of normality, linearity, and homoscedasticity. There was no indication of multicollinearity or singularity in the informants. In order to calculate a composite measure of EF, scores for each of the three EF assessments were standardized, as well as a composite measure of ToM from the subscales. Concurrent predictors included performance on the EF tasks and the measure of ToM based on parent-report data. Age was also included, considering the statistically

significant correlation with both the hidden object and resource allocation tasks. A composite score of socioeconomic status (SES) was formed, given that there were significant relations between mother education and father education ($r = .485, p = .000$), mother education and house income ($r = .591, p = .000$), and father education and house income ($r = .526, p = .000$).

A hierarchical linear regression analysis was conducted to assess the ability of two cognitive measures (EF and ToM) to predict children's choice of the accurate (but mean) puppet in the Hidden Object task after controlling for the effect of Age and SES (see Table 2). Accordingly, the predictors of children's performance were Age and SES, and entered at Step 1. Next, EF and ToM were entered at Step 2 as predictors of children's performance. The second model was statistically significant, $F(4, 133) = 3.59, p = .008, R^2 = .100, R^2_{adjusted} = .072$. EF significantly predicted children's Hidden Object Task performance, $\beta = .247, p = .007, 95\% \text{ CI } [.027, .169]$, whereas ToM did not. Lastly, the interaction term between EF and ToM was entered at Step 3 as a predictor of the performance, but the performance was not qualified by the interaction term.

The other hierarchical linear regression analysis was conducted to assess the ability of two cognitive measures (EF and ToM) to predict children's choice of the nice (but inaccurate) puppet in the Resource Allocation task after controlling for the effect of Age and SES (see Table 3). Accordingly, the predictors of children's performance were Age and SES, and entered at Step 1. Next, EF and ToM were entered at Step 2 as predictors of children's performance. EF predicted children's performance at the

trend level, $\beta = .169$, $p = .062$, 95% CI [.002, .098], whereas ToM did not. Finally, the interaction term between EF and ToM was entered at Step 3 as a predictor of the performance, but the performance was not qualified by the interaction term.

Table 2. Hierarchical regressions predicting hidden object task performance

Models	Predictors	Unstandardized Coefficients		Standardized Coefficients		Adj. R^2	ΔR^2	F	p	ΔR^2 Change
		B	SE	β	p					
Hidden Object										
Model 1						.025	.040	2.71	.070	
	Age	.019	.010	.170	.062					
	SES	-.043	.064	-.061	.499					
Model 2						.072	.100	3.59	.008	.061*
	Age	.007	.011	.062	.525					
	SES	-.049	.064	-.070	.445					
	EF	.098	.036	.247	.007					
	ToM	-.101	.075	-.116	.184					

Note. * $p < .05$, ** $p < .01$, *** $p < .0001$, ^t $p < .10$

Table 3. Hierarchical regressions predicting resource allocation task performance

Models	Predictors	Unstandardized Coefficients		Standardized Coefficients		Adj. R^2	ΔR^2	F	p	ΔR^2 Change
		B	SE	β	p					
Resource Allocation										
Model 1						.086	.099	7.23	.001	
	Age	.023	.007	.287	.001					
	SES	-.034	.044	-.068	.443					
Model 2						.099	.126	4.67	.001	.027
	Age	.017	.008	.213	.027					

SES	-.038	.045	-.076	.402
EF	.048	.025	.169	.062
ToM	-.043	.053	-.069	.419

Note. * $p < .05$, ** $p < .01$, *** $p < .0001$, ^t $p < .10$

3.6. Fourth Research Question

Is there an order effect for type of trust (i.e., the order in which children learn about an informant's competence or benevolence)?

In order to answer the last research question concerning whether there is an order effect in which children first learn about competence or benevolence of the puppets, a 2 (Induction Order: Interpersonal First and Epistemic First) X 3 (Age Group: 5-year-olds, 6-year-olds, and 7-year-olds) X 2 (Task Type: Hidden Object and Resource Allocation) mixed ANOVA was run. The analysis showed a significant main effect of Age Group, $F(2, 128) = 9.00, p = .000, \eta^2 = .123$, Task Type, $F(1, 128) = 22.68, p = .000, \eta^2 = .151$, and Induction Order, $F(1, 128) = 10.39, p = .002, \eta^2 = .075$.

