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Exploring how preschool-aged children reason about the community-bound nature of cultural conventions

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General introduction

People's behavior adheres to and is shaped by different regularities in their environment. Some of these regularities are rooted in the laws of the natural world, such as how the movement of the Earth—both around its axis and around the Sun—results in changes in the weather and the alternation of days and nights. Others are formed through social activities and held up by social agreement. Every household has their own routines and habits, for instance, about where certain items are stored and what is usually eaten for breakfast. In addition, there are other types of social agreement-based regularities that exceed the confines of small groups: being members of cultural communities specify the practices that should be held and the norms one needs to comply with. These include how one should behave upon meeting others and what kind of objects are used to attain certain goals. All of these facts—whether being natural or social—regulate the behavior of people during their everyday activities.

Upon entering the world, children need to learn about these regularities and their complex interrelations in order to competently navigate in their environment. Importantly, from the perspective of a novice to human societies, these facts differ in some relevant attributes which have implications for learning (based on Diesendruck & Markson, 2011; Kalish & Sabbagh, 2007). Some information can be considered *universal* in the sense that it is naturally available, self-evident and objectively true. Regularities rooted in the natural laws usually constitute this type of information. For instance, although its exact form and frequency may differ greatly at various locations, it can be observed by all who live on planet Earth that rain results in things becoming wet. Thus, on the one hand, children have the opportunity to observe and explore this regularity by themselves, and at the same time, they are warranted to assume that this information is known by all others. In contrast, so-called *idiosyncratic* information is only shared in a very limited circle, such as in a family or among friends. Therefore, in the case of this type of information, one needs to have specific access—i.e. being a member of the family or the friend group—in order to be knowledgeable about such information. Thus, children would be correct in assuming that the name of their sleeping toy is only known by members of their family and that only their friends from the kindergarten would understand if they referred to their favorite pretend game. In other words, while they could assume that all people shared their knowledge about how the weather

influences their environment, they should limit their assumptions about sharing the knowledge about their toy to members of their family.

However, many regularities—especially the ones that determine how one ought to behave in the social world—are rooted in cultural practices. These are often referred to as cultural or social conventions (Lewis, 1969). This kind of knowledge differs both from universal and idiosyncratic information: cultural conventions are usually acquired from others, are bound to particular cultural communities and are cognitively opaque (Diesendruck & Markson, 2011). This latter means that from the point of view of an observer, the cause-and-effect relationship between the behavior and its consequences is difficult, if not impossible, to discern. Examples for this may come to mind from religious practices: it is customary for Catholic believers to kneel and make the sign of the cross upon entering a church. At first glance, observers could neither be able to uncover the goal of this action (but could nevertheless reproduce it, without understanding the particulars), nor invent the action for themselves. Opaque cultural practices also surround having meals, which may differ from culture to culture. For example, the order in which those sitting around their table receive their food may be determined by conventions: it is often the oldest member of the family who is getting the first portion.

This attribute implies that, oftentimes, conventions cannot be learnt via individual exploration—as opposed to universal information—and it is warranted to assume that they are shared by some people (i.e., members of the same cultural community), but not by others (people who were socialized in a different culture). Thus, its applicability is more limited than that of universal information, but more broad than that of idiosyncratic. In other words, this type of knowledge often varies with regards to its scope of applicability (Kalish & Sabbagh, 2007)—both in terms of which other situations or which other persons these are applicable to. These attributes, among others, contribute to the challenges children face while learning information of this kind. First of all, they need to discern which pieces of information constitute conventional knowledge. In addition, in order to cooperate and communicate with others, they also need to figure out who shares their knowledge about conventions and who does not. As mentioned previously, this is difficult since these information are community-bound, therefore, their scope of applicability can vary greatly. Finally, since these information are neither self-evident nor naturally available—and thus are generally conveyed by other people—children need to identify those who possess the relevant knowledge in order to acquire the conventional forms appropriate in their culture. All of these

complexities of acquiring conventional knowledge highlight the importance of investigating children's developing understanding of these forms of behavior.

1.Which attributes characterize conventional forms of behavior?

As partly described above, conventional forms of behavior have a number of unique attributes (Lewis, 1969; Diesendruck & Markson, 2011; Rakoczy & Schmidt, 2013). With regards to the content of conventions, these are characterized by a certain extent of arbitrariness—which may vary from one form to another. This means that their exact form "could have been different" (Lewis, 1969; Diesendruck & Markson, 2011)—but ended up being a certain form as a result of some processes (such as social agreements or repetition). Moreover, these are characterized by the aforementioned cognitive opacity. Thus, it is usually not possible to disentangle from an observer's point of view how the action itself is causally related to the goal. In addition, conventional forms are inherently social: they come to existence through shared assignment and acceptance, and are acquired from social partners. Another attribute of social conventions is their prescriptive nature. This means that these set the standards of appropriateness both in connection with one's own behavior and the behavior of others. Importantly, a proper understanding of this prescriptivity entails that these are applicable in an agent-neutral way to people in equivalent circumstances (Nagel, 1970 in Rakoczy & Schmidt, 2013). (Note, however, there are forms of conventions that are not normative, but could be described as social regularities shared by a community (Lewis, 1969)—such as conventions about clothing.) At the same time, conventional forms are bound to certain communities. In other words, these forms are context sensitive and are applicable only within certain contexts. This context may be determined by the number of factors (for e.g., a convention could be tied to a physical location, or to a particular circumstance or community). Thus, the above mentioned prescriptivity has its boundaries. All in all, grasping these properties is necessary in order to have a proper understanding of conventions.

To illustrate the complexities of cultural conventions, let us consider greeting each other upon meeting as an example. In Hungary—and in many other countries—, it is customary to shake hands upon meeting an unfamiliar person (for the first time). This act in itself does not have a clear, specific goal—although historically, it has been proposed to signal peace, as through a handshake, one can display that they are not holding any weapon in their right hand (Oxlund, 2020). The exact form of this convention is quite arbitrary: a number of other movements could be assigned the function of introduction to and recognition

of another person (arguably, even ones which allow more personal space or pose lower health risks). Importantly, many conventions are tied to some forms of actions that are based on efficiency (such as in the example described above, according to which a handshake would allow the inspection of whether the other person is armed or not). Nevertheless, in the case of many long standing conventions, the actions have lost their original—potentially efficiency-based—purpose or in many instances, these efficient elements were intertwined with arbitrary ones right from the beginning. Additionally, through observing other people being engaged in a handshake, the exact purpose of this act cannot be disentangled clearly. Furthermore, even if the purpose itself is discernible, the manner in which the act itself is connected to this purpose is often unclear—thus, it demonstrates cognitive opacity. Although the history and the process through which long-standing conventions have been created—such as how people greet one another—are often unknown by people currently adhering to these regulations, at their point of origin, these became customary based on agreements or repetition in the community. Importantly, the way in which the conventions remain upheld is by being conveyed to newcomers (such as children) by people in their environment. In other words, children would not spontaneously discover these regularities—as they could do so by observing what happens after it rains—, but rely on others (their observation and/or their teaching) to acquire them.

Additionally, shaking hands upon meeting is not only a description of what happens in Hungarian culture, but it also constitutes a prescription: people *should* initiate and/or respond appropriately to others' greetings. Thus, based on conventions, one has a template to which they can adjust their own behavior and based on which they can form expectations about and evaluate the behavior of others (Rakoczy & Schmidt, 2013). Consequently, not adhering to these prescriptions can have consequences for people—which may range from being considered rude, or bringing about penalties. (Other types of inferences are also possible, see in further sections below—for e.g., taking it as evidence whether someone is a member of the cultural community or not (Oláh & Király, 2019).) Importantly, the applicability of conventions is restricted to certain communities, thus limiting the range within which these are prescriptively powerful. For example, other cultures may have different conventions about greeting others: in some countries, bowing is considered the proper way to do so. Therefore, the form that one should adhere to is contextually bound. This context could be determined by different factors: it is possible that one should adhere to the greeting custom of what is valid locally, but in other cases, it may be warranted to adjust one's behavior to the person they are meeting—irrespective of which place they are meeting at. To complicate

things even further, the applicability of the forms may even vary within the culture, between subcultures and with changes in time. For instance, expected forms of greetings may vary based on age, gender or closeness of relation. Conventional forms are also subject to changes in circumstances: for example, the COVID-19 pandemic in 2020 have shaped the greeting customs in Hungary, as direct contact between people's hands was considered risky for sanitary reasons. Thus, other forms have become more frequent (for e.g., waving). Additionally, it is also possible to deviate from (some) conventions based on agreements in small groups or between persons, and establish other forms based on personal preferences.

All in all, conventions have a number of aspects that are fascinating from a scientific point of view (such as the way in which these are formed, maintained or subject to changes in human societies). Nevertheless, in the further sections of this introduction we limit our discussion to what we know about children's developing understanding of these forms of behavior. Within this topic, we dedicate special focus to how children come to understand the community-bound, context dependent nature of conventions. This attribute makes conventions highly variable with regards to the scope of their validity. We focus on this aspect of conventions since this quality is one that essentially differentiates conventional information from other types of knowledge. Also, the further topics and research questions introduced in this Dissertation are linked together by their connection to this aspect of conventionality.

2. How do children discern whether something constitutes conventional knowledge?

While much information in children's environment constitutes conventional knowledge, identifying these as such poses a challenge for them. In the following sections, we discuss findings related to the question of how children may nevertheless assume conventionality in a number of cases. On the one hand, children may be more likely to assume conventionality in the case of certain domains of information. Language and human-made artifacts could constitute two such domains. On the other hand, cues in the behavior of others may also prompt children to make inferences about conventionality—for example, if something is demonstrated to them in a communicative context or as an intentional action by others, this may signal to children that the observed behavior is the way "things need to be done" (Csibra & Gergely, 2009, 2011; Diesendruck & Markson, 2011). Finally, as conventions are conveyed socially, some attributes of others (such as their expertise in the child's culture) may also lead children to consider acts performed by cultural experts as representing conventional

knowledge (Diesendruck & Markson, 2011). Importantly, in summarizing the findings of related studies, we focus on exploring whether children generalize the applicability of these behaviors to themselves and to others, and at the same time, whether these generalizations are limited by some factors—which would reflect that they indeed grasp that conventional information have a limited scope of applicability.

2.1. Identifying conventional forms of behaviors based on domain

2.1.1 Language

Language could be considered one of the paradigmatic instances of conventional forms of behavior since linguistic forms are arbitrary combinations of sounds that are assigned meaning through collective practices (Kalish & Sabbagh, 2007). Relatedly, Clark has identified conventionality as one of the principles that guides the (first) language acquisition of children (Clark, 1993, 2007). This principle describes that "(...) for certain meanings, there is a form that speakers expect to be used in the language community, where a form in question can be a word, expression, idiom, construction or some combination of these" (Clark, 2007, p. 14). Thus, successful communication relies on the assumptions of the interlocutors that certain conventional linguistic forms are used to express particular meanings (Clark, 1993). Furthermore, language is both an important vehicle of conveying conventions to children (for instance, through generic linguistic forms, Gelman et al., 1998) and a cue based on which children may infer the cultural group membership of others (and thus identify their potential "teachers", see section titled *Cues about the knowledgeability of others*).

A number of studies have investigated how children reason about whether others know a novel word they have just learnt themselves. In these experiments, children are typically taught a novel word by an experimenter ("*Where's the mido*?") (example based on: Graham et al., 2006), and then in a second round, another person enters the room, and recruits their help in selecting the object ("*Show me the mido!*") from an array of further items. Thus, if children assume that others know the novel word, they should choose the appropriate object upon request—even if this request is made by a person who was not part of the naming episode. This task is usually contrasted with information of other kinds—for example, the first experimenter may introduce the novel object as the one she wants. In these cases, the

second experimenter asks the participant to give her the object that she desires ("Show me the one I want."). Therefore, it can be explored whether children generalize other types of information—such as desires—from one person to another. Findings from these experiments show that even as young as 19-months of age, children assume that others share their knowledge about common names (such as novel object labels) (Graham et al., 2006). The pattern of results are similar both in the case of 2 year-old children and preschoolers (Henderson & Graham, 2005; Diesendruck & Markson, 2001; Diesendruck, 2005). Importantly, while one can assume that common nouns are known by others, this expectation should be limited to knowledgeable others—for example, members of a language community. Findings show that preschoolers appreciate differences in knowledgeability, and do not expect other people to know common names from another language than their own (Diesendruck, 2005, Experiment 2).

At the same time, children appropriately limit their assumptions about who shares their knowledge of other kinds of information. Toddlers do not expect people to share desires (Graham et al., 2006), nor do 2-year-olds expect others to share personal preferences (Henderson & Graham, 2005). (Although preferences—expressed, for example, by negative or positive emotions towards objects—may also constitute conventional knowledge, see the section describing *Natural Pedagogy*). Preschoolers also differentiate between linguistics forms: from the age of 2, children assume that proper names are used to refer to familiar items (Birch & Bloom, 2002, Experiment 1). Four-year-olds also understand that proper nouns should only be known by those with specific experience (those who witness someone using that name) (Diesendruck, 2005, Experiment 1). However, only 5 year olds are able to infer that a person is familiar with another person based on whether they know this person's proper name (Birch & Bloom, 2002, Experiment 2). Thus, these experimental findings show that children can appropriately extend knowledge of words to others, but are able to constrain these generalizations when it is warranted.

As children acquire language, this also becomes a vehicle for others to convey conventional information to them. In some cases, this is stated directly—such as "This is called a screwdriver" for the teaching of words, or "These are used for eating" for describing objects—, but often, it is conveyed in more subtle ways (for a discussion of naturalistic observations and experimental findings from families, see Callanan et al., 2007). One of the forms in which conventional information—and other types of facts—are conveyed to children is through *generic* language (Gelman, 2004; Gelman et al., 1998). Generic information refers to information about entire categories. The way in which this may be

expressed varies, but an example could be stating that "Forks are used for eating" (as opposed to "I use this fork for eating"). Findings show that children are sensitive to differences between generic and nongeneric language from around the age of 2 and 2.5 (Graham et al., 2011). Preschoolers assume that information conveyed in such a form can be generalized to wider categories (Stock et al., 2009; Graham et al., 2011) and is shared by others, as opposed to information introduced in a non-generic way (Cimpian & Scott, 2012)—but this latter study did not specifically test children's inferences about conventional information. Additionally, information encountered in such a way substantially shapes the categories children form about the world on multiple domains of information; for instance, children consider information conveyed in a generic linguistic form to be an essential property of the object category (Cimpian & Cadena, 2010; other domains: social others: Cimpian & Markman, 2011; biological kinds: Cimpian & Markman, 2009). As of yet, however, no study has specifically investigated how and if children limit their generalizations of information they have received in a generic format. Even if some convention is conveyed to children in this way (for e.g., "Forks are used for eating"), a proper understanding of conventional forms should limit them in extending this knowledge to those who are not members of their cultural community. Thus, further studies are needed to specifically explore how children interpret conventional information conveyed via generic language—i.e. whether they extend knowledge about this information to others, but limit these generalizations when warranted.

2.1.2 Artifacts

Another domain on which children may assume conventionality is that of human-made artifacts. This is warranted since the way in which these are used in cultural communities is heavily regulated by conventions, and functions are often assigned to objects based on the collective practices of the particular cultural communities (Searle, 1995). Importantly, these assigned functions may be related to the physical properties of the objects in varying degrees. In some of the cases—for example, in the case of (cash) money—these functions are assigned based purely on collective practices in the sense that the physical properties of the object (such as, a piece of paper) are not in any way related to the function they serve (paying) (see the concept of *status function* assignment: Searle, 1995). In other cases, the physical properties of the objects deem these appropriate for certain functions—although, oftentimes, based on these properties, a number of functions could be achieved with the same object. In

other words, objects may afford a number of different functions. For example, forks are used for eating in Western cultures, however, it would also be possible to brush one's hair with them (example from Oláh et al., 2014). Therefore, while objects may be considered (more or less) equally efficient for certain purposes, one primary function is usually assigned to them by cultural communities, thus denoting the conventional function of the object (Costall, 2012; Palacios & Rodríguez, 2015). These attributes of objects require a sophisticated understanding from their users, making the acquisition of object functions challenging for children.

Relatedly, the way in which younger children—below the preschool years—may conceptualize artifacts has been debated. The concepts of adults—and older children—can be characterized as having a *design-stance* towards objects (Dennett, 1989; Casler & Kelemen, 2005, 2007). This means that their concepts about objects are (more or less) stable, and are based on and centered around the intended function of the object. For instance, 5-year-olds believe that an object is "for" the activity it was designed to perform, regardless of its current use (Kelemen, 1999, although this may change if many people use the object differently, see in a further section titled *Other cues of behavior*, Siegel & Callanan, 2007). Furthermore, this conceptualization of objects involves an understanding of the object's function as normative which prescribes how people ought to use it. In contrast, it has been proposed that younger children's concepts about objects are characterized by a so-called *teleo-design stance* which differs from the concepts of both adults and older children, and that of monkeys (based on Casler & Kelemen, 2005). While the former—the concepts of older children and adults—are characterized by the previously described design stance, the latter—the concepts of monkeys—reflects a sensitivity to the physical affordances of objects. In more detail, the tool use of monkeys reflects a conceptualization of objects as means to reach certain ends in the here-and-now, without an enduring concept formed about the object. In contrast, the teleo-design stance considers the particular use of objects as stable, intrinsic properties that characterize the object kind. Thus, young children appreciate that objects are not merely used as transient extensions to one's goals. However, these concepts are less sophisticated and less inferentially powerful compared to the full-blown design stance.

Relatedly, studies have investigated how children learn and reason about human-made artifacts, and about the conventionality of their usage. Findings demonstrate that 2 to 3 year old children acquire the function of objects rapidly—even following one demonstration—and generalize this information to similar looking objects differing in color or slightly differing in shape (Casler & Kelemen, 2005, Experiment 1). Importantly, the object concepts of younger,

2 year-old children seem to somewhat differ from those of older children: while they attach functions to objects rapidly, an exclusivity that characterizes the behavior of older children, does not appear at this age (Casler & Kelemen, 2007). This means that younger children are less likely to consider the previously demonstrated function of the object to be its only function, and are more likely to use it for other purposes as well. At the same age, children expect others to use objects for the same function they have recently learned about (Casler & Kelemen, 2005, Experiment 2). Additionally, children consider functions of objects—both novel and familiar ones—to be normative, and protest if another person uses these objects differently (Casler at al., 2009). Furthermore, 2-year-olds expect people belonging to the same culture—evidenced by speaking the child's Native language—to use the same object for the same purpose (Pető et al., 2021, Experiment 1). However, they do not expect someone who belongs to a different community (a Foreign speaker) to use the same object (as a Native speaker) to reach the goal. (For the discussion of further findings about how children's learning about objects is shaped by the attributes of the teacher, see the *Cues about the knowledgeability of others* section below.) Additionally, children limit their generalization about whether people share knowledge about different aspects of objects: for instance, 3-year-olds do not assume that people share novel facts about objects (such as, "My sister gave this to me") (Diesendruck & Markson, 2001) or for them to have the same object preferences (Henderson & Graham, 2005). Thus, it seems children learn the functions of objects rapidly, and at the same age, expect others to possess this knowledge as well.

2.1.3 Playing and games

From the third year of their life, and even younger, children start to participate both in games with implicit rules—such as pretend play—and games with explicit rules—such as rule games—with others. Social games constitute another form of behavior which could be considered conventional, since stipulations in games resemble conventions in a number of ways: they are prescriptively powerful, contextually bound, as well as are often arbitrary and based on social agreement (Rakoczy & Schmidt, 2013). In developmental science, there has been a long tradition of investigating how children play and participate in games with others, in order to explore, among other things, their reasoning about social rules (for e.g., Piaget, 1997; Rakoczy 2007; Kalish & Sabbagh, 2007). On the one hand, game scenarios can be employed to explore which forms of behaviors children consider applicable to themselves

and whether they can follow changing norms. Related findings show that 2-year-olds follow that the same object may have changing identities in subsequent game scenarios (Harris et al., 1993). Two to 3 year-olds also learn rules of novel games quickly (Rakoczy et al., 2008), and flexibly change their behavior with the same objects according to current game rules in the given context (Weisberg & Bloom, 2009; Wyman & Rakoczy, 2009a). Thus, children rapidly learn what is appropriate behavior during games, apply these to themselves, and are also able to follow changes in what forms of behavior are currently appropriate.

Game scenarios also specifically allow the exploration of another attribute of conventional forms: namely, prescriptivity. These previously described findings do not shed light on whether children's motivation for following the game stipulations reflect an understanding of the rules as abstract and agent-neutral description of what others—and they themselves—ought to do under some circumstances (Rakoczy & Schmidt, 2013), or whether it is motivated by other factors (such as affiliative reasons). In contrast, the evaluation of other people's behavior may serve as proof that children grasp the prescriptive nature of some forms of behaviors (such as conventions) (Rakoczy & Schmidt, 2013). One manifestation of this evaluation could be spontaneous protesting or intervention towards someone who is breaking a rule (Rakoczy et al., 2008). This can be implemented in game scenarios during which both the verbal and non-verbal behavior of children can be recorded as a reaction to someone violating a rule (usually, a puppet). Thus, this type of experimental paradigm allows the participation of younger children since it does not require them to explicitly formulate their opinion—which would arguably underestimate their competence with regards to understanding game rules. Building on this method, it has been shown that in some circumstances, even eighteen months old children generalize simple rules from one partner to another (Schmidt et al., 2019). Similarly, older children—aged 2 to 3—do not only learn novel game rules very quickly, but they also attempt to enforce these on other agents (Rakoczy et al., 2008). This is true for rule-based games (Rakoczy et al., 2008; Rakoczy et al., 2009) and games of pretend play as well (Rakoczy, 2008; Wyman et al., 2009a, 2009b). Thus, based on their behavior during games, children seem to understand that some forms of behaviors are not only descriptive, but prescriptive both for themselves and for others. But do they understand that there are limitations to this prescriptivity?

Findings show that preschoolers grasp that the applicability of game rules is context dependent and constrain their generalizations about these rules according to a number of factors. For example, in case different rules are connected to the same object at separate locations, they only protest if a behavior violates the locally applicable stipulation (Rakoczy

et al., 2009; Wyman et al., 2009a), and they do not protest if someone violates a norm without an intention to join a game (Wyman et al., 2009b). In addition, 3-year-olds refrain from enforcing norms on those who did not consent to the norm during its creation and on those who lack knowledge about the rule (Schmidt et al., 2016). Relatedly, preschoolers only expect those belonging to their social group to adhere to conventional norms—represented in the study by game rules (Schmidt et al., 2012). (For a further discussion of how group membership and learning of conventional information are related, see section titled *Cues about the knowledgeability of others.*) Interestingly, in another study, 3-year-olds were shown to protest against the rule violation of an agent who could not know of a pretend game stipulation (Rakoczy, 2008).

These seemingly contradictory findings raise the question of how having knowledge about certain rules and ascertaining their applicability may figure into children's reasoning about others' behaviors. On the one hand, knowledge about the valid rules is necessary in order for somebody to comply with these—especially, when it comes to transient and ad hoc pretend stipulations which cannot be known by those who do not participate in the game. Thus, in the case of non-participants, it would be warranted to refrain from expecting them to know the rules and from protesting against their behavior. Nevertheless, if children do not consider having specific, valid knowledge—for example, about the current pretend stipulation at a specific location—as necessary in order for a rule to be applicable to somebody, they could nonetheless protest in response to a rule violation. This issue is even more complex when it comes to long-standing rules—such as those based on conventions. First, specific experience—such as being part of the game—is not necessarily required in order for somebody to have knowledge about a convention. For instance, someone could know the convention if they are a member of a cultural community (see also the section below titled *Cues about the knowledgeability of others*). Second, whether or not somebody possesses the relevant knowledge may or may not matter when it comes to what kind of behavior is expected from them. For instance, even if somebody does not know which side of the road is used for driving in a given country, they would be prohibited from driving on the wrong side and be sanctioned for doing so. In other cases, people from other cultural communities are not expected to comply with the rules (for e.g., with the rules of greeting). Thus, there is a great complexity to how knowledge about rules and their applicability may be interrelated.