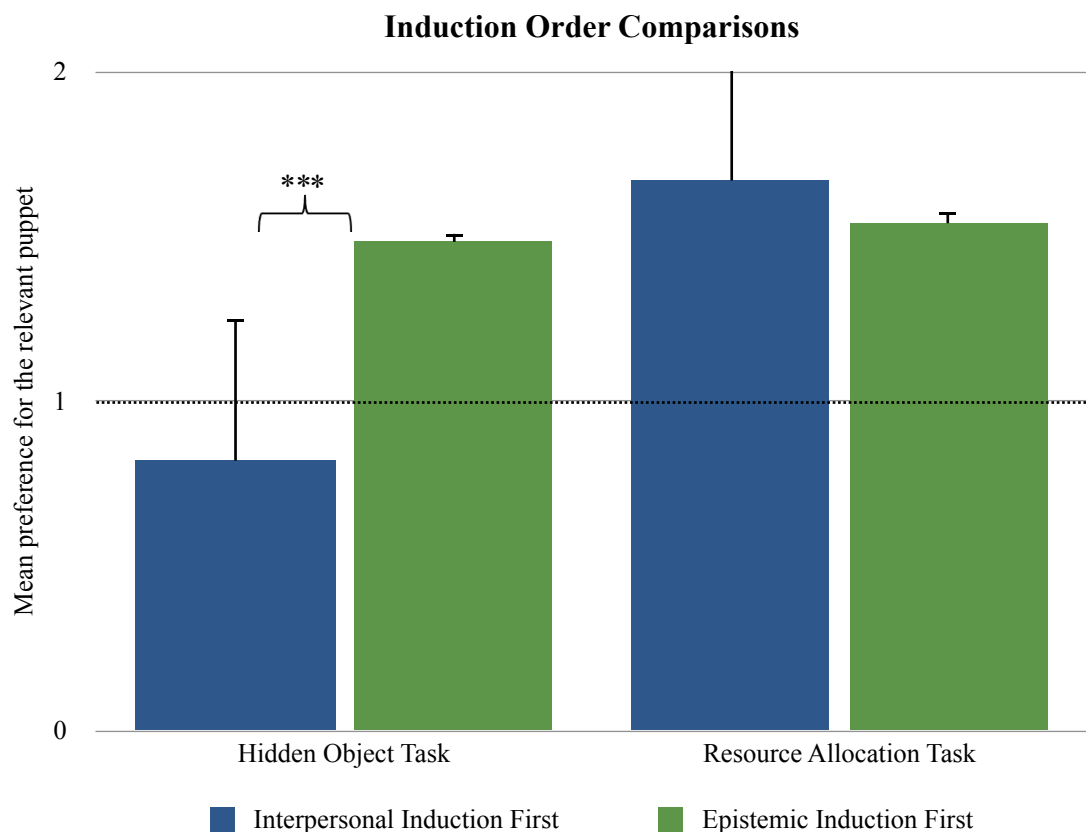
Importantly, these main effects were qualified by an interaction term between Task Type and Induction Order, Wilks' Lambda = .88, $F(1, 128) = 17.51, p = .000, \eta^2 = .120$, and also between Age Group, Task Type, and Induction Order at the trend level, Wilks' Lambda = .96, $F(2, 128) = 2.41, p = .094, \eta^2 = .036$. This suggests that the type of induction children first learned affected their flexibility later depending on the type of test tasks, and this effect was different across age groups.

We followed up on the interaction effect between Induction Order and Task Type with independent samples t-tests and compared children's performance in the Hidden

Object and Resource Allocation tasks across the induction orders (see Figure 3).

Results revealed that children who had learned first who was nice versus mean had more difficulty while choosing the relevant agent for the Hidden Object task compared to those who had learned first who was accurate versus inaccurate, $t(132) = 4.69, p = .000, d = 0.81$. That is, induction order affected children's preference for the relevant puppet when making learning decisions. However, there were not any differences between children's scores who had learned first who was nice versus mean and accurate versus inaccurate for the Resource Allocation task, $t(132) = 1.25, p = .215, d = 0.22$.