Related to these issues, in *Chapter 1* of this Thesis, we introduce a proposal that suggests that participating in pretend play may support children in understanding the

contextually bound validity of some types of information (such as social conventions). In more detail, we propose that engaging in pretense manifests and supports children's ability to set up transient, arbitrary contexts with others (Rakoczy, 2007, 2008b; Chu & Schulz, 2020). As a consequence, children's participation in these transient pretend episodes may allow them to grasp that some types of knowledge are contextually bound—even though in the case of pretend play, this context is quite narrow in terms of who is part of it—, and this may serve as a relevant model for them of how conventions are bound to smaller or wider communities. Furthermore, in *Chapter 2*, we describe a study which aimed to explore whether preschoolers understand that the context within which pretend stipulations are valid is that of the pretend episode—and consequently, that these are only known by the participants of that episode.

All in all, findings from studies investigating children's reasoning about these domains suggest that as soon as they become acquainted with certain forms of behaviors—such as how objects are used or games are played—they readily extend knowledge about these forms to others. However, these generalizations are limited in many cases—as we can see, for instance, they do not extend knowledge about proper names (Diesendruck, 2005) or unique facts about objects (Diesendruck & Markson, 2001) to those not present during their introduction, or game rules to those who do not wish to participate (Wyman et al., 2009b). Thus, these early generalizations of knowledge do not merely seem to reflect an overall tendency to extend knowledge to all others, but rather a rudimentary understanding that some types of knowledge are shared with others, while other types are not. However, the further understanding of the complexities of conventions develops extensively during the preschool period. Nevertheless, many types of behaviors may constitute conventional forms—not only those from these domains. In the following sections, we review literature about cues that may help children in identifying conventional knowledge.

2.2 Identifying conventional forms of behaviors based on cues from and about others

2.2.1 Cues from the behavior of others

Notably, most activities have some elements that are rooted in conventions, and others that are rooted in other principles, such as efficiency (Clegg & Legare, 2015). For example, while candles have a most efficient way of being lit up and could mainly serve as a light source, within the framework of a birthday celebration, the same activity can have elements that are

rooted in conventions (i.e, singing or blowing the candles). Additionally, the same behaviors could be conceptualized both as conventional or instrumental, depending on the context. For instance, taking off a hat may serve the goal of cooling down in hot weather, but it may also serve the—cognitively opaque—goal of paying respect in a church (example from Altinok et al., 2022). How would children be able to distinguish conventional forms (or conventional elements of the certain forms) for other types of behaviors?

2.2.1.1 Natural pedagogy

One proposal suggests that children consider forms of behaviors embedded in certain communicative contexts as generic and shared by others in their community. This approach, named the theory of *natural pedagogy*, contends that the swift acquisition of cultural knowledge is enabled by a social learning system based on human communication (Gergely et al., 2007; Csibra & Gergely, 2009, 2011; Király et al., 2013). In more detail, the authors suggest that the unique properties that characterize cultural knowledge—such as the aforementioned cognitive opacity—have led to the emergence of a social communicative learning mechanism named 'natural pedagogy' in human evolution. The theory posits that infants and children are likely to encode information they encounter in a communicative context as generalizable (thus, valid in other situations) and universal (accessible for and shared with others). This universality principle is later refined during development, and the generalizations become more limited (for e.g., to one's own social community) (Egyed et al., 2013)—although this shift in development has not yet been specifically tested empirically. Importantly, as children start to acquire language, certain linguistic forms become an important marker of what knowledge should be generalized (such as generic language, "Dogs bark" vs "This dog barks", Cimpian & Scott, 2012—see above in the section detailing *Language*). However, the challenge remains: would younger children be able to discern what should be generalized based on non-linguistic cues?

For the knowledge transmission to be effective, "novices" need to be prepared to receive culturally relevant knowledge, while "experts" need to be inclined to provide it. Evidence seem to confirm receptiveness on the side of infants: from an early age, they are sensitive to so-called *ostensive signals* (such as eye contact or infant-directed speech) (for e.g. Cooper & Aslin, 1990; Farroni et al., 2002; Csibra, 2010). Additionally, the behavior of infants and children suggests that there is indeed a bias to consider forms embedded in communicative contexts as generic. Infants are biased to pay attention to potentially

kind-relevant object properties in communicative contexts, for instance, they notice changes in object identities, but not object locations following a communicative interaction that involves pointing (Yoon et al., 2008). Also, they individuate objects based on communicatively shared information about their functions (Futó et al., 2010) and categorize objects based on hidden properties previously communicated to them (Kovács et al., 2016; for a review of studies, see: Csibra & Shamsudheen, 2015). Children's learning is also influenced by pedagogical cues: toddlers are more likely to copy unconventional acts (such as lighting up a lamp with the forehead) in case this action was demonstrated to them in a communicative context (Király et al., 2013). The influence of pedagogy is also manifested in the behavior of older children: preschoolers interpret pedagogically demonstrated information about objects as generalizable (Butler & Markman, 2012) and as reflecting essential object properties (Butler & Markman, 2014). Importantly, the role pedagogy plays in learning may change as children age: for instance, preschoolers copy goal irrelevant actions both following pedagogical and non-pedagogical demonstrations, but they only switch to a more efficient strategy following a pedagogical demonstration (Hoehl et al., 2014). Thus, although the role of pedagogy in learning may change during development, it shapes the concepts and learning of children from a young age.

Other evidence also indicates that infants are biased to assume that pedagogically demonstrated information is available to and shared by others (Gergely et al., 2007; Egyed et al., 2013). For instance, toddlers interpret emotional displays towards objects as shared by others in case these are provided in a communicative context (Egyed et al., 2013). Further studies would be needed to deepen our knowledge about this aspect of pedagogy, through directly contrasting what kind of inferences children draw about whether others share the knowledge received from pedagogical and non-pedagogical demonstrations on other knowledge domains (i.e. artifacts). Nevertheless, the findings from other studies show that if an adult demonstrates something to children intentionally—such as how an object is used—even 2.5 year-olds assume that another person (their teacher) would use the same object for this same purpose (Casler & Kelemen, 2005, Experiment 2). Thus, they do consider others' intentional actions to reflect shared knowledge (see next section for more details about intentionality). All in all, it seems that from a young age, children are likely to consider information communicated to them by others to be generalizable—both to other situations and to other people. Thus, communication is an important tool for conveying knowledge generally, and it is especially important when it comes to transmitting cognitively opaque information—such as conventional knowledge—to young children.

2.2.1.2 Other cues of behavior

In their review article, Diesendruck and Markson (2011) propose a number of additional behavioral attributes that may guide children in selecting which information represents conventional knowledge. First of all, *intentionality* seems to have an important role in this aspect. In other words, if an act is produced intentionally (as opposed to accidentally), this may signal to children that it constitutes conventional knowledge. Evidence from the domain of artifacts supporting this claim shows that toddlers are more likely to imitate actions that are performed intentionally (Carpenter et al., 1998). Furthermore, older children (around the age of 2 and 3) also consider acts performed with objects intentionally to be their conventional functions—which is manifested in their judgements both about how they themselves would use this object, and also, how another person would do it (Wohlgelernter et al., 2010, Experiment 1; Casler & Kelemen, 2005). Three-year-olds also believe that others are right to copy the intentional—but not the accidental—acts of a demonstrator (Wohlgelernter et al., 2010, Experiment 2).

Secondly, children may base their assumptions about conventionality on *consistency*—both when it comes to whether different people are doing something in the same way or whether the same person is doing something consistently. Evidence shows that 5-year-olds (and adults) tend to consider "what an object is for" to align with how multiple people are using it—even if this differs from the intention of the object's designer (Siegel & Callanan, 2007). At the same time, preschoolers do not change their belief about the function of an object if only one person is using it differently from its intended function. (Interestingly, 7-year-olds differ both from adults and younger children, as they consider the intended function to be what the object is for—even if that is not the way many people are currently using it). Within-person consistency also has an impact on children: 2 and 3 year-olds consider an act to be conventional in case it was consistently performed in the same way by the same person (Wohlgelernter et al., 2010, Experiment 1). Thus, consistency also plays an important role in children's assumptions about conventionality.

Other potential cues involve whether a form of behavior is embedded in some kind of *coordination* between people. In other words, this means that children would be more likely to consider an act performed by a person to be conventional if it depends on or affects another person (Diesendruck & Markson, 2011). Finally, *pragmatic* and/or *semantic markers*

provided by adults may also compel children to interpret some forms of behavior as conventional. Generic language, detailed in the *Language* section above, constitutes one such marker. The importance of the latter two cues, suggested by Diesendruck and Markson (2011), still require further investigation in order for us to better understand how children rely on these cues to discern conventionality.

2.2.2 Cues about the knowledgeability of others

One of the important features of conventions is their inherent sociality: these come to existence through shared practices and agreements and are conveyed by other people. Additionally, they are also bound to cultural communities. Thus, conventional knowledge is often communicated to children by others, mostly adults, in their environment. This reliance on communication for knowledge acquisition brings about the risk of misinformation—shared by malevolent or incompetent informants. Therefore, it has been suggested that adults possess a number of cognitive mechanisms that allow them to avoid being misinformed by others, collectively named *epistemic vigilance* (Sperber et al., 2010). The developmental trajectory of these mechanisms has sparkled empirical interest, especially since children are cultural novices who need to acquire a vast amount of knowledge rapidly from others, without the benefit of having much prior knowledge about the world. One aspect of epistemic vigilance is being able to select appropriate, knowledgeable sources of information.

Relatedly, a number of studies have focused on exploring whether children rely on certain cues that may signal the knowledgeability of others. On the one hand, there are cues that can directly indicate whether someone is reliable or knowledgeable. For example, children may encounter others who prove to be unreliable information sources or ignorant about the to be learnt information—that may be evidenced by their expressed uncertainty or by a demonstrated (in)competence with regards to things children already know. Empirical evidence shows that children take these kinds of information into account: for example, toddlers selectively imitate people who previously used familiar objects competently, compared to those who show incompetence (for e.g., someone has displayed uncertainty and put a shoe on their hand) (Zmyj et al., 2010). Thus, they probably assume that the shared information is relevant to them only in case it was demonstrated by a competent individual. Older, preschool-aged children also keep track of previous mistakes, and learn novel words (Koenig & Harris, 2005; Birch et al., 2008; Diesendruck et al., 2010) or novel object

functions (Birch et al., 2008) from others who previously proved to be linguistically accurate. These findings show that demonstrating knowledgeability has an impact on what children learn from others about conventional forms.

On the other hand, there are cues which may signal knowledgeability indirectly. In other words, knowledgeability may be inferred based on certain attributes which could signal whether someone possesses the knowledge relevant to children—or its lack thereof. For instance, the age of another individual might signal their knowledgeability (Zmyj & Seehagen, 2013). The argument goes that adults, who possess expert knowledge from the children's culture, should be considered better sources of information, compared to peers. Findings show that children indeed rely on information about age when it comes to learning (Zmyj & Seehagen, 2013): for instance, toddlers and preschoolers are more likely to copy the novel actions of adults than peers (Zmyj et al., 2012, Experiment 1; McGuigan et al., 2011) and make normative inferences about game rules presented by adults (Rakoczy et al., 2010). Interestingly, depending on the domain, sometimes children are more likely to follow their peers: for example, toddlers are more likely to imitate peers when it comes to familiar actions (Zmyj et al., 2012, Experiment 2) and to select peers as informants when they want to learn about toys (as opposed to food) (VanderBorght & Jaswal, 2009). These findings show that children rely on information about others' age to guide their learning.

Cues pertaining to social categories may also reflect knowledgeability, since these could signal the cultural community a person belongs to. Through identifying another person's cultural group membership, children can detect the borders of shared knowledge, and thus infer whether their partner has access to knowledge relevant in their culture. One of the attributes which is closely connected to one's cultural community is the language they speak (Kinzler et al., 2012; Soley & Spelke, 2016; Oláh et al., 2019). Recent empirical evidence suggests that infants can differentiate between whether another person speaks their Native or another language from birth (Mehler et al., 1988), and at 6 months of age, they prefer Native over Foreign speakers (Kinzler et al., 2007). Older children form expectations about others based on language and accent: children link speaking a foreign language to living in unfamiliar dwellings and dressing in unfamiliar clothing (Hirschfeld & Gelman, 1997), and the unconventional use of objects (Oláh et al., 2014). They also expect people speaking with the same accent to live in the same place and share cultural norms (Weatherhead et al., 2016). Other findings show that language has a priority for children when it comes to the categorization of the social world (Kinzler et al., 2010): when pitted against categorizing others based on race, preschoolers show preference for native-accented

other-race individuals over accented same-race individuals (Kinzler et al., 2009). These findings suggest that language is an important social cue for children.

Moreover, these results altogether allow us to claim that children make inferences about others regarding their cultural affiliations based on the language they speak, which indicates that language could also be factored into their cultural learning processes. Relatedly, further studies have explicitly focused on exploring how linguistic information shapes children's learning processes. Findings show that already around their first birthday, infants expect to receive information from Native speakers (as evidenced by their brain activity) (Begus et al., 2016) and preferentially look at objects previously attended by Native speaking adults (Marno et al., 2016). Behavioral measures have demonstrated that at 14 months of age, children imitate Native speakers selectively (Buttelman et al., 2014), and at a later age, they even do so following a live demonstration (Altınok et al, 2022; although a previous study with the same age group only found selective imitation after a video presentation: Howard et al., 2015). The pattern is similar in the case of preschoolers as well: they selectively imitate object function information demonstrated by a Native-accented speaker (compared to a Foreign-accented speaker) (Kinzler et al., 2011). Thus, there seems to be ample evidence that the way children acquire conventional forms is guided by both direct and indirect cues of knowledgeability.

2.2.2.1 Identifying sources from (past) learning episodes

During everyday life, however, children may also face the challenge of making judgements about the knowledgeability of their sources in hindsight. For instance, they may observe the behavior of an adult with an object and then later learn that this person speaks a Foreign language - therefore, they would need to appropriately update their assumptions about the conventionality—i.e., applicability—of the thus shared information. In order to do this, they need to be able to recall the source of their knowledge as well as the information shared by that individual. This highlights the importance of *source memory* when it comes to maintaining the validity of children's knowledge (Sperber et al., 2010). In the following sections, we very briefly summarize our current knowledge with regards to the developing source memory competence of children, and detail some studies investigating how young children rely on these to guide their learning of conventional information.

2.2.2.1.1 Source memory

Specifying the contextual information surrounding a particular memory has been otherwise named source memory. More narrowly, this may refer to recalling a specific source (a person or a media outlet) as the origin of our knowledge or the process of which we came to know something (whether we have directly seen something or were told by another person). More broadly, retaining a source may also refer to any other detail that constitutes a part of the episode from which the information originates (Johnson et al., 1993). When contrasted with memory for items—which entails making judgments about whether we have previously encountered some information or not—, source memory is considered to be reliant on the retrieval of the contextual details of a learning episode, such as the color of a word or the voice of the person speaking. In this sense, it is often connected to *episodic memory*, with some authors basically arguing that episodic memory and source memory should not be considered separate constructs (Siedlecki et al., 2005; Johnson, 2005). Accordingly, in many empirical investigations, source memory is considered to be a proxy for measuring episodic memory.

The earliest studies targeting children's source memory competence have connected its development to theory of mind abilities (Premack & Woodruff, 1978). These capacities are interrelated in many ways; most importantly, both entail understanding the relation between experiences and the beliefs formed based on these experiences, as well as understanding the nature of our representations about the world (Gopnik & Graf, 1988; O'Neill & Gopnik, 1991). Taking into account how certain information was acquired is crucial for reasoning about both the sources of our own beliefs and also those of others. This reasoning is supported by, for example, understanding how different types of experiences lead to beliefs and thus being able to take this into account while considering the certainty of a belief we hold. For instance, if we have seen something with our own eyes, we could be more certain of our belief than if we have only heard it from somebody else. Or in some situations, even if we only have second-hand information, identifying its exact source could be important while reasoning about the veracity or relevance of such information.

Empirical evidence shows that the causal account of the origins of beliefs—namely, that experiences lead to beliefs—develops between the ages of 3 and 6 (O'Neill & Gopnik, 1991). Studies inspired by this approach contrast how accurately children remember the way

they came to know a novel information depending on the manner in which it was acquired: by seeing something, by being told about it or by inference (for e.g., they were shown a box of crayons to illustrate that there is a crayon in a box) (Gopnik & Graf, 1988; O'Neill & Gopnik, 1991). Participants in all age groups (3, 4 and 5 year olds) remembered what was in the box, but there were differences in source memory performance. In one of the studies, 3 year olds had more difficulty identifying the source of their beliefs compared to the older children, especially if a few minutes of delay was introduced—however, their performance was above chance (Gopnik & Graf, 1988). In contrast, 5 year olds had a near perfect performance that remained stable even after some delay. Another study has confirmed this pattern of development, and has shown that 3-year-olds are able to differentiate between potential information sources, but have difficulty in identifying them as sources of their beliefs (O'Neill & Gopnik, 1991). Thus, source memory seems to develop substantially between the age of 3 and 4.

Other investigations were inspired by the so-called *source-monitoring framework* (Johnson et al., 1993), according to which source memory consists of processes involved in making attributions about the origins of our memories or beliefs. Within this approach, the authors define source memory as "expressions of memory that involve judgements about the origin, or source, of information. The term source refers to a variety of characteristics that, collectively, specify the conditions under which a memory was acquired (e.g., the spatial, temporal or social context of the event; the media and modalities through which it was perceived)" (Johnson et al., 1993, page 3). Thus, source-monitoring consists of judgements and decisions that are based on the characteristics of the recalled memories (such as perceptual or affective information). In this view, decisions about the source are made by exploiting regularities of information coming from different sources. For example, in case we need to decide whether something happened to us in real life or if we have only imagined it, we can rely on differences between these two types of events; namely, perceptual details could be richer and more available in the case of real events, while more extensive memory for cognitive operation could characterize imagined events. Within this framework, there are three types of processes that are of particular interest (Johnson et al., 1993; Hashtroudi et al., 1989). *Reality monitoring* refers to deciding whether the information at hand is from an external or an internal source (Johnson & Raye, 1981). Another source-monitoring situation, referred to as *internal source-monitoring*, entails discriminating between internally generated sources (for e.g., making judgments about whether we actually said something to somebody,

or only thought about it). A third instance, called *external source-monitoring,* refers to discriminating between external sources (for e.g., this entails making judgments about which person was the source of an utterance). In this short review of past findings, we focus on the development of this latter process due its relevance to the topic.

Research shows that the source-monitoring performance of children develops substantially between the ages of 3 and 8, but that the different processes may develop unevenly (for a review, see Roberts, 2002). From the age of 6 and above, children perform comparably to adults when it comes to discriminating between external sources (two other people) (Johnson & Foley, 1984). Younger children's performance, however, varies with some attributes of the sources; for example, the performance of 4-year-olds is worse in case the sources are more similar (both women), compared to when they are more distinguishable (a voice of a man and a woman) (Lindsay et al., 1991). Additionally, if a time delay is introduced between learning novel facts and identifying their source (uttered by either a puppet or a teacher), 4 year olds make substantially more mistakes than their older peers (up to eight years of age) (Drummey & Newcombe, 2002). Findings from these studies indicate that processes related to source-monitoring develop most extensively below and around the age of 4, and resembles adult functioning in many ways above the age of 6.

2.2.2.1.2 Source memory and the knowledgeability of the sources

Some recent studies have focused on whether children are able to rely on source-monitoring processes to guide their learning. More specifically, these explore situations in which children need to (re)evaluate information shared by (un)reliable others. The findings show that both toddlers and preschoolers can reevaluate what they have learnt from another person (for e.g., novel words) in case the informant turns out to be unreliable (Luchkina et al., 2020; Schütte et al., 2019; Dautriche et al., 2021). In such scenarios, children receive novel information from a source (for instance, labels for unfamiliar objects), and then are later exposed to information about whether the source is reliable or not (through demonstrating knowledge or ignorance about the names of familiar objects). In the last phase, children are tested about whether they have learnt the novel labels (for instance, through preferential looking) (Dautriche et al., 2021). Importantly, 2-year-old children already take information about reliability into account both prospectively and retrospectively: they are more likely to learn from reliable sources even if this reliability was demonstrated after the teaching of the labels

(Koenig & Woodward, 2010; Dautriche et al., 2021). Their success in discarding the knowledge shared by the unreliable—but not the reliable—informant suggests that they are able to identify the source of their knowledge and appropriately update this knowledge when it is warranted. However, no study has previously investigated the same processes in case knowledgeability is signaled indirectly for children (for e.g., based on cues about social group membership). Further studies are needed to investigate how children would treat information shared by individuals who turn out to be from a different culture following the teaching episode.

All in all, the findings from these studies investigating how children rely on cues of knowledgeability to guide their learning about conventional information—both prospectively and retrospectively—suggest that from quite a young age, children are able to identify who to learn from. This allows them, among other things, to successfully interact with people whom they have not met before, based on assumptions of shared knowledge. However, further studies are needed to better understand these processes. While the source memory of children has been explored more exhaustively with regards to direct cues of knowledgeability, investigations are needed about source memory performance in the case of indirect cues—such as social group membership. As a first step, we designed a study to see how preschoolers' memory for the source of novel information is influenced by group membership (see *Chapter 3*). Additionally, while evidence converges to show that children use linguistic information to select knowledgeable partners and that this affects their learning profoundly, we do not yet know how this figures into their long term semantic knowledge. In *Chapter 4*, we introduce a study—with 2 experiments—which aimed to explore this question.

Aims of the Thesis / Research Questions

Building on these previous findings, in this Dissertation, our aim is to explore how preschoolers reason about some aspects of conventions; namely, that these are conveyed socially and are bound to certain communities (context dependence). In *Chapter 1*, we review previous literature with regards to pretend play—which is ubiquitous in children's everyday life in almost all cultures—, and detail a proposal building on the insights of Wyman and Rakoczy (2011), as well as Chu and Schulz (2020). In this proposal, we suggest that participating in pretend play may be considered a manifestation of and support for children's ability to participate in and set up arbitrary contextual boundaries with others. In this way, it plays an important role in how children come to acquire social conventions and understand that their validity may change between contexts. Relatedly, in *Chapter 2*, we describe an empirical study that has investigated how children come to handle stipulations—which often endow objects with certain, pretend identities—created in joint pretend play. Related to the proposal in *Chapter 1*, this study could provide insight about how children reason about ad hoc, jointly created social rules and their limitations. We hypothesized that 3-year-old children already consider the constraints of jointly created, ad hoc rules and will refrain from generalizing knowledge about pretend stipulations to those who did not participate in the pretend game. We have built this assumption on previous findings which show that children understand many aspects of the contextually bound nature of pretend stipulations (for e.g., Wyman et al., 2009b, Schmidt et al., 2016).