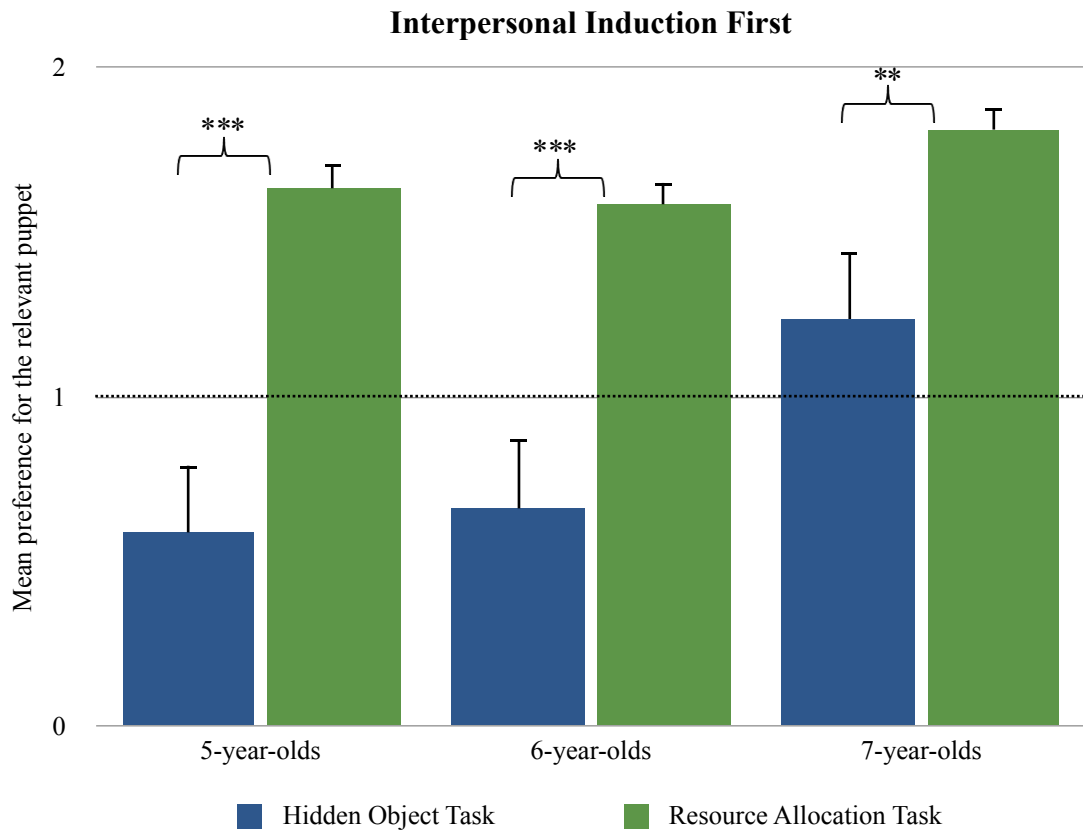
Figure 3. Children's choice of the relevant puppets across the induction orders



Note. * $p < .05$, ** $p < .01$, *** $p < .0001$

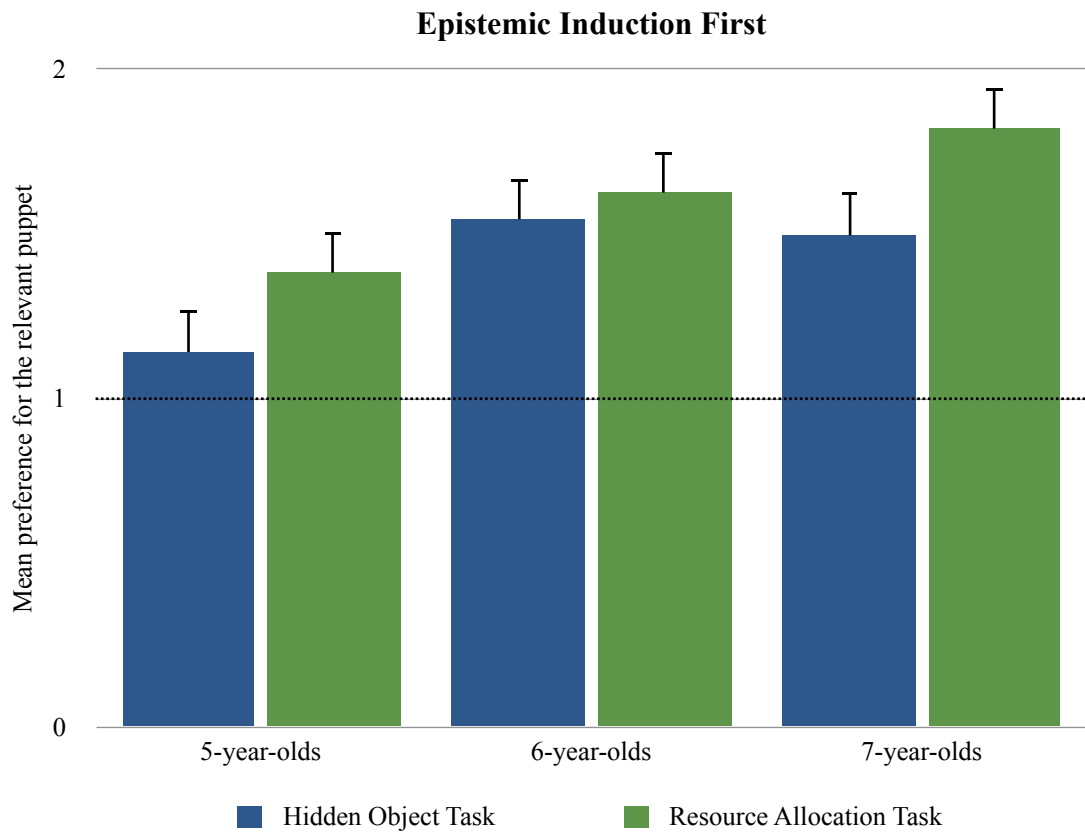
We also followed up on the interaction effect between Induction Order, Task Type, and Age with paired samples t-tests and compared children's performance in the Hidden Object and Resource Allocation tasks within each induction type by age: interpersonal induction first (see Figure 4) and epistemic induction first (see Figure 5). Results revealed that all children who had learned first who was nice versus mean had more difficulty while choosing the relevant agent for the Hidden Object task compared to the Resource Allocation task (5-year-olds, $t(21) = 3.91, p = .000, d = 1.50$; 6-year-olds, $t(23) = 4.08, p = .000, d = 1.24$; 7-year-olds, $t(20) = 3.01, p = .007, d = 0.83$). In contrast, there were not any differences between children's performance on the Hidden Object and Resource Allocation tasks if children had learned first who was accurate versus inaccurate.

Figure 4. Children's choice of the relevant puppet by age across the test tasks



Note. * $p < .05$, ** $p < .01$, *** $p < .0001$

Figure 5. Children's choice of the relevant puppet by age across the test tasks



Note. * $p < .05$, ** $p < .01$, *** $p < .0001$

CHAPTER IV

DISCUSSION

Much interest in selective trust has focused on children's preference for one agent over the other in learning situations (e.g., novel object names). In these situations, children monitor epistemic cues about the agents and decide whom to endorse based on the given indicators. Hence, children's selective learning decisions were mainly interpreted in evidential considerations, in which children either follow simple behavioral rule strategies and pay less attention to non-predictive agents or make mental state inferences and attribute incompetence or deception to inaccurate agents. That is, selective trust was treated as children's responsiveness to evidence that indicates the potential reliability of testimony or agents, such as the history of (in)accuracy and domain of expertise. Although it is not denied that children do consider ordinary evidence from what they are told in their evaluations of others, this characterization of testimonial exchanges risks being too general. In other words, the strict characterization of learning from testimony as evidence monitoring overlooks the fact that decisions to trust others vary substantially across social situations and neglects the likelihood that such variation might have significant implications for trust development. In cases of epistemic trust, children's decisions are responsive to

epistemic cues that show the predictiveness or reliability of testimony. In cases of interpersonal trust, children not only trust others because they collected sufficient evidence but because they show commitment to and take them at their word as social agents.

In order to account for the bi-dimensional nature of trust, the current paper argues for distinguishing between cases of epistemic trust from interpersonal trust and presenting children with social situations that demand different types of considerations. In particular, children were confronted with a mean agent who demonstrated an interpersonal violation of trust when the agent lied to blame a friend and avoid punishment. They were also confronted with an inaccurate agent who demonstrated an epistemic violation of trust when the agent gave incorrect information about familiar animals. The interpersonal and epistemic characteristics of the agents were later pitted against each other such that the mean agent showed accuracy while the inaccurate agent showed benevolence. That is, each agent invoked a different type of failure. Next, children were asked to prefer one agent over the other in situations that required the considerations of either competence or benevolence depending on the task demands. In this way, the current study builds upon a new direction in selective trust, and it provides evidence that children weigh epistemic and interpersonal violations of trust differently.