In the second half of the Thesis, we describe two empirical studies which concern children's reasoning about and learning of already existing conventional information—operationalized in the studies as novel objects children have the opportunity to learn about. As conventional knowledge is usually conveyed by other people, one important task in childhood is to identify those who would possess the relevant knowledge with regards to children's own culture. Thus, in these studies we investigated if preschoolers' learning is influenced by whether a teacher of novel information is a member of their cultural community or not. In the first study (*Chapter 3*), we explored whether there is a difference in how accurately children remember the source of their knowledge (an adult) depending on the source's cultural group membership. We hypothesized that 4-year-old children could be better at identifying out-group members as sources of novel information, compared to in-group sources. We believe this could be the result of children's tendency to assume that information

shared by in-group members is generalizable and universal, which may hinder their performance when it comes to identifying specific others as sources of their knowledge. In the second study (*Chapter 4*), we aimed to uncover whether children retain more information following some time delay, in case this information was previously demonstrated to them by a member of their cultural community (as opposed to when it was shown by a member of another community). We hypothesized that while 4 year-old children would be similarly accurate in reproducing the actions of adults regardless of their cultural group membership if they were allowed to do so immediately after the demonstrations, they would perform better after a delay in case the teacher is a member of their own group. We assumed this to be the case because previous findings are suggestive that information shared by community members is more likely to be integrated into children's generic semantic knowledge. In the final section of the Dissertation, we summarize and discuss the implications of the findings, and raise further questions (*General discussion* and *Conclusions*).

Chapter 1: The Joint Creation of Novel Arbitrary Social Contexts in Pretend Play

"On this rug, the red spots are now lava, we shouldn't step on them"—was declared spontaneously by a preschooler in our lab. From early on, these kinds of activities are ubiquitous in the everyday life of children. Starting from their second year of life, while they are still actively learning about the world, children seem to be capable of construing the world as it is not (Lillard et al., 2011). A number of concepts have been introduced to describe this form of activity, such as make-believe, symbolic or pretend play (Piaget, 1952; Walton, 1990; Harris et al., 1993). One crucial attribute of pretending is that it is guided by some form of mental representation that results in nonliteral behaviors or actions (Fein, 1981; Lillard, 2001; Weisberg, 2015). Children start to engage in simple pretend scenarios from around 18-months of age (or earlier, see: Fenson & Ramsay, 1981; Tamis-LeMonda & Bornstein, 1994), while they also adequately recognize pretense and share pretend scenarios with others (Haight & Miller, 1992, 1993; Onishi et al., 2007). As children age, pretend scenarios become more elaborate and often involve them taking up different roles within the games (Lillard et al., 2011). Remarkably, pretense seems to be universal—it even appears in cultures where children are not encouraged to play (Smith, 2005; Gaskins et al., 2007). Despite being one of the trademark characteristics of human childhood, the cognitive background and function of pretend play still raises open questions

In the following sections, first, we review previous theoretical accounts of and empirical findings about pretend play, organized around some important questions with regards to its developmental role and interactional roots, as well as pertaining to children's understanding of certain characteristics of social pretend episodes. Following this, we suggest extensions for previous proposals of social pretend play through drawing attention to the arbitrary and provisional social contexts created during pretense. We propose that engaging in pretense manifests and supports children's ability to set up transient, arbitrary contexts with others (Rakoczy, 2007, 2008b; Chu & Schulz, 2020). In the last sections, the details and implications of this proposal are further discussed.

1. What kind of role engaging in pretend play may play in cognitive development?

Even though people intuitively endow pretend play with benefits for children, its role in cognitive development remains a question. Some approaches suggest that early pretending

appears as a consequence of some newly emerging cognitive process, such as the ability to represent the world (Piaget, 1952) or to handle multiple models about reality (Perner, 1991; these approaches jointly described as "*pretense as process*" theories by Friedman & Leslie, 2007). In this sense, pretending may be the (behavioral) manifestation of a certain ability or process, but would not necessarily contribute to its development.

Alternative theories posit that engaging in pretense serves an important role in cognitive development. For example, it has been assumed to contribute to the development of counterfactual reasoning (Harris, 2000; Walker & Gopnik, 2013; Weisberg, 2015), creativity (Carruthers, 2002; Nielsen, 2012) or executive functions (Carlson & White, 2013; Thibodeau-Nielsen et al., 2020). Further proposals highlight its importance in reasoning about social others—through figuring into the development of children's theory of mind abilities (Leslie, 1987, 1994), or their understanding of social realities (Rakoczy, 2007). Others have argued that pretending supports children in acquiring culture specific skills, knowledge and institutional practices (Wyman, 2014; Adair & Carruthers, 2022) and that it enables children to develop their executive function skills in culture-specific ways (Doebel & Lillard, 2023).

The exact contribution of pretend play to cognitive development is difficult to investigate. The abilities that are studied in connection with pretense may be linked with one another, while creating control groups who do not engage in pretense is almost impossible and ethically questionable, therefore making the causal links difficult to disentangle (Weisberg, 2015). Nevertheless, a recent review examined empirical evidence to explore the connection of pretense with other abilities (Lillard et al., 2013). The empirical data is weak and spare with respect to direct causality; pretense might have a crucial role in the development of language, narrative abilities and emotion regulation or these abilities might enable, or merely be correlated with pretense. Correlations, but little evidence for causation, also applies to executive function abilities, social skills and reasoning. When it comes to theory of mind abilities and creativity, empirical findings are inconsistent, and may lend support to the view that a third variable is causing the association. All in all, pretend play is associated with the development of a number of abilities, but the exact way in which it may figure into their advancement appears to be complex and variable.

2. The roots of pretend play: individual or social?

Closely intertwined with the previous question is whether pretending is mainly rooted in intra- or inter-psychological processes (Nielsen & Christie, 2007). Approaches to pretending tend to either focus on the individual (pretend production and the intra-individual processes), or on the importance of social partners in its emergence. In the former view, pretending appears in childhood as a consequence of some newly emerging cognitive process (see Piaget, 1952; Perner, 1991). Accordingly, while infants and children may engage in pretense with others, this is rooted in intra-individual cognitive processes that develop at certain ages. In contrast, alternative theories argue that pretend play is fundamentally social and communicative starting from early development (Leslie, 1987; Friedman & Leslie, 2007; Friedman, 2013), that it is first produced interpsychologically (Rakoczy, 2007; Nielsen & Christie, 2007; Adair & Carruthers, 2022), and highlight the importance of adult scaffolding in its development (Vygotsky, 1967; Rakoczy et al., 2005). Relatedly, according to Rakoczy and colleagues (Rakoczy, 2007, 2008b), pretending with others can be considered an early evidence for shared intentionality—in case of which, two or more persons share an intentional "we" attitude that cannot be reduced to their individual intentions—which is ubiquitous in adulthood.

The question whether early pretend acts are rooted in social interactions or not is difficult to investigate. On the one hand, observational data could shed light on the amount of pretending children engage in with others and alone, as well as how the proportion of this may change with development. However, since children take part in social interactions from birth, even if they play individually, this still could be built on their interactive experiences with others—and vice versa. Evidence shows that early pretense is highly scaffolded and initiated by parents and older siblings (Dunn, 1988; Haight & Miller, 1993). Additionally, findings demonstrate that social pretend episodes are accompanied by communicative signals, such as eye contact, from age one, and during their second year of life, children engage in pretense through replicating others' pretend actions (Howes et al., 1989). Also, from around 18 and 24 months of age, children adequately interpret and respond to simple pretend acts by others (Dunn & Dale, 1984; Haight & Miller, 1993), and make appropriate inferences about their behavior (Harris et al., 1993).

Another line of research explored whether children's pretend acts tend to be imitative or creative (Striano et al., 2001; Rakoczy et al., 2005; Nielsen & Christie, 2007). The results suggest that the pretend acts of preschoolers are characterized by imitation and are heavily accompanied by communication such as frequent gaze-alteration and smiling (Striano et al., 2001; Rakoczy et al., 2005). At the same time, the proportion of creatively invented pretend

acts increases with age and adult modeling results in the production of novel ideas and more complex playing (Striano et al., 2001; Nielsen & Christie, 2007). These results suggest that elaborate pretend episodes with creatively produced elements in preschoolers—that could be played individually or in groups—may be rooted in observing others pretend and sharing simple pretend episodes with them. Nevertheless, it is important to note that the complementarity one could intuitively associate with "genuinely" joint pretense only appears as around the age of 3 (Howes et al., 1989). Thus, we are not able to conclusively discern how children understand and participate in these scenarios before the appearance of language—similarly to the case of other interactions, such as joint attentional situations. However, the results suggest that even young children can recognize and engage in pretending with others, and their pretense behavior cannot be disentangled from what they experience in social settings; thus highlights the importance of social context in pretending.

3. Do children grasp the transient, socially defined nature of pretend episodes?

As mentioned above, according to Rakoczy and colleagues (2007, 2008b; Searle, 1975, 1995; Walton, 1990; Wyman, 2014), joint pretense is an early instance of shared intentionality: pretending with others can be conceived as a collective activity that includes the assignment of transient status functions and made up constitutive rules ("This banana is now a telephone in our game"). Pretend play, hence, is governed by (pretend) stipulations that exist purely based on the agreement of the participants and which are applicable within the thus created framework.

It is an empirical question to explore whether children grasp these characteristics of shared pretend episodes. In order to appropriately engage in these, children need to follow pretend stipulations and their implications, and track the boundaries of the episodes. This entails quarantining the pretend representations, while at the same time, applying the stipulations at certain times and places, and to particular partners. This latter not only requires separating the representations, but also switching between contexts that implicates the involvement of executive functions.

3.1 Following pretend stipulations

Fifteen month-old infants detect pretend violations in others' actions and behave in accordance with simple pretend scenarios (Bosco et al., 2006; Onishi et al., 2007). From

around their second birthday, they draw appropriate inferences about the pretend behavior of their partners in more complex situations (Harris et al., 1993; Tomasello et al., 1999; Ma & Lillard, 2006). Preschoolers are even more proficient: they keep track of the identity of objects in different games (Weisberg & Bloom, 2009; Wyman & Rakoczy, 2009a). Two-year-olds also expect others to follow current stipulations (Rakoczy, 2008a). Thus, children follow pretend stipulations and their implications for social partners from their second year of life.

3.2 Tracking the boundaries of pretend episodes

Empirical evidence shows that by 3 years of age, children are able to separate reality from pretense (Flavell et al., 1987; Woolley & Phelps, 1994; Bourchier & Davis, 2002), and separate pretend contexts from one another (Wyman & Rakoczy, 2009a; Weisberg & Bloom, 2009). This is less clear in the case of younger children; nevertheless, even though they spend much time engaged in pretense, this does not result in mistaken beliefs. Thus, these representations seem to be appropriately quarantined from their developing knowledge about the world (Leslie, 1987). Importantly, this boundary is not always strict, for example, children can learn and generalize from pretend episodes (Sutherland & Friedman, 2012, 2013; Hopkins et al., 2015).

3.2.1 What cognitive architecture enables tracking the boundaries of pretend episodes?

One of the most influential debates about pretending concerns the representations enabling the quarantining of pretend episodes. According to Leslie and colleagues (Leslie, 1987, 1994; Friedman & Leslie, 2007), pretense is supported by metarepresentations even from young infancy. This format enables the decoupling of the regular relations of the content and thus making it available for pretense via ascribing agent-centered representations to the participants. As a result of this decoupling, the representational system and children's semantic knowledge remains intact. Stich and colleagues (Nichols & Stich, 2000) also argue that representations involved in pretense can have the same format and content as beliefs, however, they claim that ascribing agent-centered representations is not necessary to participate in pretense. Rather, representations are quarantined in a so-called Possible World Box which is a "(...) work space in which our cognitive system builds and temporarily stores representations of one or another possible world" (Nichols & Stich, 2000, p. 122). Recent

evidence indeed suggests that children grasp that mental states are involved in pretending, and thus favors the metarepresentational view (Weisberg, 2015).

3.3 Constraining pretend stipulations by time, space, and partners

The contextual boundary within which pretend stipulations are valid may be designated by a number of factors—such as time, space or participants of the episode. While sensitivity to temporal boundaries have not been tested specifically, two year olds follow that the same object may have changing identities in subsequent pretend scenarios (Harris et al., 1993). Preschoolers also understand that different stipulations may apply at different locations (Wyman & Rakoczy, 2009a) and extend this to others (Wyman et al., 2009b, Experiment 2). Additionally, they follow to whom a stipulation is known and applicable (Hickling et al., 1997; Wyman et al., 2009b, Experiment 1; Kalish et al., 2000; also see *Chapter 2* of this Thesis). This suggests that they understand that stipulations are valid within constraints by time, location and specifically, by partner.

3.4 Context-switching

Flexibly navigating social contexts not only requires separating the relevant representations, but also executive function skills. Lillard and colleagues (Lillard et al., 2013) suggest a relationship between pretending and executive functions, with pretend play being one of the developmental routes for executive function skills. Recent studies also support that these abilities are related (for e.g., Carlson et al., 2014; Thibodeau-Nielsen et al., 2020). Inhibitory control skills seem to be specifically related to engagement in social pretending (White et al., 2021). Findings from other investigations, however, did not find a straight-forward relationship between these abilities (see: Doebel & Lillard, 2023).

4. Creating arbitrary social contexts in pretend play

Previous findings suggest that early pretend play is heavily scaffolded by social partners, and that from the preschool years, children are able to competently navigate multiple episodes of pretend play with various partners (Weisberg, 2015). Preschoolers also grasp some important

attributes that characterize the social contexts created in shared pretense. While pretend play is associated with the development of a number of cognitive skills—many of which are important for socio-cognitive development (such as language and narrative abilities, emotion regulation, social skills or theory of mind)—the exact manner in which it may figure into their development remains to be explored.

Building on these findings, we propose that pretend play both manifests and supports children's ability to recognize and navigate the boundaries of social contexts with others, as well as to create novel social contexts. Humans have a fundamental motivation to maximize their learning benefit about their environment and they acquire most of their knowledge from conspecifics (Herrmann et al., 2007). That is why it is so important for them to establish a shared representational space with fellow humans, namely to get and maintain access to their knowledge base (Oláh et al., 2019). In joint pretense, novel social contexts are created that determine the action utilities and beliefs of those involved. These contexts are arbitrary and transient, and are applicable to certain places, times and people. As children participate in pretense with social partners, they gain experience in joining and creating these social contexts, which may be one of the developmental routes for skills related to recognizing, creating and navigating social-contextual boundaries in later life. The fact that pretend scenarios are transient and result in propositions which are true within the pretend context but false outside of it (Cosmides & Tooby, 2000), may prompt children to pay attention to the contextual boundaries. This may support them in identifying *who shares their knowledge,* in creating novel social contexts, and in identifying the boundaries of already existing social communities.

These abilities would be important, among other things, because much information in children's environments is constrained by being "true" only temporarily or locally. Indeed, it has been proposed that one of the remarkable characteristics of humans is that they can successfully modify their behavior tailored to the specific situation based on contingent information (Cosmides & Tooby, 2000). Additionally, as mentioned in the *General introduction* of this Dissertation, human social interactions are often guided by social conventions which are context-dependent and arbitrary (Rakoczy & Schmidt, 2013; Lewis, 1969). Therefore, the validity of cultural information is generally constrained to places, times and social communities—and thus shares many similarities with social contexts created during pretend play.

As to why children pretend, we suggest that their motivation is built on a general motivation of becoming expert members in social contexts (Király, 2019). This fundamental

drive, process fuelled by curiosity, motivates children to share in the knowledge of their partners. Pretend play may offer an opportunity to gain insight both in the formal characteristics of social contexts, as well as specific knowledge through the involvement of culture specific scripts of events in play (Wyman, 2014). In addition, we posit that humans as a species enjoy setting up simple, transient contexts with context-dependent rules, and this makes them better at creating flexible and novel contexts—such as new communities or groups—which are ubiquitous in their social world. However, we would suggest that children's motivation for social pretense would also be impacted by their cultural environment. In the following sections, we briefly expand on how this proposal ties together ideas from two prominent approaches, as well as its potential implications for development and cultural differences.

4.1 Theoretical roots

Theoretically, this proposal is closely connected to, on the one hand, a theory of playing recently proposed by Chu and Schulz (2020). The authors suggest that one of the most important characteristics of the unique form of playing that emerges after toddlerhood is the invention of novel problems. This entails the "players" intervening in regular utility functions which would otherwise frame their behavior, and incurring unnecessary costs and aiming for arbitrary, self-invented rewards. In this view, engaging in play scenarios could be useful for supporting the generation of new problems and goals which may lead to novel thoughts and ideas, and is often motivated by curiosity. Additionally, the authors also address the arbitrary nature of play and propose the following: "(...) the idiosyncratic, arbitrary nature of the problems set in play, and the often flimsy, inadequate solutions generated, may be offset by the fact that the ideas generated in play can be decoupled from the problems that inspired them and be valuable in their own right." (Chu & Schulz, 2020; 14.11). In other words, although the problems invented during play may be arbitrary, these can inspire solutions that could be useful in a future context. Importantly, this theory focuses on solitary as well as collaborative play and proposes that, in the sense of inventing arbitrary constraints, many kinds of play involve a kind of "pretending" or "making up" goals (Chu & Schulz, 2020, p. 14.12).

On the other hand, it is also rooted in the proposal of Rakoczy and colleagues which posits that participating in pretend play supports children's developing understanding of

social realities (Rakoczy, 2007; Wyman & Rakoczy, 2011; Wyman, 2014). In more detail, pretend play shares similarities with adult social institutions—for example, it involves the assignment of status functions—, yet its structure is much simpler. For example, it only applies to a small number of people and does not constitute part of a wide web of function assignments (Wyman & Rakoczy, 2011). This deems participating in these episodes suitable as a cradle for understanding more complex social institutions (Rakoczy, 2007) and allows children to have a rudimentary grasp on the fact that fictional status can be assigned by joint intention (Wyman, 2014).

We believe our proposal ties together and expands on these approaches through integrating important insights about pretend episodes. First, the theoretical approach of Rakoczy and colleagues highlights that creating pretend stipulations with others resembles the operation of social institutions in multiple aspects. We enrich this idea, arguing that pretending supports children in creating, recognizing and navigating the boundaries of social contexts. This may figure into the development of a number of social skills necessary for navigating multiple social communities in adulthood, within which the capacity to re-identify members for a given set of shared knowledge is essential, since it could guide the organization of their knowledge base. Second, as Chu and Schulz observe (2020), pretend episodes are characterized by modified utility functions with arbitrary rewards. We broaden this argument for social pretense, by emphasizing that utility functions and their rewards are rooted in the pretend stipulations created by the group and thus determine the behavior of both the child and the other participants. Even though problems tackled in play may be arbitrary, these could inspire solutions in future contexts. This consequence has social aspects as well: ideas decoupled from their original contexts might be shared with others. Furthermore, if pretending figures into abilities related to creating social groups, this contributes to the creation of novel social contexts which, in turn, may increase the probability of the ideas itself becoming useful in future contexts. Arbitrariness itself is a characteristic of social conventions that regulate everyday life (Lewis, 1969; Rakoczy & Schmidt, 2013). Thus, having experience with social pretense may also support children in grasping that human social interactions are often regulated by agreed upon, arbitrary utility functions.

4.2 Empirical implications and questions

We propose that pretending is one of the developmental routes for abilities connected to recognizing, creating and navigating social-contextual boundaries, but not an exclusive one. Another potential route is through gaining experience with how word meanings may be shared among members of wider or smaller communities. As detailed in the *General introduction*, relevant evidence shows that toddlers expect common names to be known by different individuals (Graham et al., 2006; Henderson & Graham, 2005), but older children do not expect those without specific experience to be familiar with proper names (Birch & Bloom, 2002; Diesendruck, 2005, Experiment 1) or people to know common names from another language than their own (Diesendruck, 2005 Experiment 2). Another route could be to gain experience with the conventional use of objects and how these may be known and shared by members of cultural communities. Evidence suggests that by the age of two, children understand some aspects of the conventionality of objects: two year olds expect others to use the same object for the same function (Casler & Kelemen, 2005), but their expectations are also guided by cues of shared cultural knowledge (Oláh et al., 2014; Pető et al., 2021). These findings show that children are sensitive to conventionality, thus experience with language and objects could serve as potential routes for understanding contextual boundaries.

Relatedly, as there are multiple developmental routes for these abilities, individual differences in pretending would not necessarily result in differences in adulthood. However, we would predict that relevant socio-cognitive abilities—such as tracking other people's knowledge states or their changing utility functions, as well as the boundaries of social contexts—are facilitated in pretend play scenarios. At the same time, we would expect to find cultural differences, with pretend play being more diverse, frequent and pervasive during childhood in societies where children are members of and encounter more communities and institutions which would require them to represent contextually bound information.

4.3.1 Development and individual differences

Empirical findings reflect that from early on, children are proficient in navigating the boundaries of social pretend episodes (Harris et al., 1993; Woolley & Phelps, 1994; Weisberg & Bloom, 2009; Wyman & Rakoczy, 2009a). As mentioned above, we would predict relevant skills to be facilitated in pretend scenarios. Findings suggests that this is true in the case of theory of mind abilities—children report their own past belief and the false belief of others

accurately in case they need to report a previous pretend stipulation at earlier ages than it is the case with "real" state-of-affairs (Gopnik & Slaughter, 1991; Hickling et al, 1997; Kalish et al., 2000; see *Chapter 2* of this Thesis). We would predict this to be true in other abilities as well, for example, for how the utilities of another person change from context to context.

Relatedly, it is an open question how children reason about the way action utilities may vary between pretend episodes or between social contexts for the same person. To our knowledge, no study has specifically addressed this question. On the one hand, as expanded on above, children can adequately follow changing pretend stipulations and their implications for themselves and for others. This would suggest that they could also monitor changes in utilities. Recently, it has been shown that both toddlers and children reason about other people's behavior based on the assumption that others choose actions to maximize utilities—and make adequate inferences about other people's costs and rewards based on their choices (Jara-Ettinger et al., 2015; Jara-Ettinger et al., 2017). Relatedly, they grasp that the same action may have different costs for different people (Jara-Ettinger et al., 2015) and can apply their reasoning about the utilities of others when deciding what to teach them (Bridgers et al., 2020), but it remains a question whether they grasp that the same action may have different costs for the same person. Based on our account, we would predict that it would be easier for children to follow how utilities may change for another individual in pretend scenarios (at an earlier age and in more complex situations). At the same time, it would be interesting to explore whether children's inferences about the utilities of their partners differs in pretend play. For example, a seemingly most costly manner of doing something may be the reward itself while pretending (see Chu & Schulz, 2023), therefore otherwise warranted inferences about competence or preference need to be reconsidered.

4.3.2 Differences between cultures

The presence of pretend play seems to be universal in all cultures (Smith, 2005; Gaskins, 2013). At the same time, the frequency, content, and developmental trajectory of pretending, as well as parental attitudes towards it vary between cultures (Haight & Miller, 1993; Haight et al., 1999; Gaskins et al., 2007). A number of interpretations have been proposed to explain these differences, including children engaging less in pretend play in cultures where they get more opportunities to practice culturally relevant skills via other activities and children who live in words which are less complex and open-ended (Gaskins et al., 2007). We believe our account can be an interesting addition to this question through highlighting that children

could be more inclined to engage in social pretense—both more frequently and more persistently in childhood— and the thus created social contexts, in societies where they encounter more communities and social institutions. This remains an interesting empirical question.

5. Conclusions

The social aspects of pretend play are important to examine as, from early on, children recognize pretense in others and engage in shared pretending with them. These shared play scenarios result in an agreed upon set of representations that guide the behavior of game partners—which, in many ways, resemble the socially constructed, seemingly unwarranted shared beliefs that determine social interactions in the life of adults on a much bigger scale (Cosmides & Tooby, 2000). We propose that engaging in social pretense supports children in recognizing, creating and navigating the boundaries of social contexts. While pretending with others, children participate in and set up arbitrary contexts with others and they need to apply representations created in pretense in a context dependent manner. Being sensitive to the boundaries of these contexts is crucial, on the one hand, as children are members of a number of smaller or wider communities with varying expected shared knowledge and norms, and on the other hand, in order to navigate successfully in societies that are becoming increasingly multicultural.

Chapter 2: Do preschoolers expect knowledge about pretend object identities to be shared by ignorant or knowledgeable partners?

1.Introduction

As mentioned above, much information in children's environment constitutes conventional knowledge shared by members of a given culture. This poses a challenge for children when it comes to assessing to whom this knowledge should or should not be generalized to. One of the ways in which children's understanding of this question has been studied is through exploring their reasoning and behavior during shared games with others, and more narrowly, during pretend play. Based on the findings summarized in the section of *Chapter 1* titled *Do children grasp the transient, socially defined nature of pretend episodes?,* we can see that preschoolers are able to apply pretend stipulations in a context dependent way, if the context is signified by location (Weisberg & Bloom, 2009; Wyman et al., 2009). However, the boundary of a context could also be signified by whether their partner shares their knowledge about a certain game stipulation.

Some related findings show that children can track the changing beliefs of their partner during pretending. Three-year-old children follow that when the pretend content of a glass has been changed in the absence of another person, she then has a false belief about the current pretend content, and they correctly report that she thinks it contains chocolate milk instead of orange juice (Hickling et al., 1997). In another study, 3- and 4-year-old children had to report the current state of affairs following changes in pretend stipulations, game rules (which marbles are the 'winners') and their belief about the content of a box (a crayon box containing candles). Additionally, they were also asked to report the representations of an interactive partner who was ignorant of the changes (and was thus only familiar with the initial scenarios) (Kalish et al., 2000). While children responded accurately in all scenarios from their own point of view, both age groups were better at reporting the ignorant representations of their partner in pretense. Additionally, preschoolers were shown to selectively enforce game norms on people who were part of a norm creation process and were, therefore, knowledgeable regarding the current norm (Schmidt et al., 2016). These findings suggest that children follow their partner's knowledge about current pretend stipulations.

Interestingly, in another study (Rakoczy, 2008a), 2 and 3 year old children set up pretend scenarios together with an experimenter and were joined by a puppet who was ignorant of the pretend identities of the objects. In some cases, the puppet used the objects according to the valid stipulations, while in other cases, he mixed up how objects should be used during pretense. Three-year-olds—and to some extent, 2-year-olds as well—protested against the behavior of the puppet in the latter condition, even though he could not know the pretend identities of the objects. This may suggest that they were not able to appropriately track that the puppet had no previous knowledge about the rule or may have overgeneralized its scope of applicability. Importantly, in this experiment, the puppet declared an intention to join the game, which could have led the children to disregard its lack of knowledge. Nonetheless, this result seems to contradict findings, which show that children can keep track if their game partner is ignorant of a novel pretend stipulation (e.g., Hickling et al., 1997).

Therefore, the aim of the current study was to further explore this apparent contradiction, and uncover whether children can keep track of the pretend identity of objects tied to separate contexts if the boundary of the context is designated by the knowledge of their game partner. In other words, the goal was to see if they refrain from generalizing the game context to an ignorant partner. In a way, the study can be considered to be a conceptual replication of the study of Hickling et al. (1997), while employing an interactive situation similar to the Rakoczy (2008a) experiment. The participants of this current study were aged between 42 and 48 months. This selection of age was based on Hickling et al. (1997), in which a similar age group, three and 4-year-old children were tested. During the experiments, children participated in two consecutive play scenarios with two experimenters. Both of these scenarios involved two play episodes, each including the same object and a corresponding prop (in total, 1 object and 2 props per scenario). One of the experimenters was either present or absent during these scenarios and was thus ignorant or knowledgeable about the latest pretend stipulation. Whether children were sensitive to the knowledge state of their partner was measured by which prop they gave her upon request. This design was partly inspired by studies investigating how infants may disambiguate communicative acts based on previous shared experience with a communicator (e.g., Ganea & Saylor, 2007; Woolley & Phelps, 1994).

The prediction is that in case another person has knowledge of the most recent pretend game, 3-year-olds would expect her to play with this object according to its pretend identity.

On the contrary, in case she was ignorant of this identity, we predicted that children would believe her goal to be manipulating the object according to its conventional use. All predictions, procedural details, statistical tests, sample size and exclusion criteria have been pre-registered at asPredicted.org (#29218). The data that support the findings of this study are openly available in OSF at https://osf.io/yaung/.

2. Methods

2.1 Participants

Based on an a priori power analysis, the planned sample size was 60 participants (odds ratio: 2.0, power: 0.8, proportion of discordant pairs: 0.6). The final sample consisted of 57 Hungarian children between the ages of 42 and 48 months (31 boys, mean age = 45.3 months [1379 days], SD = 50.96 days). Children were recruited from the database of the University lab. All participants attended preschool in the urban area of Budapest, came from mixed socioeconomic backgrounds and were monolingual Hungarian speakers. Participants' caregivers gave written informed consent. An additional 13 children were tested but were excluded because of fussiness or shyness (n = 5), experimenter error (n = 4) or lack of clear object choice in one or both trials (n = 4). These criteria had been previously set in the preregistration of the study. Testing sessions were conducted at the ELTE Babylab.

2.2 Materials

Testing materials included a small red ball, a pencil, a key, a pencil sharpener, a matchbox, a lock and a small cup (see Figure 1. for all objects included in the experiments). The objects were all compatible in size and were chosen for being familiar objects to preschool aged Hungarian children. During the experiments, participants were seated at a small table. Test sessions were videotaped for coding purposes.

2.3 Procedure

The study had a within subject design. All children participated in both conditions and were tested individually with two female experimenters. The order of conditions, the target object

type and the locations of the props at the test phase were counterbalanced between and within participants. The independent measure was whether a second experimenter was present or absent during the pretend play episodes. The dependent measures were object choice type and decision latency.

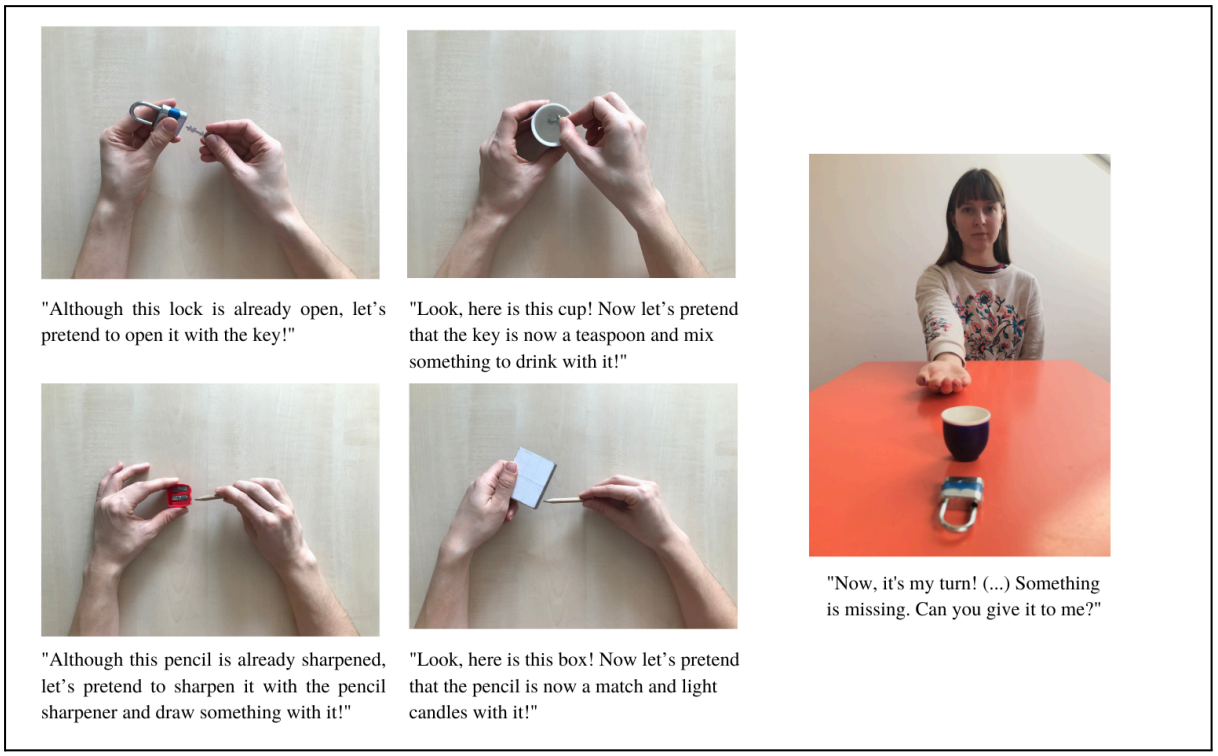


Figure 1. *Experimental procedure: The images depict the target objects and the props used in the game scenarios. The image on the right illustrates the test phase, as E2 is making the request*

Experimental sessions started with a warm-up phase during which the child and the two experimenters sat at the table and played with a plastic ball for approximately 30–60 seconds. Following this, the first experimenter (E1) presented a box and declared that they were going to play with the objects in the box. The box contained six objects: a pencil, a pencil sharpener, a matchbox, a key, a lock and a small cup. At this point, the second experimenter (E2) either left the room—after declaring that her phone has started to ring and she needed to leave the room for a while (*E2 Absent condition*)—or remained in the room, but moved the chair farther from the table ('*I will now sit and pay attention from here*') (*E2*

Present condition). After this, E1 opened the box and took out the first target object (either the pencil or the key) and a prop connected to its conventional use (in the case of the pencil, it was the pencil sharpener) (see Figure 1). The rationale for including a phase in which the object is used according to its conventional function in a pretend manner was to ensure that neither one of the props was more novel or produced a tangible outcome, which could contribute to its being more salient in the test phase. E1 initiated a pretend game ('*Although this pencil is already sharpened, let's pretend to sharpen it with the pencil sharpener and draw something with it!*') and started to play with the objects according to the proposed rule. She encouraged the child to play with the objects while taking turns. After approximately 30 to 40 seconds of playing, E1 put the prop away. At this point, she proposed a second game with another prop, which appeared to be made up on the spot ('*Look, here is this box! Now let's pretend that the pencil is now a match and light candles with it!*'). Similarly to the first episode, she started to play with the objects according to this new pretend stipulation and encouraged the child to play with the objects as well. Again, after approximately 30 to 40 seconds of playing, E1 put the target object at the opposite side of the table—close to where E2 was sitting previously—while placing the two props in front of the child in a row.

At this point, E2 returned to the table—either coming back from outside or moving the chair back to the table from farther away, and E1 turned away from it. E2 declared that now it was her turn and picked up the target object while observing it for approximately 1–2 seconds. However, she concluded that something was missing and made an ambiguous request to the child ('*Something is missing. Can you give it to me?*'). The trial ended either when the child put an object in or close to her palm or in case they did not make a choice upon repeated requests. In case the child hesitated to give an object or asked questions, E2 neutrally encouraged them to make a choice ('*Can you give it to me? Can you give me the one that is missing*?'). After a short play episode with the plastic ball from the warm-up phase, the same structure was repeated with the other condition and the other target object. Children usually completed the experiment in around 6.5 minutes.

2.4 Coding

All sessions were videotaped and coded by an experimenter. A second independent observer coded a random sample of 50% of all sessions for reliability. Reliability was very good

(Cohen's weighted κ = .92). Therefore, the coding of the experimenter was used as the basis for the data analysis.

In both trials, the dependent measures were object type choice and decision latency. Latency was measured as it could reflect the complexity of a decision, thus we could explore whether children found either of the ambiguous requests more difficult to interpret. During the experimental procedure, children were asked to choose from two objects, in the two consecutive trials. The dependent variable in this case was the type of object they chose. This was coded as the type of prop—corresponding to either the conventional function or the pretend identity of the target object—they decided to give to E2 (either by placing it in her palm or moving it close to her hand). Their decision time was measured as the number of seconds between the experimenter asking for an object and the child placing an object close to or in her palm.

3. Results

Statistical analyses were performed with the SPSS 21 software. We used Generalized Linear Mixed Models (GLMM) with binary regression to test for the difference in object choice in the two conditions. We used this method for analyses since the study had a within subject design, the main dependent variable was binary, and we also planned to explore the potential effects of additional variables on the dependent variables. The following variables were included in the initial model, but were later removed as their effect was not significant: gender, age group (younger: 42–45 months, older: 45–48 months), condition order, object pair type, position of choice and mask. This later variable was included in the analysis as, due to safety regulations in our country connected to the Covid-19 pandemic, starting from the summer of 2020, the data collection was conducted with the two experimenters wearing masks in the experimental situation. ‘Participant’ was added as a factor and ‘Condition’ as the repeated measure. Only condition as a fixed effect was included in the final model.

Condition had a significant main effect on object choice with a higher proportion of participants choosing the prop connected to the made-up, pretend identity in the E2 Present condition (56.14%) compared to the E2 Absent condition (31.58%) (F [1, 112] = 6.706; p = .011) (see Figure 2.). The same effect of condition was present with the comparison of proportions (occurrence of the two prop type choices in the two conditions) using McNemar's test (χ2[1] = 6.036; p = .014). This further confirms that there is a significant difference in the

proportion of object choices in the two conditions. For an overview of the frequency of the prop choices in the two conditions, see Table 1. below.

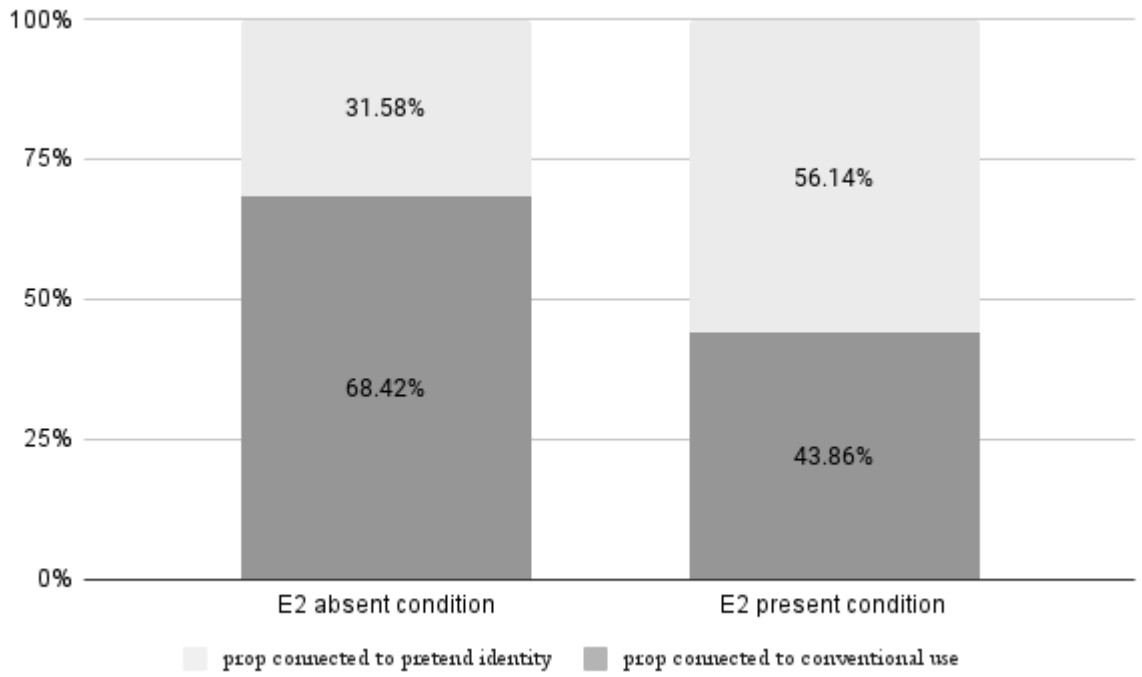


Figure 2. *Proportions of prop type choices in the two conditions*

Table 1. *Proportion of prop type choices in the two conditions additionally grouped by target object type (key or pencil)*

	E2 absent		**E2 present**	
	Object choice			
	conventional use	**pretend identity**	**conventional use**	**pretend identity**
Target object				
key	34% (19)	14% (8)	24% (14)	28% (16)
pencil	35% (20)	17% (10)	20% (11)	28% (16)

In addition to the analyses we preregistered we have also conducted binomial tests in the two conditions separately, to explore whether the object choices of children differ from

chance level (0.5). This yielded a significant difference only in the E2 Absent condition (p = .008). In the E2 Present condition, the choices did not differ from chance (p = .427).

We have also conducted a GLMM analysis with decision latency as a dependent variable, with gender, age group, condition order, object pair type (pencil/key as target object), mask and condition as fixed effects. These effects were not significant. It appears, therefore, that none of these factors had an influence on the amount of time children spent selecting the prop upon request. In the pre-registration, we also added the level of engagement in the pretend scenarios as a potential variable to explore in our analyses. However, after collecting our data, it was revealed that we were not able to code the behavior of children in a meaningful way.

4. Discussion

Through involving preschoolers in a number of pretend play episodes, we investigated if 3-year-old children take into account whether someone has knowledge about the pretend identity of an object while reasoning about their behavior. We found that the knowledge state of the person making an ambiguous request had an influence on the way children interpreted this request. In case she was not familiar with the recently played, novel game, the majority of children (68.42%) selected the prop connected to the conventional use of the object—which differed from the object's made-up pretend identity, but could be known by her regardless of being previously present or not. In contrast, the pattern of results was the opposite in the other condition. When she had observed the play episodes, a bigger proportion of participants (56.14%) handed over the prop connected to the game made-up on the spot. We found no difference in decision latency between the two conditions, which could suggest that children did not find either of the requests more difficult to interpret. This pattern of results suggests that at this age, children can separate pretend contexts based on the knowledge of their game partner.

While this experiment had a similar structure to the Rakoczy (2008a) study, the data do not shed light on the exact reason why children protested the behavior of the puppet who was not familiar with the previously introduced pretend stipulations. However, both this current investigation and the study of Hickling et al. (1997)—in which children accurately reported that their partner would still believe a past pretend stipulation to be the state of

affairs in case he had been absent during a change in the pretend scenario—suggest that this protest is not due to lack of appropriate knowledge tracking regarding the pretend stipulations. It is possible that the puppet's declaration to join the game was the main reason for protesting. In our study, we intentionally worded the request ambiguously (‘*Now, it's my turn*!’) so that it can be interpreted as having a turn in the game. This did not lead children to choose the prop connected to the recent game, therefore, it can be assumed that a declaration to join may not automatically prompt children to disregard the other person's lack of knowledge. Additionally, protest behavior may also be motivated by a desire to teach a rule to the other person—which children may be especially motivated to do in case it is not known by their partner.

The current study has a number of limitations. In the *E2 present* condition, while the pattern of choice shows the predicted tendency (with 57% of participants selecting the prop from the made-up game and 43% of them selecting the other one), this pattern does not differ from chance. There may be a number of reasons for this lack of difference: in this condition, both games—each of which involves a different prop—are observed by the requester. Therefore, she is knowledgeable about both object identities, so the children could reason that both props could be ‘appropriate’ to give upon request. In contrast, in the absent condition, she could only be knowledgeable of the conventional identity. Furthermore, for the preschoolers, there is arguably a strong association between the object and the prop connected to its conventional function, which may bias them to choose this prop even if their partner also knows the pretend identity. All in all, based on the pattern of choices, no firm conclusions could be drawn regarding the reasoning of children in this condition. Still, the direction of the results suggests that they are more likely to infer that the requester is referring to the prop connected to the pretend identity.

A recent review—mentioned in *Chapter 1* as well—has explored the way in which pretend play may contribute to the development of a number of abilities (Lillard et al., 2013). Relatedly, some of these abilities would be interesting to explore in connection with the current task. As children need to switch strategies in their object choices based on the knowledge of their partner, abilities that constitute executive functions could play an important part in how children behave in this task. Additionally, both this current study and other ones exploring children's reasoning about pretense may benefit from more flexible experimental designs in which children are actively involved in the setting up of the pretend

scenario or are playing together with a peer. These episodes may reflect a more natural scenario, resembling the everyday context of pretending, and thus allowing a better understanding on how socio-cognitive skills, like theory of mind and language development, may alter pretense skills.

Chapter 3: How does group membership influence the source memory of children?

1.Introduction

As it has been described in more detail in the *General introduction* (see sections titled *Artifacts* and *Cues about the knowledgeability of others*), children take into account the knowledgeability of their partner while learning about objects in their environment. More specifically, whether someone speaks their Native language has a profound effect on their learning—especially when it comes to acquiring conventional forms of behaviors (for e.g., how objects need to be used). However, while some studies have investigated source memory processes with regards to direct cues of knowledgeability—such as reliability (for e.g., Koenig & Woodward, 2010; Dautriche et al., 2021)—, we know little about how children's source memory performance may be impacted by the cultural group membership of such sources. As a first step, in this experiment, we targeted measuring the external source-monitoring performance of children in connection with the cultural group membership of the source.

How may cultural group membership figure into children's source memory performance? On the one hand, it could be argued that information obtained from in-group sources, similarly to information communicated pedagogically (Csibra & Gergely, 2009), are encoded by children as relevant and generalizable in their immediate environment, thus focusing their attention to the content of such communications. While this allows the rapid acquisition of culturally relevant information, in turn, it could hinder children's memory for the source of such information. However, information shared by an out-group model would not necessarily be encoded as generalizable in the immediate environment; nevertheless it could represent knowledge potentially useful in certain future contexts. Thus, in order to correctly identify these future contexts, the original source of the information may need to be retained (for e.g., the information may become useful in places where they speak the same language). This could bias children to encode the information in a way that it is closely associated with the source, resulting in a boost for their source memory performance.

It can also be argued that children may consider out-group sources to be ignorant or less reliable, and refrain from retaining knowledge shared by them altogether (both the content and the source)—nevertheless, this is not what previous findings suggest (see *Chapter 4* of this Dissertation, and other studies such as Altınok et al., 2020 and Pető et al.,

2018). However, it is also possible that the information shown by out-group sources are encoded in person-specific ways (for e.g., “She uses these tweezers to pick up the ball” as opposed to “The function of the tweezers is to pick up the ball” or “The tweezers should be used to to pick up the ball”)—similarly to what Sabbagh & Shafman (2009, p. 421) proposed could be the case of how children “treat” information from ignorant sources. This person-specific representation may result in better source memory performance. These lines of argument—in the previous and the current paragraph—would both support the hypothesis that the source memory performance of children could be better in the case of out-group sources, compared to in-group ones.

Importantly, the findings of a study with an adult sample suggest that adults are better at recalling in-group sources of information in a memory task, compared to out-group sources. In more detail, the results show that the source memory performance of participants is better for in-group sources (when the group membership variable is based on age) (Experiment 1), and that figuring out along the way that another person belongs to same group as the participants boosts their performance (when the group membership variable is based on cultural group membership) (Experiment 2). The opposite pattern was found in case someone turned out to be an out-group member: the performance of the participants declined after the reveal (Greenstein et al., 2016). Therefore, based on these findings, the opposite hypothesis could also be formed that, similarly to adults, children would show better source memory performance for people belonging to their in-group, compared to if they belong to their out-group.