4.1. Children's Halo-Like Trust Generalizations

In the initial induction phase, children were given either epistemic or interpersonal information about the informants, and in the first test phase, they were asked to

prefer one informant for different types of situations in which they were supposed to learn the place of hidden objects or distribute limited resources. Accordingly, the first research question was whether children make halo-like generalizations when provided with only epistemic or interpersonal information about the informants. Past research showed that when informants differed from each other in overall competence within a domain, whether it be epistemic or interpersonal, children preferred the more competent informant for all test tasks beyond the chance level (Brosseau-Liard & Birch, 2010; Fusaro et al., 2011; Lane et al., 2013). Specifically, children considered an accurate labeler also to be more prosocial, a strong informant to be nicer, and an informant with positive traits (e.g., smart, nice, honest) to be knowledgeable. Hence, they recruited the more competent or benevolent informant regardless of whether the given domain of competence and the task demands matched or not. Thus, they demonstrated halo-like generalizations from one type of cue to both relevant and irrelevant domains.

Although children tend to show halo-like generalizations when provided with one accurate and one inaccurate (or one nice and one mean) informant at the same time, there also seem to be findings against such generalizations across domains. One factor relevant for generalization seems to be whether the type of error is semantic or episodic (Stephens et al., 2015). It was demonstrated that children show less responsiveness to episodic errors (e.g., object locations) compared to semantic errors (e.g., object labels), and thus they generalize more heavily if an informant exhibited semantic incompetence. For example, children mistrusted the testimony of an incorrect labeler about the location of objects even when the labeler had perceptual

access (Kushnir & Koenig, 2017). Similarly, another study showed that children who were provided with an inaccurate speaker about familiar objects avoided the speaker both for learning novel object names and the places of hidden objects (Stephens & Koenig, 2015). However, children who were provided with an inaccurate speaker about object locations did not generalize the incompetence of the speaker, and thus they only mistrusted the inaccurate speaker to learn object locations.

These past findings indicate that children may be more vigilant toward semantic errors. Given that episodic errors are situation specific and thus tied to place and time, they are not as likely to signal violations of social conventions and be more “excused” or “forgiven” as unintentional ignorance (e.g., lack of visual access).

Whereas semantic errors violate generalizable, arbitrary, and conventional knowledge, and therefore they might be more readily attributed to an informant than to be situational. That is, misinformation communicated through language might be informative not only about the world but also about its speakers. It might be the inexplicable violations of commonly held knowledge that call into question the reliability of an informant and hurt its authority as a social agent, which eventually results in selective mistrust against inaccurate labelers. The inaccurate speaker exhibits a type of deviation from the conventional or shared knowledge that might lead to severe interpretative problems for young children. Hence, once semantic violations are identified, they may signal different importance for children’s later practical and learning decisions than episodic ones.

Given the empirical evidence for children's halo-like generalizations of perceived competence as well as their avoidance of semantic incompetence, it was hypothesized that children will choose the same informant (either nice or accurate) for both the hidden object task and the resource allocation task. In line with the first hypothesis, the results revealed that children preferred the accurate or nice informant for both kinds of test tasks above chance, and thus we found evidence for the halo effect. Furthermore, this type of halo-like generalization for the competent or benevolent informants did not differ as a function of age, and all age groups showed the same pattern. These findings might suggest that children have a relatively undifferentiated trust of informants proven to be 'good' in one domain and form positive global evaluations of the competent or benevolent informants when accompanied by an incompetent or malevolent ones. In the same vein, the alternative interpretation might be that children form global negative evaluations of the incompetent informant when accompanied by a competent one, and thus they have undifferentiated mistrust of informants who are proven 'bad' in one domain. In either case (i.e., choice of a competent informant or avoidance of an incompetent informant), children go with the same informant for all test tasks if only one type of information is available to them about the informants. Hence, children might treat informants as (un)trustworthy across multiple domains, whether it is because of choosing or avoiding informants. There is no clear evidence in which direction trust or mistrust toward informants with positive or negative characteristics prevails.