The authors discuss their findings in connection with the “out-group homogeneity” effect (Simon & Brown, 1987; Judd & Park, 1988; Boldry et al., 2007). According to this phenomenon, people tend to perceive those who belong to another social group to be more similar to each other, than people in their own group. According to the authors’ argument, as a consequence of this effect, people perform worse when it comes to identifying a source in case it was an out-group person—since they cannot distinguish those from an out-group as well as in-group members. Some evidence can be found for this effect in the case of children (for instance, Aboud, 2003; Guinote et al., 2007; Shilo et al., 2019; Fogiel et al., 2023); however, the results are not clear. A recent study, which involved the participation of infants around the age of 1, showed that they are already more likely to individuate in-group members than out-group members (Fogiel et al., 2023). Importantly, the group differences were based on preferences (food and shirt color)—thus, this study employed a minimal group paradigm. In another study, which investigated natural categories, preschoolers were found to

perceive those having a different skin color than their own as more similar visually (Aboud, 2003). However, the presence of this effect varies as a function of status: children belonging to minority groups do not perceive their own group to be more heterogeneous (Guinote et al., 2007) and while children tend to homogenize people belonging to a cultural out-group in terms of their biological properties, this was not found to be the case for psychological properties (Shilo et al., 2019). All in all, although it is not clear whether children show an out-group homogeneity effect similar to adults, this tendency may impact children in our own sample as well, resulting in the opposite pattern as it would be predicted by our arguments described above.

Nevertheless, there are some characteristics of the study of Greenstein and colleagues (2016) which are worth considering and modifying—which we believe may impact the pattern of findings. First of all, the task of the adult participants was to decide who performed familiar actions they had previously read about (for e.g., hanging the curtain or grabbing a purse). This information would not necessarily constitute cultural knowledge—as opposed to information such as the functions of artifacts or words. We would argue that in case the cultural background knowledge of the demonstrator is specifically related to the to-be-recalled information, participants may perform differently than if the information is not culturally relevant. As argued above, both if people consider out-group members ignorant or if they treat information shared by in-group members as generalizable and relevant, could result in the better retention of out-group sources. However, this would only be the case for information about which cultural in-group members could be considered to be knowledgeable, while out-group members to be ignorant. Consequently, we suggest that measuring the influence of cultural group membership on source memory performance is more valid if the information shared by these sources is cultural. Additionally, we would not expect to find an advantage for out-group sources if the shared content constitutes other types of information (such as personal preferences) or if the group differences introduced in the task do not reflect differences in cultural knowledgeability (such as eye color).

Furthermore, the study of Greenstein and colleagues investigated source memory in the broader sense (see section titled *Source memory* in the General Introduction), according to which source refers to any other detail that constitutes a part of the episode from which the information originates (Johnson et al., 1993). We suggest that it would be worth studying the potential influence of group membership on source memory in its more narrow sense—as recalling a specific source as the origin of our knowledge. In other words, instead of describing people as being engaged in some everyday tasks, they could be shown as

demonstrating some novel information. We believe that since cultural group membership reflects a person's knowledgeability about conventional knowledge—such as how objects are used—, it is more valid to study its influence on how well people remember others as sources of some novel, conventional information. Finally, it is a possibility that information about group membership influences adults and children differently. On the one hand, fully-fledged source memory processes may differ from developing capacities. On the other hand, childhood is characterized by the extensive learning of novel information, and since children are novices and possess less previous knowledge based on which they could evaluate the validity of the information shared with them by others (Sperber et al., 2010), they may be generally more inclined to scrutinize the sources of the information at hand.

According to these considerations, in this online study, we investigated whether 4-year old children's memory for the source of their knowledge—in this case, specific people—is influenced by the cultural groups these sources belong to. We have selected this age group since source memory still seems to develop substantially between the ages of 3 and 4 (Gopnik & Graf, 1988; O'Neill & Gopnik, 1991), thus, the performance of 3-year-olds may be too fragile. However, the performance of 4-year-olds does not yet resemble that of adults (Roberts, 2002): their memory for the sources of their knowledge is still vulnerable to a number of factors (such as similarity or time delay, Lindsay et al., 1991; Drummey & Newcombe, 2002), which allows the exploration of how other factors may improve or hinder their performance. During the experiment, children were introduced to four characters, two of whom belong to their linguistic in-group (Hungarian speaker), while the other two belong to an out-group (French speaker). Following the introduction, these characters demonstrated how to use a number of objects—thus, information that could be considered conventional—, and children were later asked to report one by one who had shown them the objects, by repeatedly making selections from four images. Children's source memory performance was measured as the number of accurately identified sources in each condition. We predicted that the source memory performance of children could be superior in the case of out-group sources, compared to in-group sources. In addition to this, we explored whether children remembered the group membership of the sources accurately at a later stage of the experiment, and their memory for how the previously presented object sets were used. We predicted that their memory for the content of demonstrations would be better in case these were shared by an in-group source, compared to an out-group source. The data that support the findings of this study are openly available in OSF at https://osf.io/jqb4k/.

2. Methods

2.1 Participants

Based on an a priori power analysis, the planned sample size was 34 participants (effect size = 0.5, power = 0.8). The final sample consisted of 63 Hungarian children between the ages of 48 and 60 months (32 boys, mean age = 53.251 months [162 days], SD = 98 days). This sample size was collected in order to have at least 34 children in the group who passed the manipulation check (see criteria later). Twenty-nine children also completed the task, but did not pass the manipulation check. In addition to this, 17 children were tested, but were excluded due to experimenter error (3), not completing the task (10), parental interference (2) and technical error (2). Children were recruited from the database of the ELTE Babylab. All participants attended preschool in the urban area of Budapest and were monolingual Hungarian speakers.

2.2 Materials

All participants were tested remotely, via the software called Zoom. During the sessions, children played the games with one female experimenter. Therefore, participation required a video camera, a microphone and a device on which the software could be installed. The experimenter used a laptop, with a built-in camera and a microphone, to present the stimuli via screen sharing a PowerPoint presentation. Children got acquainted with four characters, of whom they saw images and short videos, and they were shown eight object sets on short videos. For a detailed description of how the object sets were used by the characters, see Figure 3. Test sessions were recorded on video for coding purposes.

2.3 Procedure

Written informed consent was obtained from the parents before the testing via the Qualtrics site of Eötvös Loránd University. At the beginning of the test sessions, oral informed consent was also obtained from the parents, as well as the children. The testing started with a short

introduction of the study during which the parents were instructed to remain passive (except for a short period during the test phase, see later). Following this, the recording was started, and both the parent and a child gave a short oral consent to participating in the study. After this, the technical requirements for participation were checked (sound, full screen settings, positioning the image of the experimenter) (see Figure 4 for the illustrations of the view of the participants). The session for each participant lasted around 15-17 minutes.

This was followed by a warm up game (Warm up). During this game, children saw four images in four corners of the screen (a ball, a flower, a car and a star) and their task was to point to the objects one by one, after these were mentioned by the experimenter. The reason for this game was three-fold: on the one hand, this provided an opportunity for the experimenter and the child to get acquainted in a playful manner. On the other hand, it also served as a final check to see if the screen is indeed organized according to the instruction on the side of the participant. Lastly, it functioned as practice for the test phase, during which children also needed to point to images on the screen. All participants pointed accurately during the warm up game.

After the warm up, the first phase of the familiarization has started (Familiarization 1). The study had a within subject design, thus all children were introduced to all four characters (both in-group and out-group). The order of the introductions and the group assignments of all four characters were counterbalanced across participants. At the beginning of each trial, an image appeared in the middle of the screen, and the experimenter started the video by proclaiming "*Look, there is someone here! Let's listen to what she says*!". During the video, each person introduced herself, either in Hungarian or French (for e.g., "*Salut, je m'appelle Léa*." or "*Szia! A nevem Lea*."). After this, the experimenter highlighted some information about the character: "*Look, this is Lea! She speaks the same language as you and lives in the same country. / She speaks a different language than you, and lives in a different country*". Thus, the group membership manipulation was introduced both by varying the language spoken by the person on the video, as well as by the information provided by the experimenter. The group induction manipulation was based on McLoughlin and Over (2017). Information about group membership was also supported by stickers: the characters belonging to the same cultural group also had similar coloured stickers (yellow or green).

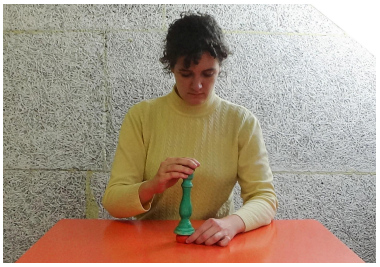
After each introduction, children were immediately asked what they remembered ("*Do you remember what I said, which language does she speak? (...) Do you remember what I said, where does she live?*"). In case children answered correctly, they were given positive feedback (for instance, "*Yes, you are right, she speaks the same language*."). In case they

answered incorrectly or refused to answer, the information was repeated by the experimenter (for example, "*No, she speaks a different language then you, and lives in a different country*.") All four characters were introduced one by one in the same manner; two of whom belonged to the same group as the child, while two belonged to a different group.

Following the introduction of the characters, the experimenter told the participant that they would now see the same girls in short videos, and that they would introduce different objects. Before this phase began, the experimenter declared that she had another task and that she needed to write some things in a notebook, but that the child should watch the demonstrations and let her know when they were finished. This was designed this way to ensure, on the one hand, that the experimenter would not know the correct answers in the test phase, and to make it more natural that the experimenter would later ask the source memory questions from the children (since she did not know the answers). The children were also instructed to play attention to what they saw.

Following this instruction, children saw eight short videos involving the same 4 characters and 8 object sets (see Figure 3 for the object sets) (Familiarization 2). The order in which the objects were introduced, as well as the character introducing them was counterbalanced across participants. In order to counteract potential recency or primacy effects, the order of the characters was counterbalanced in a way that both the first 4 and the second 4 videos included all characters at least once. This way, two in-group and two out-group demonstrations were included in both halves of the introduction.

Object set	**Illustration**	**Description**
a ball, tweezers, a modified box with one transparent side		First, the tweezers are located next to the box and the ball is in the box. The tweezers are used to pick up the ball from the box.

a small ball, a pencil, a tube		At the beginning, both the modified pencil and the tube are on the table, and the small ball is in the tube. The pencil is used to push the ball out from the tube.
two building blocks, a scoop, a decorated glass jar		At the beginning, both building blocks are in the glass jar, with the scoop placed next to the jar on the table. The scoop is used to remove the two blocks from the jar, one by one.
a piece of plasticine, a green toy tower		First, the plasticine and the toy tower are located next to each other on the table. The toy tower is then used to flatten the plasticine.
a box with a squeaker inside, a small wooden rod		At the beginning, the rod is located on the table, next to the box. Then it is used to push the squeaker, thus evoking a squeaking sound.
a corkwood rod, a decorated paper box with bells located on the inside		First, the rod is located next to the paper box. Then, the rod is used to ring the bells.
a small lamp, a modified yellow rod		At the beginning, the rod is located next to the lamp on the table. Following this, it is used to turn the lamp on and off.

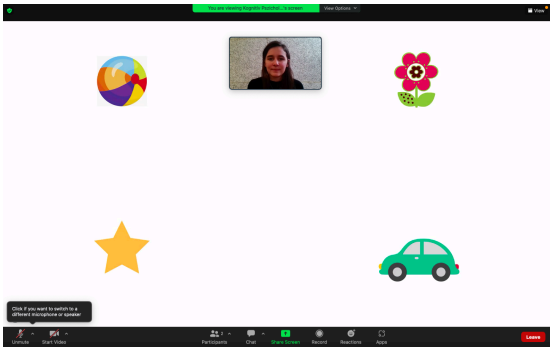
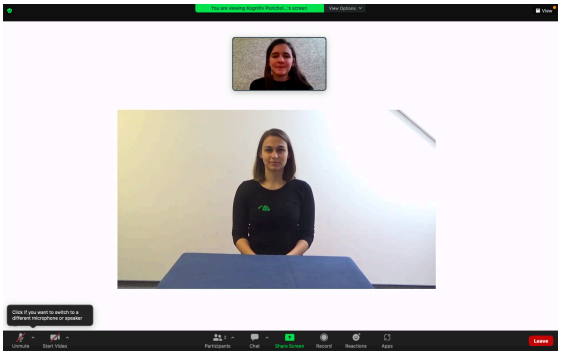
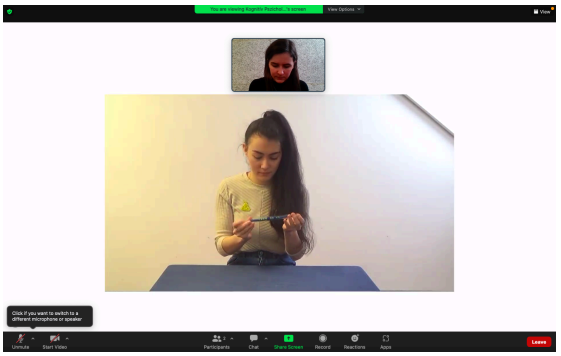
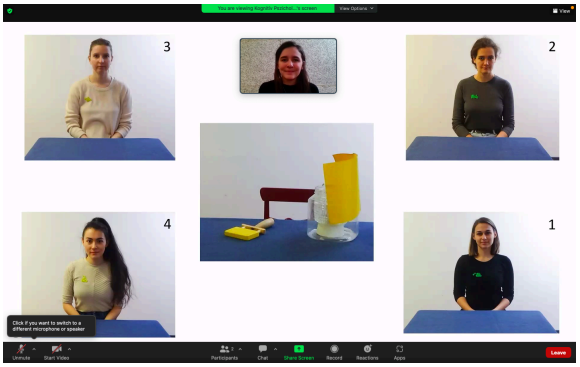
a small blue rod and a paper hoop		First, the blue rod is on the table, next to the hoop. Later, the rod is inserted in the whole of the hoop, and the hoop is then rolled on the table.

Figure 3. *Illustrations for and short descriptions of the object set demonstrations in Familiarization 2.*

During the first test phase (Test phase 1), children saw the images of the previously introduced object sets one by one, as well as images of all four characters. They were instructed to indicate by pointing which person had previously shown the object to them (for an illustration, see Figure 4). During pilot testing, we were unable to code which images had been indicated by the children based solely on their pointing, therefore, the parents were asked to help in this phase of the experiment. Each image included a number, and the parents needed to report the number corresponding to the image that the child pointed at. Importantly, children were encouraged to answer even if they had been uncertain. The order in which the object sets were presented, as well as the location of the images of characters during the test phase were counterbalanced between and across participants.

In addition to measuring children's memory for the source, we also tested whether they remembered the group membership of each person (Manipulation check). During this part, children were shown images of the characters one by one, and were asked whether they spoke the same language as them or not.

During the final phase of the experiment (Test phase 2**)**, children's memory for the object sets was also probed. They were shown images of the object sets, one by one, and were asked "*What is this for*?". The wording was left intentionally ambiguous, so that we could measure whether children reported what they saw on the video, or some alternative idea (for e.g., based on their knowledge from outside the experiment or based on speculation).

Phase of the experiment	Illustration
Warm up Children are instructed to point at the images, one by one.	
Familiarization 1 Children are introduced to 4 characters in short videos (2 in-group and 2 out-group characters). They are also told whether the person on the video speaks the same language or lives in the same country as they do.	
Familiarization 2 Children see the same 4 characters in short videos (2 of each), demonstrating 8 object sets in short videos. The experimenter is engaged in a different task (looking down).	
Test phase 1 Children see images of the object sets one by one, and the 4 characters in the four corners of the screen. They are instructed to select the person who introduced each object.	

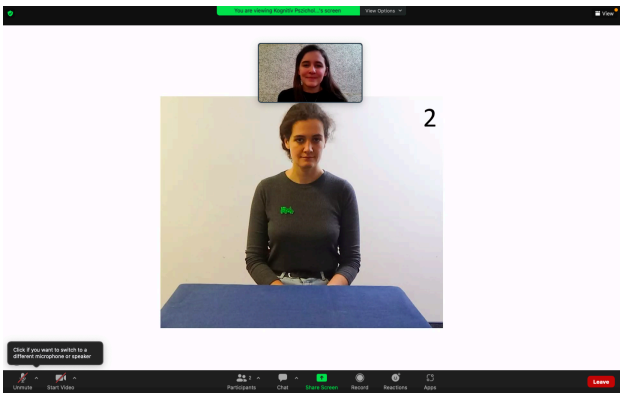
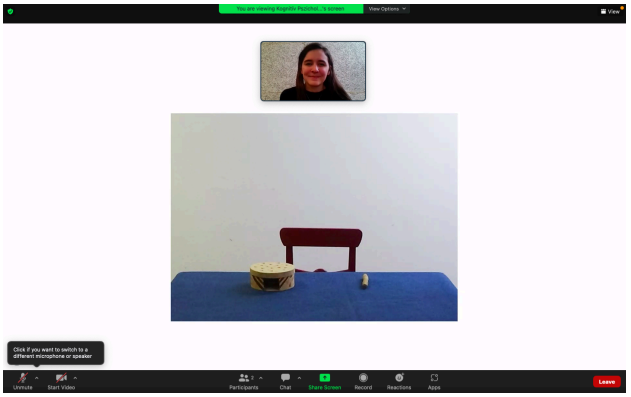
Manipulation check Children see images of the 4 characters one by one. They are asked whether this person speaks the same language as them, or not.	
Test phase 2 Children see images of the 8 object sets. They are asked what these are for.	

Figure 4. *Illustrations for the point of view of the participant in the different phases of the experiment.*

2.4 Coding

All sessions were recorded and coded by an experimenter. A second independent observer coded a random sample of 25% of all sessions for reliability. Reliability was very good (Cohen's weighted κ = .92). Therefore, the coding of the experimenter was used as the basis for the data analysis.

First of all, we coded whether participants passed the manipulation check or not (1 = pass, did not pass = 0). We considered children to pass the manipulation check if they identified the group membership of at least 3 characters—which suggests that they were not selecting randomly. In the final analysis, we included this as a variable, to see whether there was any difference in the two groups. The source memory trials were coded one by one, into a binary variable (1 = correct, 0 = incorrect). As the testing was relatively long and took place

in an online setting, not all participants completed the whole experiment. To reduce the overall dropout rate, we decided to include participants who completed the tasks up until at least the end of the manipulation check. This way, we could ensure that we were able to adequately measure their performance in connection with our main question (source memory performance). Nevertheless, we also analyzed their performance in Test phase 2 to explore whether children's memory for the information about the object themselves were influenced by group membership in any way. It is important to note, however, that these analyses were based on smaller samples (overall analysis: n = 46, those who passed the manipulation check: n = 23). Children's answers were coded on a nominal scale (0 = different answer, 1 = response suggests memory for demonstration).

We excluded participants altogether:

- who did not complete the task until the end of the manipulation check,
- whose performance was influenced by the behavior of the parent in Test phase 1 or during the manipulation check (for example, if they commented on the behavior of the child or helped them).
- in the case of technical issues that had an influence in the familiarizations or the test phase (for example, if the experimenter's video was blocking the visibility of one of the corners, thus covering the image of any characters).
- children who selected the same character at least 4 times in a row in response to any of the source memory questions (in the end, no children were excluded based on this preset criteria).
- in the case of experimenter errors (for example, counterbalancing errors or mistakes in the stimuli).

Some of the parents have interfered in Test phase 2 when children had to recall the information connected to the objects (for e.g., through rephrasing the question). If they did so already in the first trial, we excluded the participant from this section of the experiment. In case the interference happened in a later trial, the participants were not excluded from this section altogether, but the subsequent trials (those which included the interference and those that followed it) were not included in the analysis. In the end, there was only 1 child in the sample with only 3 trials (5 were excluded due to parental interference).

3. Results

Statistical analyses were performed with the R 4.1.2 with lme4 and emmeans packages and the SPSS 21 software. We performed analyses concerning source memory accuracy and content recall as target variables using Generalized Linear Mixed Models with binomial distributions for our dependent measures. We used this method for analyses since the study had a within subject design, the main dependent variables were binary, and we also planned to explore the potential effects of additional variables on these dependent variables. We analyzed two datasets: one included all participants (n = 63), while the other was the subgroup of children who passed the manipulation check (n = 34).

Accuracy of source memory

In order to explore whether the choices of children differed from chance level (0.25), we conducted a one sample t-test for their overall score. Children selected the correct images on average in 39% of the cases. This significantly differs from chance ($t(62) = 6.25$, $p < 0.001$). We conducted the same analysis in the smaller subgroup as well (those who passed the manipulation check). In this group, children selected the correct images on average in 38% of the trials. This also significantly differs from chance ($t(33) = 4.183$, $p < 0.001$).

In the case of the wider dataset, the following variables were included in the initial GLMM model: condition (group membership of demonstrator), age, gender, manipulation check, as well as the interaction of manipulation check and condition. We added random slopes for each participant. The target variable was accuracy in the source memory question in each trial (1 = correct, 0 = incorrect). We found no significant main effects or interaction. We also analyzed the effect of condition separately, and found no significant effect ($\beta = -.173$, $z = -.940$, $p = .347$).

We completed the same analysis in the subgroup who passed the manipulation check (n = 34), with age, gender and condition as variables. We found no significant main effects, but a trend of condition ($\beta = -.446$, $z = -1.775$, $p = .079$). The pairwise comparison has shown that children tended to identify a higher number of sources accurately in the out-group condition compared to the in-group condition (1.73 (0.43 in proportion) and 1.32 (0.33 in proportion) in the out-group and in-group conditions, respectively) ($z = 1.755$, $p = 0.079$) (see Figure 5). Based on the results of one sample t-tests, both of these proportions differ from chance (out-group condition: $t(33) = 4.451$, $p < 0.001$; in-group condition: $t(33) = 2.149$, $p =$

0.039). Thus, the results show the predicted pattern, but we could not confirm our hypothesis since the difference is not statistically significant.

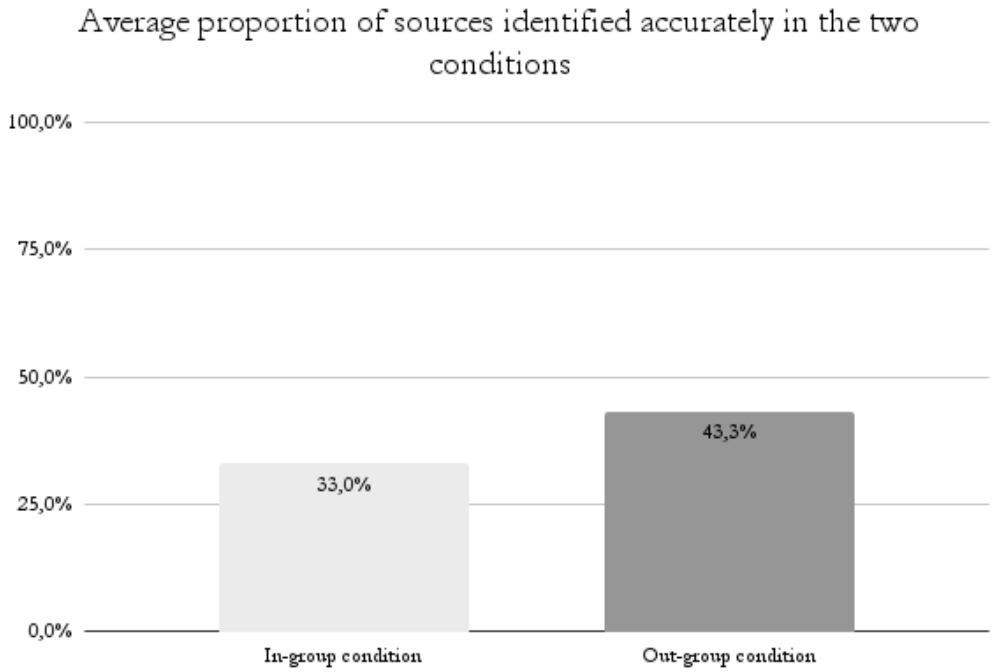


Figure 5. *The pattern of results in the source memory task showing the comparisons between the in-group and the out-group conditions. Showing the subgroup in which the participants passed the manipulation check (n = 34)*

Memory for the content of the demonstrations

In the case of the wider dataset, the following variables were included in the initial GLMM model: condition, age, gender, manipulation check, as well as the interaction of manipulation check and condition. We added random slopes for each participant. The target variable was whether children recalled any details from the demonstrations accurately in each trial (1 = reference to the demonstration, 0 = no reference). As mentioned above, this analysis was performed on a smaller dataset because of exclusions due to parental interference and participants not completing this part of the experiment (including 363 data points from 46 participants). The chosen analysis—Generalized Linear Mixed Model—is robust with regards to handling missing data.