Although it is only possible to understand whether children prefer the nice and accurate informants or avoid the mean and inaccurate informants unless each

informant with positive or negative characteristics is pitted against a neutral informant, the question of what such preference for one informant indicates arises at this point. From the perspective of the evidential accounts, children's halo-like generalizations are indicators of their lack of advanced cognitive skills necessary for being a selective learner or the use of simple behavioral rule strategy such as copying 'the most successful' informant (Hermes et al., 2018; Heyes, 2016; Poulin-Dubois & Brosseau-Liard, 2016). From the perspective of the current perspective, on the other hand, such a pattern of halo-like generalizations does not necessarily reflect children's cognitive limits or bias to believe what they are told. Instead, this pattern indicates that children pursue interpersonal goals for their own sake. That is, when there is no conflicting epistemic and interpersonal information about the informants available to children, they may have found an informant worth (mis)trusting, irrespective of the type of test tasks. Hence, children may have been motivated to be affiliated with the accurate or nice puppet for both tasks, not because accuracy was a cue to benevolence or niceness was a cue to competence. In fact, interpersonal considerations may have featured in children's judgments of the informants, and children may have been driven by establishing or maintaining an ongoing social practice with the seemingly cooperative informants. Since trusting someone does not solely involve estimating reliability in light of the evidence, social dynamics embedded in a shared reality might have led children to (dis)favor an informant.

4.2. Children's Flexible Trust Decisions

In the updated induction phase, children were given additional information about the informants that they were confronted with in the initial induction phase, and thus

they learned conflicting epistemic and interpersonal characteristics of the informants. Then, in the second test phase, they were asked to prefer one informant for the same social situations in which they were supposed to learn the place of hidden objects and distribute limited resources. Accordingly, the second research question was whether children flexibly weigh epistemic and interpersonal considerations in accordance with the purpose of a broader social situation when making selective trust decisions. Past research showed that children's favorability ratings of an agent were reduced if they witnessed an antisocial behavior of the agent, and children shared less resources with that agent; however, their learning decisions from that agent were not reduced (e.g., Hetherington et al., 2014; Pesch & Koenig, 2018). That is, the interpersonal failure of the agent moved children's practical decisions about that agent but not their epistemic decisions. Therefore, it was hypothesized that children will choose the accurate (but mean) informant for the hidden object task and the nice (but inaccurate) informant for the resource allocation task.

Partially in line with the second hypothesis, results revealed that older children preferred the accurate (but mean) informant for the hidden object task. In particular, this preference for the accurate (but mean) informant differed as a function of age such that only the oldest children endorsed the accurate informant to learn the places of hidden objects. In contrast, all children preferred the nice (but inaccurate) informant for the resource allocation task. This preference for the nice informant did not differ as a function of age, so all children decided to share more resources with the nice informant. These findings overall indicate that only older children appreciate that an informant can be unreliable for interpersonal reasons (i.e., mean behavior),

but that the same informant may still have accurate knowledge to share or vice versa. Hence, older children might have developed a better understanding that trust can be situational. However, it seems that the interpersonal characteristics of the informants interfered with young children's epistemic decisions. That is, young children were unable to disregard the immoral behavior of the accurate informant in order to learn the places of hidden objects above the chance level. Instead, they were affected by the accurate informants' interpersonal violation of trust, and thus they did not prefer the accurate informant even if the situation required epistemic competence.

In contrast to the current results, past studies have found that children's practical decisions to share with an agent were affected by interpersonal characteristics such as benevolence, but their epistemic decisions to learn from the same agent were not affected by how nice or mean that agent was (Hetherington et al., 2014; Pesch & Koenig, 2018). The discrepancy in results related to younger children's inability to switch to the accurate (but mean) informant when asked to learn novel object places is likely to be a result of a difference in the induction phases between the studies. In the present study, the accurate (but mean) informant versus the nice (but inaccurate) informant were introduced on equal terms such that in the benevolence induction phase, one informant was nice and one was mean, while in the accuracy induction phase, nice one was inaccurate and mean one was accurate. Thus, the epistemic and interpersonal characteristics of the informants were pitted against each other, and children were given the opportunity to witness both induction phases. In the previous studies, in contrast, children only saw an interpersonal induction phase in that they learned which informant was malevolent but were not presented with information

about their knowledge levels. Hence, the potential reason behind children's unmoved learning judgments might be their lack of information about the informant's epistemic characteristics, and therefore children might have found interpersonal information insufficient by itself to feature in their decisions. As they were given both types of inductions in the current study, who was nice or mean might have been more informative about the informants for younger children, which, in turn, resulted in their persistence in preferring the nice (but inaccurate informant) for all test tasks.