We found a main effect of manipulation check (β = 1.571, z = 2.574, p = *p* = 0.01). Children who passed the manipulation check recalled more information (average proportion = 0.711) compared to those who did not do so (average proportion = 0.460) (z = -2.574, p = 0.01). We also found a trend for condition (β = 0.490, z = 1.829, p = 0.067). Children tended to recall recall more information about the objects from the videos in case these were introduced by an in-group member (average proportion = 0.625) compared to their performance following out-group demonstrators (average proportion = 0.548) (z = -1.829, p = 0.067) (see Figure 6). Importantly, this pattern was found in the sample which included both those who passed the manipulation check and those who did not.

We conducted the same analysis in the subgroup—those who passed the manipulation check—with age, gender and condition as variables. This analysis included 184 data points from 23 participants. We found no significant effects. We also analyzed the effect of condition separately, and found no significant effect (β = .359, z = .966, p = .334).

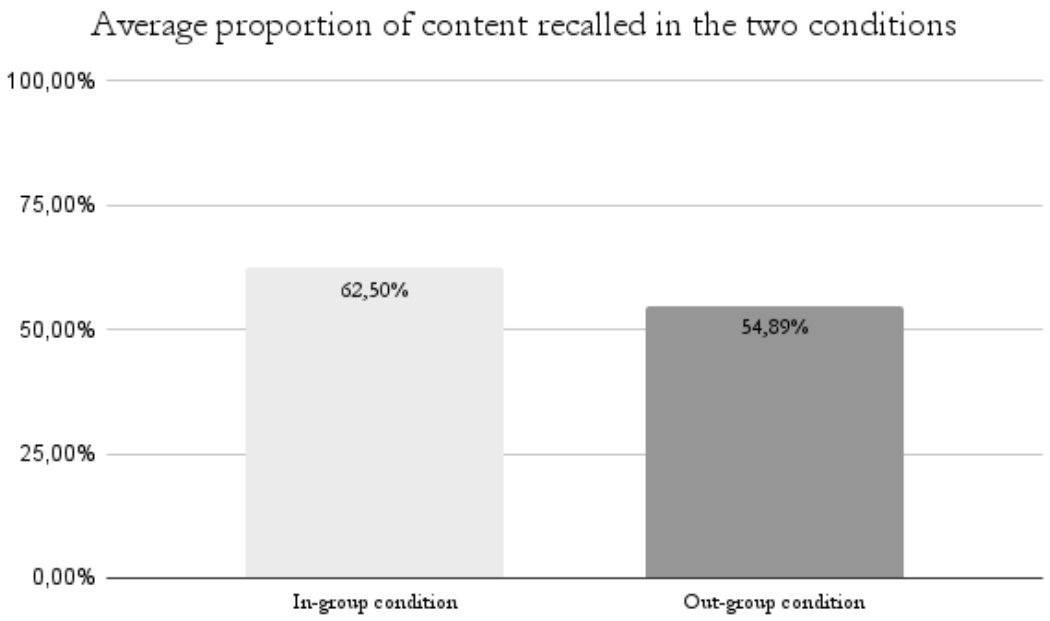


Figure 6. *The pattern of results in the content recall task showing the comparisons between the in-group and the out-group conditions. Showing the whole sample (n = 63)*

4. Discussion

In this online experiment, we set out to uncover whether children's source memory performance would be influenced by cultural group membership. More specifically, if they would remember sources of novel information more accurately if these people belong to their cultural community (speak the same language and live close to them) or if they belong in another community (speak a different language and live far away). We predicted that children could be more accurate in the case of out-group sources. We could not confirm this in the overall analysis (including all participants), but we found a trend in the subgroup that included those children who passed the manipulation check. We believe that the results from this latter group are more relevant with regards to this research question, since these are the participants who remembered the group membership of the demonstrators better. In this subgroup, children tended to identify a higher number of sources accurately on average if they belonged to another cultural group (1.73), compared to when they belonged to their own group (1.32). Thus, these results point in the predicted direction: children may encode learning episodes differently depending on whether these include in- or out-group teachers, and this may result in a better source memory performance for those belonging to a different cultural group than the child's own.

With regards to what children remember from the demonstrations content-wise, we expected them to perform better in the in-group condition, compared to the out-group condition. We could not confirm this pattern in the overall analysis, but found a tendency in this direction: children recalled more information from the videos in case the demonstration was shown by an in-group source (average proportion = 0.625), compared to an out-group source (average proportion = 0.548). In this group, we also found a main effect of manipulation check: children who passed the check performed better in recalling information about the objects (average proportion = 0.711), compared to those who did not do so (average proportion = 0.460). In the subgroup who passed the check, we did not find an influence of group membership in the memory performance for the shared content. Thus, although we found that children tended to recall more information from the demonstrations if these were introduced by a member of their cultural community—as it was predicted—, this difference was not significant.

Importantly, we have only found this tendency in the group which included all participants—even those who performed worse when it comes to identifying the group membership of the sources. It is possible that even though many of the participants could not

identify the sources accurately, their performance was nonetheless influenced by the group membership manipulation. However, we have no evidence to disentangle this question. On the other hand, many children did not complete this part of the experiment (or were excluded due to parental interference), therefore, these analyses were based on more limited samples compared to the source memory analyses. This is especially important in the subgroup which included those participants who passed the manipulation check: this only included data from 23 participants.

Nevertheless, we find these patterns of results promising with regards to the initial assumptions, and would suggest that a future replication of this experiment with changes introduced in the experimental design and the process of the data collection would be worth considering. First, although we aimed to standardize the stimuli and give as clear instructions to the parents as possible, the testing environment of each child was substantially more varied because of online testing, compared to a data collection in the lab or in kindergartens. Remote testing has its advantages: for instance, children may be more comfortable in the familiar setting of their home, compared to a novel environment (in a lab). Also, remote testing can ensure the involvement of a wider circle of participants—including those, for example, who could not commute to the lab or could not arrange to visit a laboratory. This type of testing requires less time on the part of the participants which could be crucial in the everyday life of families with young children (especially for those with parents who work). However, it is also important to mention that it excludes the participation of those without a stable internet connection and suitable devices (microphone, camera, laptop or desktop computer), as well as that allowing a view into their home may not be comfortable for all families.

At the same time, remote testing creates a more noisy environment and results in more interruptions, compared to testing in a lab. Additionally, although we aimed to standardize what children see during the experiments—through providing careful explanations as to how to arrange the display—, we could not completely ensure that all participants had the exact same view (partly, due to the variability in the devices). Potentially, in a future remote testing, we could also ask the parents to take a picture of the display arrangement and share it with us to control for this issue. The variation in the devices may have resulted in children viewing the images in differing sizes—the standardization of which would be crucial for the source memory identification phase of the experiment. Also, the parents were instructed not to interfere, and we excluded those who visibly did so—however, smaller, involuntary forms of influence are harder to discern in a remote setting. This is

especially important in the test phase, as the parents were involved in this part of the experiment and had to indicate which images the child had selected. Although we mentioned that it is possible for them to leave during the familiarization, most of them did not do so—many times, because the child would not have stayed to view the stimuli by themselves. This aspect of the data collection could be better handled in a laboratory setting. Finally, we used relatively complex stimuli for this age group: children had to view and recall a relatively larger amount of information, and we aimed to tackle potentially small differences in memory performance (on average, children could accurately identify around 3 out of the 8 sources in the group who passed the manipulation check). This could also be easier to measure in a more controlled setting. All in all, we can conclude that testing in the setting of a laboratory may be more suitable to uncover these processes, thus, a replication in a live setting is worth considering.

In the current design, quite a number of participants and trials were dropped either because a participant did not finish the experiment up until the end of the manipulation check (n = 10), or because they did not complete the final phase of the experiment (recalling the content of the demonstrations) (n = 17 children did not complete any trials in Test phase 2). Implementing the experiment in a laboratory setting with more varied tasks could result in more participants completing the whole experiment. For example, instead of selecting from the images on the screen during the source memory test phase, children could select from images on a table. Additionally, their memory for the content of the demonstrations could be probed via imitation (see new design ideas below). This newer procedure would not require them to sit still in front of the computer for about 15-17 minutes, and would allow them to participate in some tasks that are potentially more suitable for this age group.

Additionally, many participants were dropped from the main analysis because they did not pass the manipulation check (n = 29). This raises the question whether the part in which the characters were introduced was implemented adequately. First, we would suggest making this phase longer, with including 3 repetitions of the videos and of the information introduced by the experimenter ("*She speaks the same language as you and lives in the same country. / She speaks a different language than you, and lives in a different country*."). Also, we would suggest a more stringent criteria based on which children could continue to the introduction of the next character and to the next phase. For example, they could be required correctly to respond to the questions of the experimenter in this phase of the experiment at

least once for all 4 characters. Since this was the beginning of the experiment, many children were still shy and had a hard time answering the questions of the experimenter about the characters. A live setting replication may improve this aspect of the procedure, since there would be more time for the children to familiarize themselves with the experimenter.

With regards to children's memory for the content of the demonstrations—how the objects were used—much data was lost due to, on the one hand, parents interfering with children's verbal responses with regards to what the objects are for (many of them have rephrased the question which was deliberately ambiguous). On the other hand, data was also lost due to children having a hard time expressing their knowledge verbally—some of them even tried to show how the objects were used, but these responses were hard to record in this online setting. A live replication of the study could remedy these issues in a number of ways. With the more active involvement of the experimenter, the parents may be instructed better, which could result in less interference. Additionally, in a lab-based experiment, the verbal measure could be replaced by an imitation measure during which children could receive the object sets themselves and would be able to reproduce those actions that they remember. Related evidence shows what children can learn about objects from video demonstrations (Howard et al., 2014).

Additionally, if the experiment would be replicated in a live setting, this would also allow us to implement a baseline condition with regards to the object sets. A group of 15 children could be invited to the lab, and receive all the sets. In this way, it would be possible to uncover whether children in this group would spontaneously use the objects in a similar manner as shown on the videos. Thus, we could ensure that their children's behavior with the object sets in the experimental group is based on memory, and not on individual exploration.

Chapter 4: How does the group membership of a teacher influence the long term retention of novel cultural information?

1.Introduction

Whether someone speaks the Native language of children has been shown to impact their learning in many ways. For instance, it has been demonstrated that children below the age of 2 are more likely to imitate Native speakers, compared to Foreign speakers (Buttelman et al., 2014; Altınok et al, 2022). Preschoolers are also more likely to endorse object function information demonstrated by a Native-accented speaker (compared to a Foreign-accented speaker) (Kinzler et al., 2011). Furthermore, preschoolers' learning is impacted by linguistic information in other ways: 3-year-olds are more likely to generalize newly learnt object functions to similar looking, but bigger objects following a demonstration by a Native speaker (Oláh et al., 2016). At the same time, if the information about the function of the object was shared by a Native speaking adult, preschoolers tend to exclusively assign this function to the object kind, and they select a different looking object for carrying out another function (Pető et al., 2018).

Nevertheless, it does not appear to be the case that children completely disregard information from people who may lack the relevant cultural knowledge. For example, a recent study by Altınok and colleagues (2020) found that 4-year-old (and older) children are equally likely to reproduce the actions performed by an adult involving an artifact, regardless of whether they speak the child's Native language or a Foreign language. At the same time, they were less likely to switch to a more efficient strategy following it being demonstrated by a Foreign speaking adult, compared to a Native speaking one. Additionally, children in the study of Pető and colleagues (2018) were able to reenact the object functions demonstrated by a Foreign speaker—but did not consider it to be the culturally accepted, exclusive function of the object. Also, preschoolers retain information shared by ignorant others: for instance, when taught novel words by an ignorant person, they map them to their referents, but interpret them differently and forget them more rapidly, compared to when they are taught by a knowledgeable person (Sabbagh & Shafman, 2009). Electrophysiological markers also show that children are familiar with words taught by ignorant speakers, but do not attach meaning to them (Mangardich & Sabbagh, 2018). Thus, there seems to be a difference between how children handle information from knowledgeable or ignorant sources when it

comes to how the information at hand is integrated in their accumulating semantic knowledge.

If the difference in how preschoolers handle information from more or less knowledgeable sources lies, in fact, in what they integrate into their general semantic knowledge, we would expect this to be reflected in what they retain in the longer term. If the information shared by their partner constitutes relevant cultural knowledge, children can expect this information to apply to other situations and to other people as well. This could prompt them to more accurately retain the shared information. However, all previous experiments measured the effect of language on children's learning immediately or following a short delay (a few minutes). Studies involving preschoolers in delayed imitation paradigms, without a group membership manipulation, show that they selectively retain some elements from the information demonstrated to them—although it is not clear whether they consider the non-reproduced elements irrelevant, and thus do not reproduce them, or forget them altogether (Simpson, & Riggs, 2011; Kline et al., 2019).

Therefore, in this current study, the aim was twofold: first, to explore whether the cultural group membership of a model has an influence on how accurately preschool-aged children reproduce action sequences demonstrated to them, since previous results appear to be contradictory. Second, we intended to uncover how accurately the observed information is retained for a longer period of time based on the demonstrator's group membership. We manipulated cultural group membership through varying the language spoken by a demonstrator (whether it was the Native language of the child or a Foreign language). Four-year-old children were selected based on previous experiments investigating the selective learning of preschoolers (Kinzler et al., 2011; Pető et al., 2018; Altınok et al., 2020).

To study this, we designed 2 experiments, and compared the behavior of children both between experimental conditions (Native or Foreign demonstrator) and to a no instruction baseline (for the overall design of the experiments, see Figure 7). In Experiment 1, children witnessed an adult (who previously spoke in either their Native or a Foreign language) demonstrate three event sequences with three object sets. After the demonstrations, children were allowed to play with the objects immediately. In Experiment 2, children saw the same demonstration (again, with two conditions which differed in the language spoken by the model), but were only allowed to try the objects after a one week delay. In both experiments, we measured to what extent their behavior matched that of the adult. In the Baseline condition, children received the object sets without any demonstration. The goal of this

condition was to uncover whether children would spontaneously produce the actions involved in the demonstration of the adult.

We predicted no difference in the behavior of children when they were allowed to imitate the models immediately. Although a number of studies have found that children imitate Native speaking adults selectively (see Buttelman et al. 2014; Kinzler et al., 2011), the findings from a recent study show that children do not disregard information shared by out-group members altogether when it comes to reproducing a complex set of steps (Altınok et al., 2020). Therefore, in our own study, we targeted the same age group in a between subject arrangement (Native or Foreign speaker), and designed the stimuli to involve complex event sequences. Importantly, this assumption differs from our hypothesis with regards to how much children will remember from the demonstrations in the in-group and out-group conditions of *Chapter 3*. In that experiment, we predicted a difference with an advantage for the in-group sources. We believe the task in that experiment was more difficult than the immediate imitation task in this experiment: children saw demonstrations about 8 object sets, which arguably resulted in a higher memory load, and children had to verbally respond to a question about each object, around 5-6 minutes following the demonstrations. The amount of information to be retained may prompt preschoolers to prioritize paying attention to information shared by in-group members—which may result in a better performance following in-group sources.

Thus, in Experiment 1, we aimed to conceptually replicate the findings of Altınok and colleagues (2020). However, we predicted that after a one week delay, children would reproduce the demonstrated information more accurately if it was shown to them by a Native speaker compared to a Foreign speaker. This prediction is based on the assumption that children are more likely to integrate information shared by members of their cultural community into their semantic knowledge, resulting in a more accurate retention of the acquired information. Additionally, we predicted that children would retain information from all demonstrations, except from the Foreign language condition in Experiment 2 (when a delay is introduced). Thus, we predict that children's behavior will differ from the baseline in both conditions of Experiment 1, and in the Native condition of Experiment 2. However, in the Foreign language condition of Experiment 2, we predicted no difference from the baseline. The data that support the findings of this study are openly available in OSF at https://osf.io/4udva/.

Experiment 1: immediate imitation

2.1 Methods

2.1.1 Participants

The sample consisted of 56 monolingual children between the ages of 48 and 60 months (25 boys, mean age = 1651 days, SD = 117 days). The sample sizes of this current study were based on the study of Hoehl and colleagues (2014). Children were recruited from the database of the University lab and local kindergartens. All participants attended preschool in the urban area of a European city. Data collection occurred in a country where data on ethnicity cannot legally be collected. Participants' caregivers gave written informed consent. Children were randomly assigned to either the Native (n = 28), or the Foreign language (n = 28) condition. An additional 5 children were tested but were excluded because of fussiness or shyness (n = 2), being bilingual (n = 1), or being inattentive and interfering with the demonstration phase (n = 2). Testing sessions were conducted at the ELTE Babylab and local kindergartens.

2.1.2 Materials

All three sets included a tray, two containers (which differed in color), a main object, an auxiliary object, and some other objects connected to the goal that could be achieved with the main object (see Figure 8 for all objects included in the experiments, and Table 2 for a detailed description of the three games). The containers differed in color in order to help children remember the information about the location. Test sessions were videotaped for coding purposes.

2.1.3 Procedure

The experiment had a between subject design: children participated in either the native or the foreign language condition, and were tested individually with two female experimenters. The first experimenter (E1) communicated with the children in their native language, while the demonstrator (D) spoke either in the native or foreign language, depending on the condition.

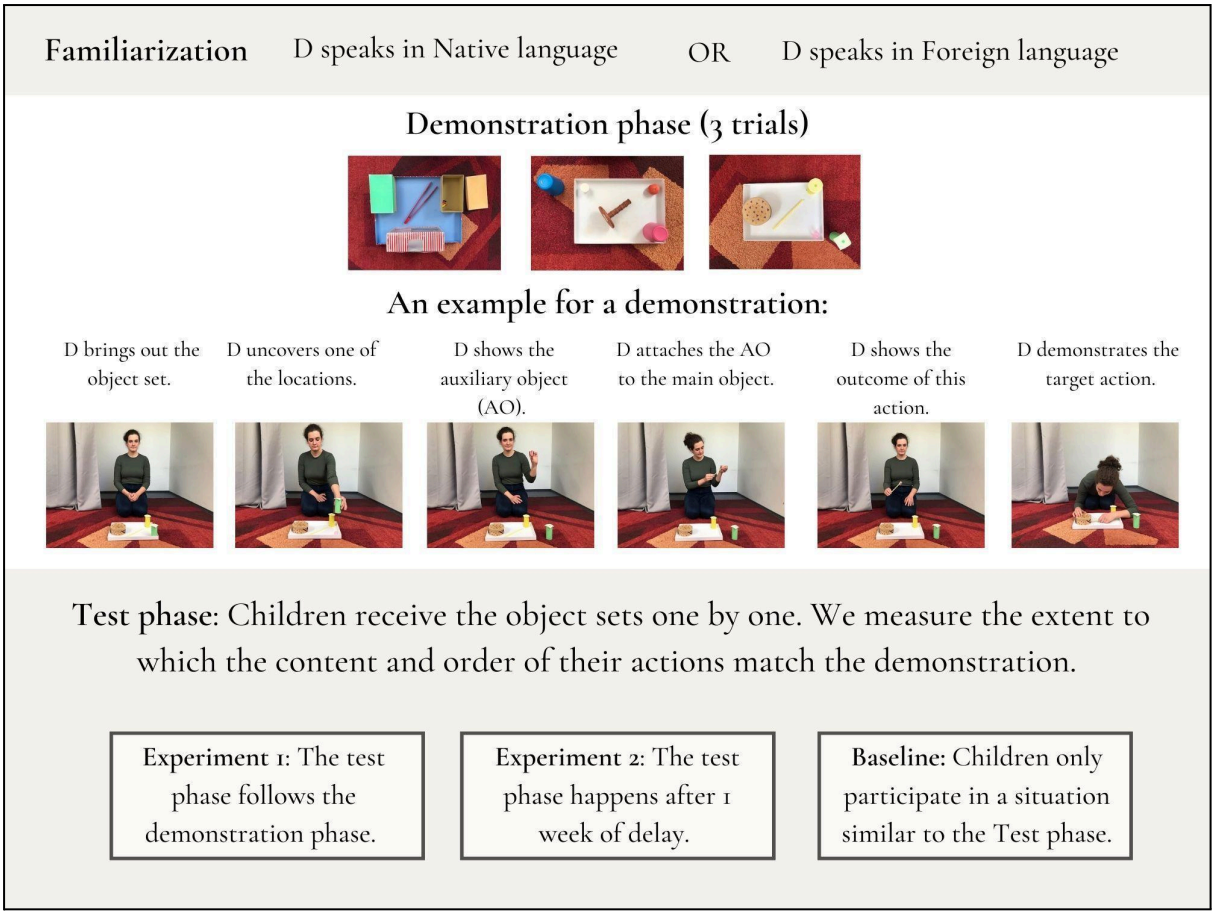


Figure 7. *An overview of the procedures of the 2 experiments and the baseline condition.*

Upon arrival at the lab, children spent a few minutes playing together with E1 in a child-friendly reception room. Following this, in the company of their caregiver and E1, the children were escorted to the behavioral testing room. The caregiver was seated in a chair a few steps away from the child, while the child was instructed to sit on a small, round shaped rug. At this point, E1 said that she needed to leave the room for a while, but that they were going to play some games upon her return. In the meantime, she instructed the child to remain seated on the rug, until her return. After she left, D entered the room, and spoke either in the native language of the child or a foreign language, depending on the condition ("*Where are my objects? They must be here somewhere. Oh, I remember*!"). The manipulation was based on the study of Oláh and colleagues (2016). Importantly, she uttered these sentences while still standing close to the door, and no further linguistic information was provided during the presentation of the object sets themselves.

All three object sets were stored behind a curtain, on three separate trays. D presented the object sets one by one, upon bringing each out from behind the curtain. The order by which the object sets were presented was counterbalanced across participants. All

demonstrations had a similar structure: first, D put the tray on the floor, in front of the child. In the case of the Rattle-game (for an illustration, see Figure 7 and Figure 8), a green and a yellow cylinder, a straw, and a round shaped box containing some bells were visible. Following this, she revealed the location of a small (auxiliary) object in one of two locations. (The location of the auxiliary object was also counterbalanced across participants.) In this particular game, she revealed a pink toothbrush cover. Then she presented the auxiliary object, and the main object to the child. Following this, she demonstrated how to attach the auxiliary object to the main object, as well as the main goal of the target action. In the case of the Rattle-game, the pink toothbrush cover was attached to one of the sides of the straw, then she reached into the round-shaped box with the straw (with the side including the toothbrush cover), and by moving the other side of the straw, she demonstrated that the box can be rattled. (For an example for a demonstration, see Figure 7, for a detailed description of each game, see Table 2, and for images, see Figure 8). As the experimenter was not allowed to speak, parents were asked to instruct the child to remain seated on the rug, in case they tried to interfere with the demonstration. After replacing the last object set behind the curtain, D left the room ("Bye!"). All demonstrations were accompanied by nonverbal ostensive signals. Through designing these object sets and adding an auxiliary object to each, we aimed to measure how children learn cultural knowledge that contain many arbitrary or semi-arbitrary elements that can only be learnt by observing other individuals perform the actions.

The event sequences were designed in a similar structure: there were always two possible locations, and the event sequences were designed to include an additional step—involving the auxiliary object—in order to reach a goal. Importantly, this additional step was intended to facilitate the reaching of the goal, but was not necessary. In a way, faithfully imitating the demonstration can be considered suboptimal (as it took a longer time), but this step itself was not goal-irrelevant. The rationale for this design was to allow some variability in the behavior of children, since most likely the goal-relatedness of this step was opaque to children. In addition, making this additional step necessary could lead to all children eventually carrying it out, in order to reach the goal.