4.2.1. Children's Flexible Trust Decisions and Cognitive Measures

Two cognitive factors that might account for children's flexible trust decisions were investigated: ToM and EF. Accordingly, the third research question included three subquestions: (a) Does EF account for age effects? (b) Does ToM account for age effects? (c) Does interaction between EF and ToM account for age effects? The relation between children's preference for the relevant informants and ToM development indicated inconsistent results in the literature. In particular, no relation was found between 3- and 4-year-olds' false belief understanding and their preference for an accurate informant such that both age groups were able to endorse a more accurate informant to learn novel object names (Pasquini et al., 2007).

However, another study that used ToM tasks designed to measure children's mental state understanding more comprehensively (e.g., not only false belief but also knowledge access and diverse desires tasks) found a positive relation between children's scores on ToM battery and selective trust scores (Brosseau et al., 2015). It should be noted that although children's overall ToM score seemed to predict their trust performance, explanatory analyses revealed that only children's diverse belief

scores predicted learning from the accurate informant. Similarly, a different study that used ToM battery found a positive relation between children's knowledge ignorance scores and their ability to identify the accurate source (Allen et al., 2021).

The relation between children's preference for relevant informants and EF development also remains somewhat unclear. It was found that children who protested informants' overtly misleading testimony also performed better on an inhibitory control task than those who repeatedly deferred to misleading testimony (Jaswal et al., 2014). Also, children with advanced EF skills preferred an accurate informant to learn novel object names and a strong informant to lift heavy objects and thus did not make halo-like generalizations (Hermes et al., 2018). However, it was found no relation between 3- and 4-year-olds' working memory, inhibitory control, and flexible set-shifting skills and their preference for relevant informants (Lucas et al., 2013).

In contrast to studies that reported positive relations between ToM and selective trust, in the current study, we failed to find any significant correlation between ToM and children's flexible preference for the accurate (but mean) informant in the hidden object task and the nice (but inaccurate) informant in the resource allocation task. Accordingly, we may offer two interpretations for the divergent findings: methodological and theoretical. In terms of a methodological interpretation, it is noteworthy to point out that direct measures of children's mental state understanding were not used in the present study. Instead, a parent-report measure of mental state understanding was used, and therefore findings are less directly comparable to the

other research. Still, the CSUS has good internal consistency, which confirms the reliability of the scale across different studies (Brousseau-Liard & Poulin-Dubois, 2019; Gluck et al., 2021; Tahiroğlu et al., 2014). In contrast to its reliability, we were unable to find any relation between children's age and ToM as well as their EF scores, which contradicts with the past results that found a positive correlation between age, ToM, and EF constructs (Tahiroğlu et al., 2014). Given this disparity, it could be suggested that the scale may not be age appropriate to capture corresponding improvement of children's mental state understanding. Noteworthy, the lack of link between them warrants further investigation to clarify if parental report ToM is reliably associated with age and EF skills (Dutemple et al., 2023). In terms of a theoretical interpretation, children's flexible trust decisions may not require mental state inferences about informants per se. Instead, learning from others is a form of interpersonal trust far from the beginning, and children learn to differentiate epistemic trust from interpersonal as they participate in ongoing shared realities and appreciate that the nature of social situations varies. Thus, children may prefer to learn from accurate or nice informants for different reasons, and mental state inferences might be unnecessary for engaging in such social realities (Allen & Bickhard, 2018).

In line with the studies that reported positive relations between EF and selective trust, in the current study, we found significant correlations between EF and children's flexible preference for the accurate (but mean) informant in the hidden object task and the nice (but inaccurate) informant in the resource allocation task. Further inspections of the relation between EF and children's flexible trust decisions

revealed that composite EF predicted children's preference for the relevant informant even after controlling for age for the hidden object task but not for the resource allocation task. These results suggest that EF may be a key construct to account for the age differences in the hidden object task. Although younger children were able to give correct answers to manipulation check questions, they still did not choose the accurate (but mean) informant to learn the place of hidden objects. As they potentially had difficulty in switching between cues, moral information would have interfered with their epistemic decisions, and therefore they could not demonstrate a preference for the relevant informant. However, this pattern was not valid for the resource allocation task in that they chose the nice (but inaccurate) informant to share more resources with.