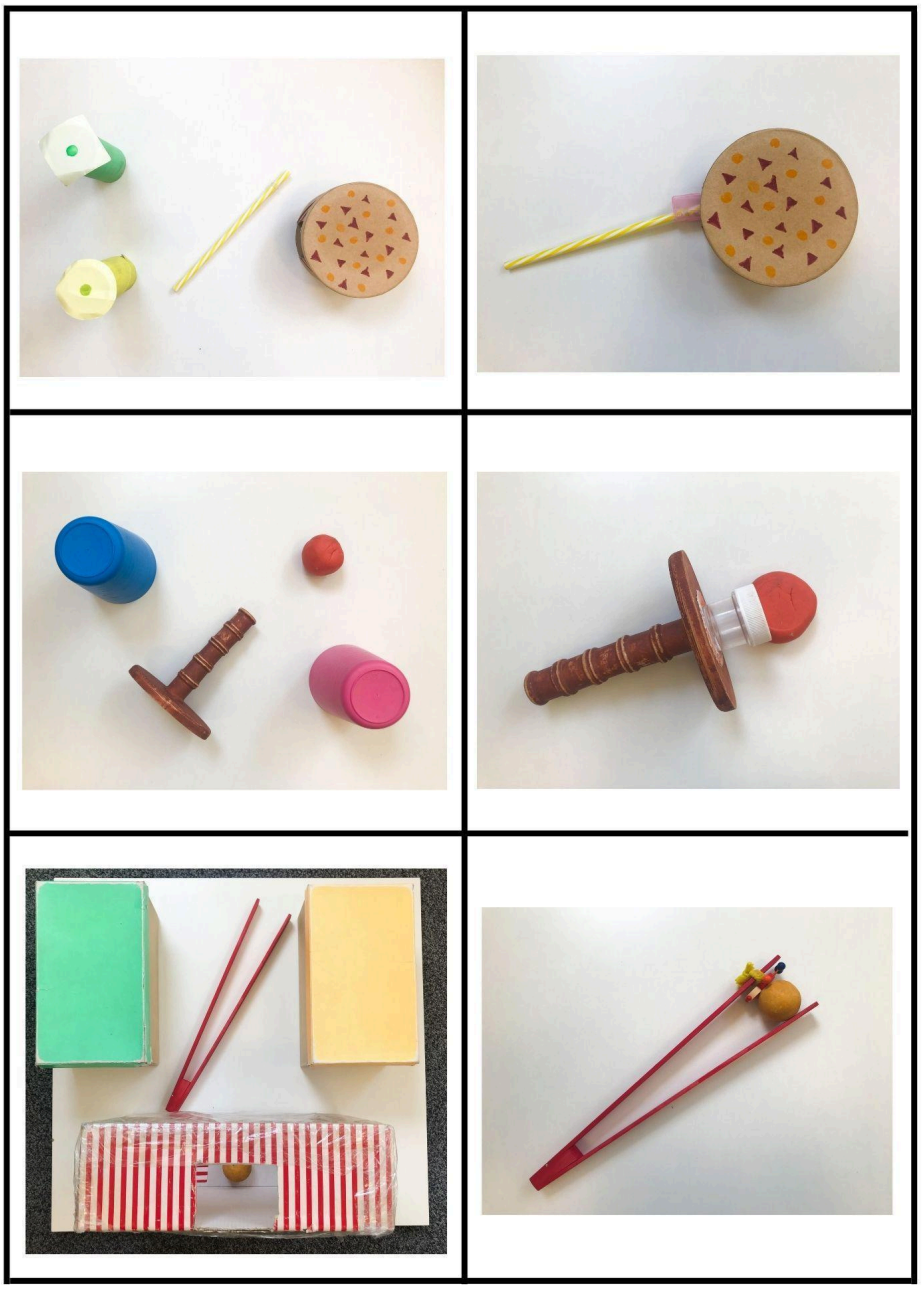


Figure 8. Object sets used in the experiments.

Left column: Object sets presented at the beginning of the demonstration and at the test phase. Right column: The auxiliary object attached to the main object. 1. row: Rattle-game, 2. row: Plasticine-game, 3. row: Tweezers-game

At this point, E1 returned to the room and said that they were going to play some games. Then she brought out the object sets on the trays, one by one, in the same order as they were presented, and instructed the child to play with them ("*Now it's your turn! Play with these*!"). Children were allowed to play with the objects for up to approximately 30 secs.

If the child asked some questions regarding the games, E1 always replied she did not know how to do it. Some children had a difficult time carrying out certain steps in the games (for e.g., attaching the toothbrush cover to the straw). In these instances, E1 asked the child if they needed any help. If they agreed, E1 took the objects and asked for a short description of what she needed to do. If the child provided a clear explanation of what E1 should do (for instance, indicating that the toothbrush cover had to be put on a particular side of the straw), she carried out the given step, and then returned the objects to the child, so that they could continue playing the game. A clear explanation included information about what should be carried out specifically - including which are the objects that should be involved, what act needs to be carried out and, if applicable, on which side of the target object. If the explanation provided by the child was vague (for e.g., "*Put it on!*"), E1 asked further questions ("*Put what on? And where?*").

The procedure was the same when the children were tested in kindergartens. However, there was no separate warm up phase (as children were tested in a familiar location and therefore, felt more secure) and the parents were not present during the experiments.

Table 2.

Detailed description of the three object sets used in the experiment

	Name of object set		
	Tweezers-game	**Rattle-game**	**Plasticine-game**
Containers	a box with an orange and a box with a green lid	a yellow and a green cylinder	a blue and a pink cup
Main object	red tweezers	a yellow-white colored straw	a wooden handle fixed on an oval sole
Auxiliary object	a scrunchie with a small bear attached to it	a pink toothbrush cover	a small container with a white lid
Goal of the target action	picking a small ball from a see-through box using the tweezers	rattling the bells with the straw in a colorful, round shaped box with a	flattening a piece of plasticine with the wooden handle

		hole on one of its sides	
Role of the auxiliary object	through attaching the scrunchie to one of the sides of the tweezers, it becomes easier to pick the ball	through attaching the toothbrush cover to one side of the straw, it becomes more effective in rattling the bells	through sticking the small container to one side of the wooden handle, it can more effectively flatten the plasticine

2.1.4 Coding

All sessions were recorded with a video camera, and were coded offline by an experimenter. A second independent observer coded a random sample of 35% of all experimental sessions for reliability. Reliability was good (proportion of observed agreements = 96.49% and 94,74%, Cohen's weighted κ = .94, and κ =.86, for the two dependent variables, respectively). Therefore, the coding of the experimenter was used as the basis for the data analysis.

To capture the accuracy of children's imitative behavior, we included two dependent measures: a content and an order score. Children received a content score for each trial. For each game, children could receive 4 content points in total. Children received a point for the following accurately remembered details: searching at the correct location first (1), carrying out the target action (with or without the auxiliary object) (1), attaching the auxiliary object to the main object (1), carrying out the target action with the auxiliary object used in some relevant manner (1). Importantly, children who did not use the auxiliary object could receive 1 or 2 points (2 points, if they uncovered this object, but did not use it in connection with the main object or goal). Children also received an order score for each trial. For each game, children could receive 2 order points in total. Children received a point for the following accurately remembered order of steps: if they uncovered the auxiliary object and immediately tried to attach it to the main object (1), and if after attaching the auxiliary object, they immediately tried to carry out the target action (1). Children who did not use the auxiliary object always received an order score of 0.

After coding the videos, some trials were excluded from the analysis. These included trials during which there was an experimenter error (the experimenter initially searched for the auxiliary object at a wrong location) or the children touched the target object during

demonstration and/or attempted to carry out the target action. Importantly, participants with two or more excluded trials were excluded altogether. In Experiment 1, a total of 8 trials were excluded (out of 168) in the experimental conditions.

2.2 Results

All statistical analyses were performed with the SPSS 21 software. First, we measured the cumulative number of seconds children spent observing the demonstrations of the experimenter (from the moment D touches the correct container until she puts her hands on her lap before putting away the tray), to explore whether there were any differences in the two conditions. The analysis shows that children paid an equal amount of attention in the two conditions (98% of the demonstration in the Native, and 97% in the Foreign condition, Z = -.652, $p = 0.514$).

Generalized Linear Mixed Models (GLMM) were used to test for the differences in the two conditions. We used this method for analyses as we could include the trials separately as a within-subject variable and in order to explore the potential effects of additional factors on the two dependent variables. 'Participant' was added as a factor and 'Trial number' as the repeated measure.

For the content score as the dependent measure, the following variables were included in the initial model: Condition, Gender, Age, Trial type, Trial number, Order of familiarization trials, and Location (lab or kindergarten). *Trial type* refers to the object set children received in that particular trial, while *Order of familiarization trials* refers to the order in which children received the object sets. The following variables were later removed since their effect was not significant: Gender, Age, Trial type, Order of familiarization trials, and Location (lab or kindergarten). The mean score was 3.26 in the Native and 3.11 in the Foreign condition, but the main effect of Condition was not significant (F = 0.803, $p = 0.372$). However, the effect of the Trial number was significant (F = 6.274, $p = 0.002$). Pairwise tests revealed that there was a significant difference between the content scores of the first trial (mean score = 2.71) and the second trial (mean score = 3.25) (contrast estimate = -0.670, $p = 0.006$) and the first trial and the third trial (mean score = 3.52) (contrast estimate = -0,819, $p = 0.001$), but there was no difference between the second and the third trial (contrast estimate = -0,149, $p = 0.413$). Children reproduced a greater number of steps accurately for the two games that were presented to them more recently.

For the order score as the dependent measure, the following variables were included in the initial model Condition, Gender, Trial type, Trial number, Order of familiarization trials, and Location (lab or kindergarten). The following variables were later removed since their effect was not significant: Gender, Age, Trial type, Order of familiarization trials, and Location (lab or kindergarten). The mean score was 1.69 in the Native and 1.49 in the Foreign condition. Although there was a trend towards an effect of condition, it was not significant (F = 3.356, p = 0.069). The effects of Trial number (F = 6.342, p = 0.002) and Age (F = 3.903, p = 0.05) were significant. Pairwise tests show a similar pattern as in the case of the content score: there was a significant difference between the first (mean score = 1.31) and the second (mean score = 1.75) (contrast estimate = -0.430, p = 0.005) and the first and the third trial (mean score = 1.74) (contrast estimate = -0.421, p = 0.004), but no difference between the second and third trials (contrast estimate =-0.008, p = 0.942). Thus, it seems that upon immediately imitating the behavior of the model, children reproduced the event sequences presented more recently to a greater extent. Since there was a main effect of age in the case of the order score, we conducted a Pearson Correlation analysis to explore the relationship of age and performance. It seems that older children recalled the order of steps more accurately, although this effect was not significant (r(55) = 0.23, p = 0.089).

Experiment 2: imitation after 1 week delay

In Experiment 1, we found no significant difference between the performance of children in the Native and the Foreign language conditions. This result suggests that four year old children learn from a variety of sources—which is in line with previous findings that show that preschool aged children also learn from out-group sources (Pető et al., 2018; Altınok et al., 2020). However, there was a tendency for children to reproduce the order of steps more accurately following a demonstration by a Native speaker. These findings—that show a lack of difference in an immediate recall scenario—raise the question whether the influence of cultural group membership may emerge following some delay. We argue that if a delay is introduced, children would reproduce the previously seen actions more accurately following a demonstration by a Native speaker. This is the case since they are more likely to interpret information from in-group sources as relevant cultural knowledge which should be retained in the long term. Therefore, in Experiment 2, another group of children observed the same event sequences demonstrated by either a Native or a Foreign language speaker, but they were only allowed to imitate following a week of delay. Additionally, we also conducted a

baseline condition with a smaller group of children, to explore whether children have learnt from the demonstrations in each condition.

3.1 Methods

The sample, which had the same number of participants as Experiment 1, consisted of 56 monolingual children between the ages of 48 and 60 months (25 boys, mean age = 1638 days, SD = 92 days). Children attended preschool in the urban area of a European city. Data collection occurred in a country where data on ethnicity cannot legally be collected. Participants' caregivers gave written informed consent. Children were randomly assigned to either the Native (n=28) or the Foreign language (n=28) condition. An additional 17 children were tested but were excluded due to missing the second session (8), experimenter error (2), fussiness or shyness (n = 6) or being bilingual (1). Testing sessions were conducted at the University Babylab. Additionally, 15 monolingual children from the same age group were included in the baseline condition (8 boys, mean age = 1636 days, SD = 118 days).

3.1.1 Materials

The same materials were used as in Experiment 1 (see Figure 2 and Table 1 for images and detailed descriptions).

3.1.2 Procedure

The procedure was similar to that of Experiment 1, however, children were only allowed to play with the objects upon returning to the lab after a one week delay (number of elapsed days varied between 6 and 8) (see Figure 7 for a general overview of the design of the two experiments). The test phase on the second week was identical to the test phase of Experiment 1. Parents were instructed not to specifically discuss the games with their children during the delay. Children were informed that they would be returning to the lab for a second time, but they had no further information about the task or the second session.

Baseline condition

In this condition, children received no instruction regarding the events, just the set of objects. Similarly to the children in the experimental conditions, participants spent a few minutes playing together with E1 in a child-friendly reception room, and were later escorted to the behavioral testing room. After they were seated, children received the object sets one by one, and E1 instructed them to play with the object in any way they liked. The order by which the object sets were presented and the location in which the auxiliary object was located were counterbalanced across participants. The reasoning behind designing this relatively conservative baseline was, first, to see whether children would tend to choose either one of the boxes more frequently than the other. Since the two containers were rather salient in the set-up, it could be argued that there is a relatively high baseline probability (50%) that children would uncover the auxiliary object. Second, the aim was to explore whether they would spontaneously perform some elements of the event sequences (such as attaching the auxility objects to main objects in any way) without seeing a demonstration - thus, ensuring that the behaviors of those in the experimental groups were based on memory for the witnessed events and not simply discovering the actions themselves.

3.1.3 Coding

All sessions were recorded with a video camera, and were coded offline by an experimenter. A second independent observer coded a random sample of 35% of all sessions for reliability. Reliability was moderate (proportion of observed agreements = 78.94% and 84%, Cohen's weighted κ=.709 and κ=.744, for the two dependent variables, respectively). Therefore, coding disagreements for any trials were re-coded by a more trained coder who was blind to experimental conditions. The revised coding was used as the basis for the data analysis.

The dependent measures were the same as in Experiment 1 (content score and order score). After coding the videos, some trials were excluded from the analysis. The rationale for this was the same as in Experiment 1. In Experiment 2, a total of 6 trials were excluded (out of 168). In the baseline condition, 1 trial was excluded (out of 45).

3.2 Results

First, we also recorded the cumulative number of seconds children spent observing the demonstration of the experimenter to explore whether there were any differences in the two conditions. The analysis shows that children paid an equal amount of attention in the two conditions (99% in both conditions, $Z = -1.573$, $p = 0.116$).

Generalized Linear Mixed Models were used to test for the differences in the two conditions. 'Participant' was added as subjects and 'Trial number' as the repeated measure. For the content score, the following variables were included in the initial model: Condition, Gender, Age, Trial type, Trial number and Order of familiarization trials. The following variables were later removed since their effect was not significant: Gender, Age, Trial type, Trial number and Order of familiarization trials. The effect of Condition was significant ($F = 4.824$; $p = 0.030$): the average score being 2.6 in the Native, and 2.2 in the Foreign condition (see Figure 9). Therefore, it seems children retained more details following a Native speaker demonstrating the events. For the order score, the following same variables were included in the initial model. The following variables were later removed since their effect was not significant: Gender, Age, Trial type, Trial number and Order of familiarization trials. The effect of Condition was significant ($F = 4.813$; $p = 0.030$): the average score was 1.18 in the Native, and 0.87 in the Foreign condition. This shows that children were also better at accurately reproducing the sequences in the correct order in the Native condition (see Figure 10).

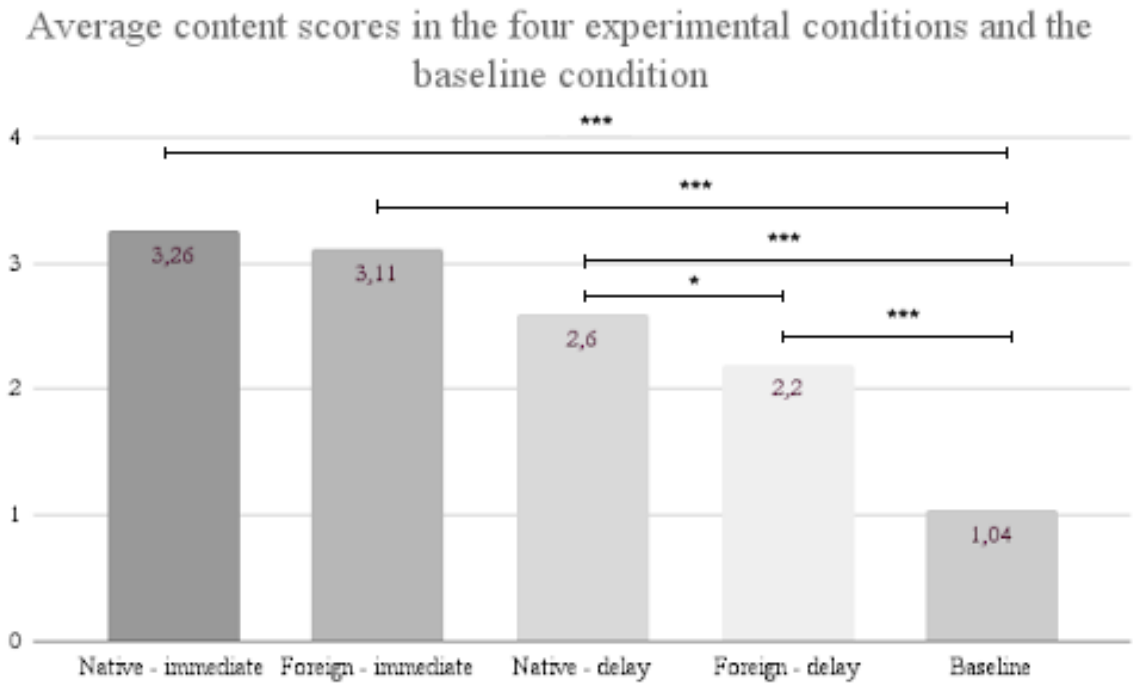


Figure 9. *Average content scores in experimental conditions of Experiment 1 (Immediate recall), Experiment 2 (Delayed recall) and the Baseline condition.*

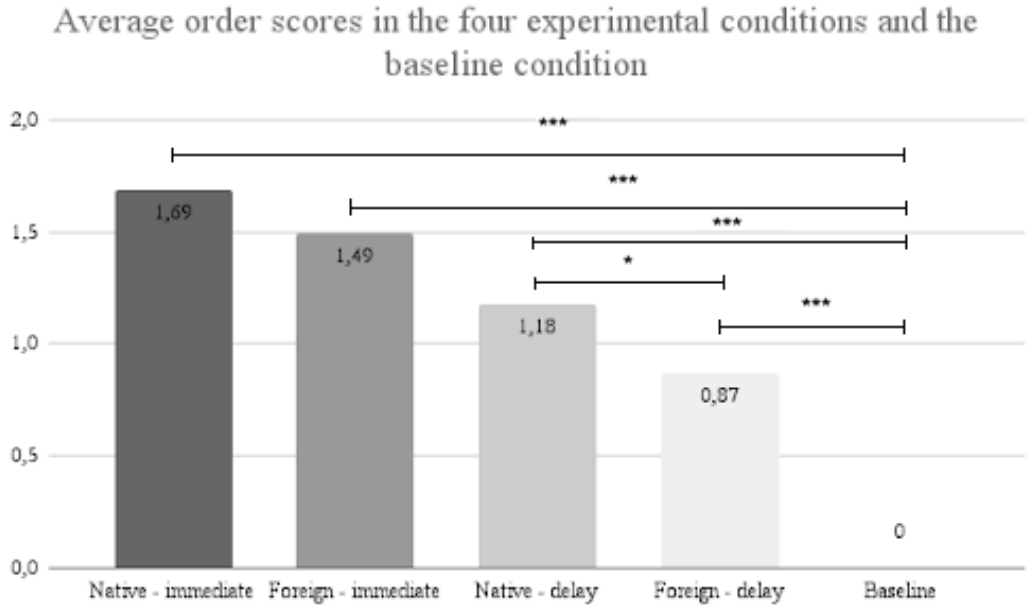


Figure 10. *Average order scores in experimental conditions of Experiment 1 (Immediate recall), Experiment 2 (Delayed recall) and the Baseline condition.*

We further explored the differences between the two language conditions by examining what aspects of the demonstration children omitted from their actions. This could shed light on whether there were any particular steps in the demonstration that were less likely to be retained in the Foreign language condition. We predict that children would be less likely to use the auxiliary object in the demonstrated way—either by using it less accurately or by omitting it altogether—in the Foreign condition, compared to the Native condition. We found that children search for the auxiliary object (AO) in similar proportions in the 2 conditions (84% in the Native, and 83% in the Foreign condition). Additionally, they found the AO in a slightly higher proportion of trials at first attempt in the Native condition (48%), than the Foreign condition (40%). While looking at what children do with the auxiliary object, we found they attached the AO in the demonstrated way in a similar proportion of the trials in the 2 conditions (43% in Native, 42% in the Foreign condition). They attached it in a different manner in a slightly higher proportion of trials in the Native condition (Native condition: 17% vs Foreign condition: 9%). Additionally, there were more trials in which children did not even uncover the AO in the Foreign condition (Foreign condition: 23% and Native condition: 16%) (see Figure 11 for an illustration of these proportions). With regards to the target action, in the Native condition, children carried it out on the same side of the target object (with or without the attachment) in 75% of the trials, with a different side of the target object in 4% of the trials, and did not carry it out at all in 21% of the trials. In the Foreign condition, children carried out the target action (with or without the attachment) in a slightly lower proportion of trials (70%), with a different side of the target object in 6% of the trials, and did not carry it out at all in 24% of the trials. Finally, with respect to use of the auxiliary object specifically, children carried out the target object with the AO appropriately attached in 39% of the trials in the Native condition, and only 33% of trials in the Foreign condition. Although none of these condition differences were significant (based on Pearson's χ^2 analyses), overall, they resulted in better performance in the Native condition.