At this point, it goes unexplained from the perspective of the evidential accounts why the evidence about the informant's epistemic characteristics was not registered in younger children's evaluations of the informants. That is, the evidential accounts of children's selective learning decisions leave it unclear why children were selective of the nice informant in their practical decisions (to share limited resources) but not the accurate informant in their epistemic decisions (to find hidden objects). After all, children were presented with both epistemic and interpersonal information about the informants, both of which are types of evidence accepted to have impacts on children's selective trust (Doebel & Koenig, 2013; Liu et al., 2013). If children reduced an informant's interpersonal violation of trust to evidence, it will need to be explained why the informant's unreliability was not only registered in practical decisions but also in learning decisions. This interference of interpersonal

considerations with younger children's choice of the nice (but inaccurate) informant for both test tasks can be best explained by whether children consider epistemic and interpersonal violations of trust as categorically the same or one type of trust signals a more serious failure of an agent.

4.2.2. Children's Flexible Trust Decisions and Induction Orders

In the current study, the order in which interpersonal and epistemic information about the informants was counterbalanced so as to investigate whether there is an order effect for type of trust on children's flexible trust decisions. In the literature, children are often presented with interpersonal information about informants first (e.g., familiarity, benevolence) due to the task structure of the canonical trust paradigm. As the presentation of interpersonal information about informants was manipulated in a way to resemble the presentation of epistemic information, and both became different induction phases on their own, such manipulation enabled us to counterbalance each induction phase. It was speculated from the theoretical standpoint of this paper that interpersonal and epistemic violations of trust, in essence, signal different types of failures (Bickhard, in prep). Once an agent offers incorrect information about familiar animals and thus demonstrates incompetence, that agent violates epistemic trust in that the presumption of the agent as a potential source of information in a shared reality is put into question. However, the agent can more easily fix such a violation of trust because it does not require social agent repairs but just situational repairs. In contrast, once an agent lies for selfish reasons and thus demonstrates immoral behavior, that agent violates the shared reality itself, and the whole sociality of that agent is put into question. Hence, this type of failure requires different and

probably more complex repairs. Accordingly, it was hypothesized that children will avoid the mean informant for both the hidden object and resource allocation task when interpersonal information comes first.

In line with the last hypothesis, children who learned the interpersonal characteristics of the informants first showed less flexibility in their learning decisions but not in their practical decisions. That is, children who were presented with initial information about which informant was nice and which was mean had more difficulty in choosing the accurate (but mean) informant in the hidden object task. It should be reminded that their failure to prefer the relevant informant for the hidden object task was not because they could not understand who was accurate or inaccurate. Their answers to manipulation check questions confirmed that they learned the epistemic characteristics of the informants (also for children who received the accuracy induction in the initial phase). That said, they still could not switch from endorsing the nice (but inaccurate) informant to the mean (but accurate) informant for the learning situation. Therefore, these findings suggest that children indeed treat interpersonal violations of trust as more serious failures, which in turn supports the idea that children's early testimonial learnings are characterized by the interpersonal form of trust. Such interpersonal considerations are never left behind, given that learning is irreducibly a social action, but children learn to differentiate situations, and thus evidential considerations modulate interpersonal trust depending on the type of social situation. As interpersonal considerations that feature in children's evaluations of others have broader implications for reliability since children begin to engage in shared social practices, interpersonal violation of trust

might have been more difficult to forgive for young children's newly developing understanding of situational flexibility.

4.3. Conclusion

Recent work in selective trust seeks to examine the forms of trust that feature in children's judgments about agents. Toward that end, children are presented with multidimensional agents who have conflicting moral and epistemic characteristics, and they are asked to evaluate them not only in learning decisions but also in more practical decisions. Although the current findings suggest a dissociation between children's learning and practical decisions, they still call for closer investigation of the varieties of trust in order to advance our understanding of what role they play in trusting others. Furthermore, it will be significant for future research to clarify contextual factors that may have an impact on children's evaluations of epistemic and interpersonal trust. That is, samples from more diverse populations can help us to understand how enculturation may inform children's decisions to trust or avoid people who offer unreliable testimony. For instance, children who were raised in less secure environments (e.g., low SES, authoritarian parenting) may be more vigilant in general or may be less likely to forgive some violations of trust. It is also significant for future research to consider the alternative possibility that once children endorse information from ignorant or deceptive agents, such decisions may not necessarily indicate the credulous or irrational nature of children who are unable to monitor evidence. Instead, it may reflect children's, as participants in processes of social realities, robust decisions to (mis)trust others for the sake of interpersonal reasons.

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