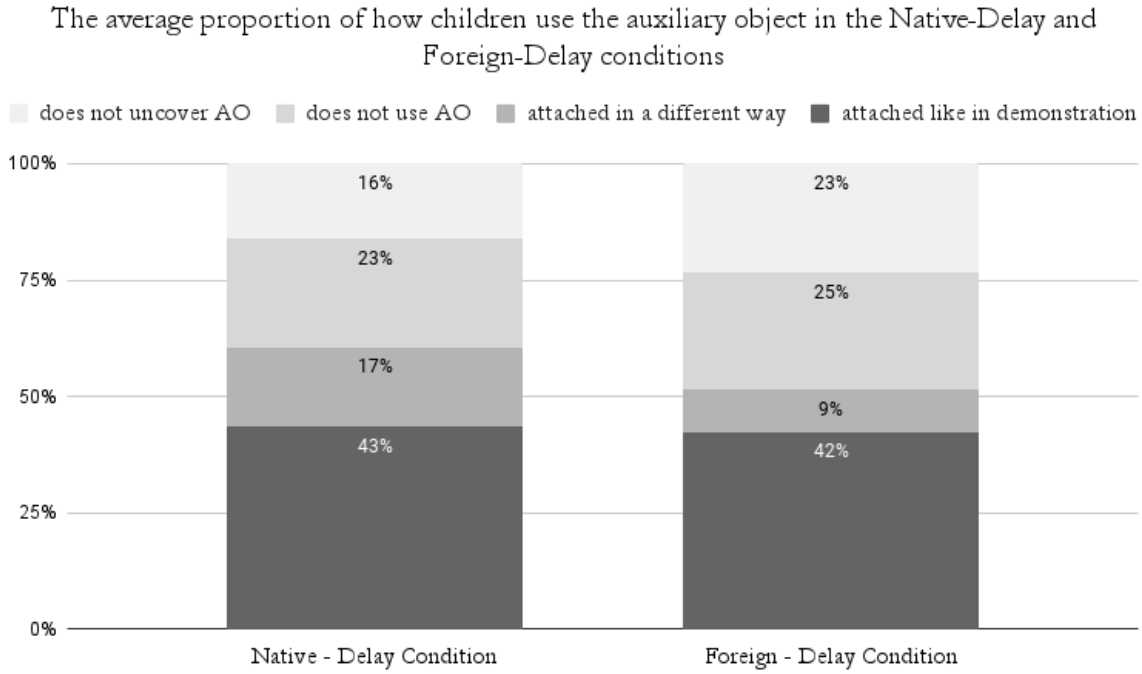


Figure 11. *The average proportion of how children use the auxiliary object in the Native-Delay and the Foreign-Delay conditions*

Comparing Experiment 1, Experiment 2 and the Baseline condition

Comparing the experimental conditions to the baseline condition

Generalized Linear Mixed Models were used to test for the differences between the four conditions (Immediate-Native, Immediate-Foreign, Delay-Native, Delay-Foreign) and the no instruction baseline. 'Participant' was added as subjects and 'Trial number' as the repeated measure. For the content score, children received an average score of 1.04 in the baseline condition. This differs significantly from all experimental conditions (*Immediate-Native* mean score = 3.26, contrast estimate = 2.296, $p < 0.001$; *Immediate-Foreign* mean score = 3.11, contrast estimate = 2.152, $p < 0.001$; *Delay-Native* mean score = 2.6, contrast estimate = 1.583, $p < 0.001$; *Delay-Foreign* mean score = 2.2%, contrast estimate = 1.280, $p < 0.001$). All children in the baseline condition received 0 points in all trials regarding the order score. This differs significantly from mean scores in all experimental conditions (*Immediate-Native* mean = 1.69, contrast estimate = 1.705, $p < 0.001$; *Immediate-Foreign* mean = 1.49, contrast estimate = 1.598, $p < 0.001$; *Delay-Native* mean = 1.18, contrast estimate = 1.196, $p < 0.001$;

Delay-Foreign mean = 0.87, contrast estimate = 0.940, $p < 0.001$). Thus, it seems children retained some information from all demonstrations in both experiments.

Overall analysis

Generalized Linear Mixed Models were also used to explore the overall performance of children in Experiment 1 and Experiment 2. In the analysis, 'Participant' was added as a factor and 'Trial number' as the repeated measure. The following variables were added to the model: Condition, Timing of Imitation, the interaction of Condition and Timing of Imitation, Gender, Trial type and Order of familiarization trials Trial number and Age. The following variables were later removed as these were not significant: Gender, Trial type and Order of familiarization trials. In the case of the content score, there was a significant main effect of Timing of Imitation (F = 43.835, $p < 0.001$), Condition (F = 5.809, $p = 0.017$), Trial number (F = 4.578, $p = 0.011$) and Age (F = 4.053, $p = 0.045$). However, we found no interaction between the effect of Timing of Imitation and Condition (F = 0.727, p = 0.394). We explored the effect of the same variables for the order score as well. The following variables were later removed as these were not significant: Gender, Trial type and Order of familiarization trials. We found a main effect of Timing of Imitation (F = 42.014, $p < 0.001$), Condition (F = 7.194, $p = 0.008$), Trial number (F = 3.815, $p = 0.023$) and Age (F = 4.571, $p = 0.033$). We found no interaction between the effect of Timing of Imitation and Condition (F = 0,809, p = 0.369). These patterns show that Timing of Imitation had an overall effect on the behavior of children: children reproduced the behavior of the model more accurately if they could imitate it right away, compared to when they only had the opportunity after a week of delay. In more detail, the average content score was 3.21 and 2.38, and the average order score was 1.6 and 1.02 in Experiment 1 (Immediate imitation), and Experiment 2 (Delayed imitation), respectively. Condition also had an overall effect: the participants reproduced more details and in the correct order following a demonstration by a Native speaker (the average content score being 2.64 and 2.95, and the average order score being 1.19 and 1.43 in the Native and the Foreign conditions, respectively). Additionally, children reproduced the contents of trials presented to them first less accurately (content score mean = 2.52), compared to both the second (content score mean = 2.85, contrast estimate = -0.333, p = 0.043) and the third trial (content score mean = 3.01, contrast estimate = -0.490, p = 0.003). This pattern was also found in the case of the order score (trial 1 mean = 1.13, trial 2 mean = 0.37, trial 3 mean = 1.43; difference between the 1st and the 2nd trial: contrast estimate = -0.248, p = 0.031;

difference between 1st and 3rd trials: contrast estimate = -0.301, p = 0.008). As we found a main effect of age**,** we also explored the relationship between age and the two dependent variables. In order to conduct the analysis, both the content score and the order score of the participants were converted to reflect the proportion of accurately recalled details (number of points divided by the maximum points). We found no correlation between age and the content score ($r(111) = 0.08$, $p = 0.403$) or the order score ($r(111) = 0.112$, $p = 0.198$).

4. Discussion

In these experiments, we investigated whether 4-year old children's long term learning is influenced by the cultural group membership of their information sources. We found that children reproduced action sequences more accurately if it was demonstrated to them one week earlier by an adult speaking their Native language compared to when it was shown by a Foreign speaker (Experiment 2). In more detail, they reproduced more steps from the events (on average, 2.6 steps (65%) following a Native, versus 2.2 steps (55%) following a Foreign demonstration), as well as retained the order of event sequences more accurately (on average, order score was 1.18 (59%) in the Native, and 0.87 (43%) in the Foreign condition) following an in-group demonstration. This pattern suggests that children retain more details from novel information that was shared with them by a member of their cultural community.

The results were different when children had the opportunity to reproduce the actions immediately (Experiment 1): group membership did not have an influence on the amount of content they accurately reproduced (3.26 (82%) versus 3.11 (77%) in the Native and Foreign conditions, respectively) or on how accurately they followed the order of the actions sequences (1.69 (85%) versus 1.49 (74%) in the Native and Foreign conditions, respectively). Nevertheless, the pattern was similar in the two experiments, with the average scores being higher in the Native, compared to the Foreign condition. The joint analysis of the Experiment 1 and 2 also revealed an effect of condition: children overall retained more information following a demonstration by a Native speaker. In this analysis, we did not find an interaction effect between condition and time of imitation. By comparing the behavior of children in both experiments to a no instruction baseline, it appears that children learn and retain information following all types of demonstrations. Contrary to our prediction, this was also the case in the Foreign condition of Experiment 2 (imitation after delay) (average of 1.04 steps produced spontaneously in the no instruction baseline compared to 2.2 in the delayed Foreign condition). All in all, timing of imitation has an effect on the accuracy with which

children reproduce what they have learnt previously, and they seem to learn from various information sources, even from people belonging to a different culture than their own.

Additionally, in Experiment 1—when children could imitate immediately—we did find an effect of trial order: children retained more details and reenacted event sequences more accurately from the two events demonstrated to them more recently. This could be due to a recency effect, often found in experiments investigating short term memory (Murdock, 1962). Also, children might grasp the structure (two containers, one auxiliary object, one target object and action) of the events after the first demonstration which may improve their understanding of the following events. Importantly, this was only found to influence the immediate reproduction: trial order had no effect in Experiment 2. This could be related to research showing that different factors determine short and long term recall (Atkinson & Shiffrin, 1968).

It is important to note, however, that the results of the overall analyses contradict those of the separate analyses of the two experiments: in the overall analyses, we found no interaction between timing of imitation and condition, while we did find a main effect of condition. This suggests that the language spoken by the demonstrator has an overall effect on children's learning, resulting in more accurate reproduction following the demonstrations of Native speakers. As we have argued beforehand, this is possibly due to the representation of the information demonstrated by in-group members as relevant, shared cultural knowledge. This is in line with previous findings which demonstrate that language has a profound effect on learning, often also in immediate contexts (Buttelman et al., 2014; Oláh et al., 2016; Altınok et al., 2022; Kinzler et al., 2011). The aim of Experiment 1 (immediate imitation) was to see if we find any immediate effect of linguistic information on learning. Furthermore, Experiment 2 (delayed imitation) was designed with the intention to further explore if we find evidence for a better consolidation of such information which could further substantiate the claim that children indeed consider knowledge shared by group members as relevant generic knowledge that they may need to use in the future. As for the no interaction finding, since time had a significant effect on imitation accuracy, and we aimed to test how linguistic group membership would affect long-term retention specifically, rejecting the results of the separate analyses would oversimplify the more profound difference that we found in the delayed imitation situation.

As to what contributes to the difference that arises after a time delay, we would argue that preschoolers could perceive relevance differently in the immediate imitation situation. For example, they could reason that since an adult had shown how to do something here and now, the demonstrated way is how it should be done in this context. This could be the case, regardless of the goal-relevance of the steps or the group membership of the teacher. However, if a time delay is introduced, selection processes may already start taking place as to what gets incorporated into children's semantic knowledge. We would assume that information shared by members of other cultural communities (Foreign speaking adults) is more likely to be omitted due to these selection processes. Therefore, we would argue that the differences in the long term retention are based on memory processes. It is reasonable to assume that if children had retained all elements of the action sequences, they would have performed them similarly to how they imitated immediately. The context of recall was the same after a delay—thus, it would have warranted the recollection of the demonstrated information in both cases. However, due to the processes involved in selecting out relevant information, less could be recovered from what was taught by an out-group teacher. We believe this to be adaptive, since what gets consolidated is information that could be useful in the cultural community in the future. Nevertheless, based on our findings, it is not possible to definitively disentangle whether children are more motivated to reproduce the actions of an in-group member, or if indeed they remember less from what was shown to them by an out-group member. However, the fact that we did not find a clear difference in Experiment 1 would suggest that children are motivated to learn both from in- and out-group members, and the difference may lie in what gets incorporated in their long term semantic knowledge.

Relatedly, it would be interesting to explore how changes introduced between the teaching and the recall contexts would influence the pattern of findings. In Experiment 2, the context in which the object sets were introduced and that of the recall were deliberately very similar (same room(s), same experimenter bringing forth the object sets). It can be argued that if children are indeed more likely to integrate information shared by in-group members into their generic semantic knowledge, but are less likely to do so in the case of out-group members, changes in the recall context would differentially influence their performance in these demonstrations. More specifically, a different recall context could more extensively hinder their performance in the case of an out-group demonstration. In this aspect, designing the study in this current way may have underestimated the influence of group membership on children's performance, since the similar contexts may have supported children in recalling

the previous occasion in both conditions, and this might have led to an improved performance in the case of the out-group demonstration. In everyday situations, we rarely have such an accordance between the context in which we learn something and the one in which we can apply this knowledge. Thus, differences between how well information shared by in-group and out-group members is retained and applied in future context may be greater when explored in more natural scenarios.

Finally, we have deliberately designed this study to differ from those employing so-called “over-imitation paradigms”. During such experiments, children observe another person perform both causally relevant and perceivably irrelevant steps, in order to reach a goal (Whiten & Horner, 2005). The study of Altınok and colleagues (2020) have implemented such a paradigm, to explore whether there are any differences in how many of the irrelevant steps are reproduced by the children depending on whether these were demonstrated by in- or out-group members. This current study differs from the study of Altınok and colleagues (2020) in an important way: all steps of the event sequence were goal-relevant, although some of these could be considered suboptimal in the sense that they made reaching the goal more complex. We designed this experiment with the aim of uncovering potential long term effects and of ensuring that children do not omit some steps due to the realization that these are irrelevant (that could be the case in the other design), but possibly, due to forgetting. Relatedly, our design may have made it more difficult to grasp differences due to group membership since all steps were goal-relevant. This, on the one hand, could have contributed to the lack of difference in Experiment 1. At the same time, we believe the findings emphasize the important contribution of group membership to learning, since a difference was found with this design following a time delay. Importantly, based on the current data, it is not possible to ascertain whether children considered the additional steps to be goal-relevant and/or suboptimal. A further study could explore this issue, potentially by asking the children to reflect on what they do and why.

General Discussion

In this current Dissertation, our aim was to introduce a theoretical proposal and three empirical studies which contribute to our knowledge about how preschool-aged children understand certain aspects of conventional behaviors. The empirical studies have focused on two aspects of these forms of behaviors: first, that these are community-bound—in other words, context dependent—and second, that these forms are usually conveyed by knowledgeable others. In the first study (*Chapter 2*), we employed a pretend play based paradigm, the engagement in which has been proposed to reflect children's reasoning about forms of behaviors that could be considered conventional—due to pretend stipulations and conventional norms sharing a number of attributes (see *Chapter 1* of this Dissertation, also Rakoczy & Schmidt, 2013; Rakoczy, 2007; Wyman & Rakoczy, 2011; Wyman, 2014). All in all, findings of this study show that 3-year-old children consider others' ignorance while reasoning about the validity of context dependent information (i.e., a pretend stipulation). Furthermore, we introduced a proposal about how engaging in social pretend play may figure into the social development of children—with a special emphasis on grasping that the validity of their knowledge may change from context to context—and outlined potential empirical implications of such a proposal (*Chapter 1*).

In the second study (*Chapter 3*), we investigated whether how accurately children remember others as sources of their conventional knowledge is influenced by the cultural group membership of such sources. We hypothesized that children could be better at identifying out-group sources—potentially as a consequence of considering information shared by in-group sources as generalizable and relevant, thus hindering the retention of the source itself. At the same time, we hypothesized that they will be more likely to remember the information shared by in-group members (conventional knowledge about how objects are used). The pattern of findings did not firmly confirm the first hypothesis; we did find a tendency that children were better at identifying cultural out-group members as sources of novel information compared to in-group members. This difference was only found in the subgroup which consisted of the children who remembered the group membership of the demonstrators more accurately. Thus, it is possible that treating information from in-group sources as generalizable and culturally relevant does hinder children's memory performance about the source—but these findings are not fully conclusive. Furthermore, we also found a tendency in how well children recalled the previously shared conventional information. More specifically, they tended to recall more information about the objects when these were

presented by in-group members, compared to when they were shown by out-group members. This is in line with other findings which show that children are more likely to learn from in-group sources. Importantly, this pattern of results was only found in the overall analysis, which also included participants who performed worse in identifying the group membership of the sources. Due to these limitations as well as limitations to the experimental design and the process of data collection (online setting), we would suggest modifying the experiment in some aspects—the details of which were described extensively in the *Discussion* section of *Chapter 3*. Overall, the findings from this online study seem promising with regards to the initial assumptions, and we believe a modified experiment could result in more conclusive findings.

In the third study (*Chapter 4*), we built a on an imitation paradigm during which children could observe how another person—either a Native or a Foreign speaker—used novel object sets, and we measured how accurately they reproduced these actions 1, if they had the opportunity to do so immediately, or 2, if they themselves could only use the object sets following a week of delay. If children indeed grasp that conventional forms are conveyed by knowledgeable others, they should reproduce and retain information shared by in-group members more accurately (since they are supposedly more knowledgeable with regards to conventional knowledge, compared to members of a different culture). The findings show that children retain the shared information more accurately following a delay if it was shown by an in-group member (*Chapter 4*, Experiment 2). However, we did not find such an advantage in case they were allowed to try the objects immediately (*Chapter 4*, Experiment 1)—although we did find that children tended to recall the order of steps more accurately following an in-group demonstrator. These results partly align with previous literature which shows that the acquisition of conventional forms is greatly shaped by cues of cultural knowledgeability. We argue that the difference we find in the delayed imitation paradigm is the consequence of children inferring that information shared by culturally knowledgeable others is relevant generic knowledge that they may need to use in the future. This results in a better consolidation of the thus shared information.

Now turning to a more elaborate discussion of the findings, in *Chapter 2*, we introduced an empirical study which aimed to uncover how children come to handle stipulations in joint pretend play. In more detail, the aim was to investigate whether children consider their partner's knowledge—or ignorance—about a pretend stipulation while reasoning about their behavior with an object that has been endowed with a pretend identity in a recent pretend game. Our hypothesis was that 3-year-old children refrain from

generalizing knowledge about the stipulated identity of the object (for e.g., the pencil as a match) to others who did not participate in the pretend game. More specifically, this would result in them selecting the prop aligning with the canonical function of the object in case of the experimenter's absence, while the prop related to the pretend function, in case she was present during the games. We could confirm this hypothesis, as the majority of children expected their partner to use this object according to its canonical function in case they were ignorant of the pretend stipulation. In contrast, in case this person was familiar with the pretend identity of the object, children were equally likely to expect them to behave with this object according to the stipulated function or its canonical function. Thus, these findings show that children keep track of their partner's knowledge about transient, ad hoc pretend stipulations, and consider this knowledge to mark the boundary of the validity of the pretend context.

This is in line with and extends other studies which suggest that, on the one hand, children are sensitive to a number of factors that may mark the validity of what happens in pretend episodes. This includes understanding that pretend stipulations may be connected to location (for e.g., the block serves as a soap at the red house, but it is a carrot at the blue house) (Wyman et al., 2009a), may change in time (Harris et al., 1993; Weisberg & Bloom, 2009; Wyman et al., 2009a) or that this validity also depends on whether someone has an intention to participate in the game or not (Wyman et al., 2009b; Schmidt et al., 2016). This current finding, and the results of other studies, now also highlight that they grasp that as pretend stipulations are made up on the spot and transient, other people's knowledge states or beliefs with regards to these stipulations also mark a boundary of their validity (Hickling et al., 1997; Kalish et al., 2000). Most of these studies target 3 year-old participants, and since children start to engage in pretend scenarios between 18-24 months of age, it would be interesting to employ these behavioral methods to explore children's reasoning about pretend stipulations at earlier ages as well.

Furthermore, this and other studies highlight that 3-year-old children already appreciate the representational diversity in pretend play—namely, that a lack of access to pretend stipulations results in differences about what people think about current stipulations (Gopnik & Slaughter, 1991; Hickling et al., 1997; Kalish et al., 2000). Interestingly, this means that they are able to adequately follow what others think about current stipulations (Hickling et al., 1997; Kalish et al., 2000) and report their own previous thoughts about pretend identities of objects (Gopnik & Slaughter, 1991). While our own findings could not directly speak to whether what children track in pretend contexts is knowledge/ignorance or

changing beliefs *per se*, these converging findings would suggest that at the age of 3, they are able to do and report both. This is true at an earlier age compared to which they would correctly report others' and their own changing beliefs in "typical" false belief tasks such as unexpected location or content tasks (Wimmer & Perner, 1983; Hogrefe et al., 1986). Relatedly, these findings support those theoretical approaches of pretending which consider children's understanding of such happening to be mentalistic (see Leslie, 1987, 1994; Friedman & Leslie, 2007; Weisberg, 2015)—although these results cannot address if this is true about the earliest instances of pretending, especially those that appear below and around the age of 2.

Future studies could target discerning what exactly makes reasoning about and reporting others' (and their own) mental states in pretend scenarios easier for children, compared to "regular" false belief tasks. One the one hand, recent empirical evidence is suggestive—building on measurements that do not require participants to report others' past beliefs verbally—that children under the age of 4 do represent others' (changing) beliefs in some ways (for e.g., Onishi & Baillargeon, 2005; Southgate et al., 2007; Buttelmann et al., 2009, Király et al., 2018; for a review, see: Baillargeon et al., 2010). Thus, in itself, it is not necessarily surprising that children exhibit a competence in considering others' mental states under the age of 4. For instance, our own study employs a nonverbal method during which children do not need to verbally describe their partner's thoughts about the pretend happenings—but only have to select an object upon their request. However, the fact that they can also verbally report past pretend representations in other studies—both their own and those of others—highlights that the potential reasons are worth examining.

Some factors have been shown to improve 3-year-old children's performance in false belief tasks—such as if a motive is presented for the happenings in the task (for e.g., if the goal of the location change is deception) or if children are more involved in the setting up of the story (Wellman et al., 2001) (Note that changing that task according to these factors do not result in an above chance performance for 3-year-olds.) Thus, it is worth considering if some of these might contribute to children's successes in pretend scenarios. One possibility is that the pretend context makes the mental state of the person more *salient* to children. On the one hand, other evidence shows that 3-year-olds understand that the validity of information created in pretense is constrained to a certain context in many aspects—for instance, that it is only valid at a certain location. Perhaps this understanding prompts children to pay attention to what other factors could mark such a contextual boundary. This may lead them to consider—apart from more visible boundaries such as change of location—less easily

accessible markers, such as others' mental states. This may support them in identifying who does or does not share their knowledge about the current pretend stipulations. In contrast, reasoning about others' "regular" beliefs is more complex, for instance, since the boundaries of "real life" episodes are not so clearly marked and it is harder to discern whether some information is limited in validity, compared to representations from pretense. Another way this could be conceived is that since pretend games usually require children to keep the pretend happenings in mind—since these usually include imaginary content that needs to be attached to other people or objects—, the context of pretending itself may highlight the relevance of mental processes—both those of the child and their partner(s).

Another possibility is that since pretend stipulations do not result in changes of what is *true* outside of the episode (as opposed to a change in a belief or a convention) (Kalish et al., 2000), children do not have to inhibit responding based on the observed reality. For instance, if an empty cup is stipulated to contain chocolate milk, but this is later changed to regular milk in the absence of a game partner, children only face an empty cup while answering questions about current and past "pretend" beliefs. So in this case, the "pull of the real" may not hinder their performance (Baillargeon et al., 2010). This suggestion may be empirically investigated if the pretend stipulations could result in some "actual" changes on the scene. For example, imagine a pretend-play based, false belief task-like scenario, during which the content of a cup is stipulated to be the above mentioned chocolate milk and then changed to regular milk. Both of these would be represented by a change in the content of the cup—from a piece of blue plasticine which would represent chocolate milk to a piece of green plasticine which would represent regular milk. If it is the lack of change in the reality in itself which results in a better performance in the pretend play tasks, children should have difficulty responding to the question correctly in this newer version of the task. Importantly, in this scenario, the experimenter would intentionally "breach" the pretense-reality boundary which may result in children treating these happenings as real in some sense, as opposed to pretense. Therefore, we would suggest that it would also be interesting to design a version in which this breach is unintentional. This could be implemented if the pretend game involved the experimenter pretending to pour the chocolate milk on the table, and as doing so, she would accidentally drop the plasticine on the table. Thus, there would be a "real", but unintentional change in the scenario, and children would have to respond to what they thought another person would believe with regards to the whereabouts of the chocolate milk.

This latter suggestion would also be in line with findings which show that children's performance is enhanced if the object is not present while they have to report their partner's

belief about the object's location (Wellman et al., 2001) or if the experimental question does not refer to the object specifically (Rubio-Fernández & Geurts, 2013). Furthermore, more interactive designs—as opposed to more storytelling based experiments—and the lack of an additionally character (apart from the child and the experimenter) who brings about the change in the scenario were shown to support 3-year-olds in solving such tasks (Rubio-Fernández & Geurts, 2013). These both characterize our own study and the study of Hickling and colleagues (1997), during which children actively engage in changing the pretend stipulation with an experimenter in the absence of another agent. Thus, it remains a question whether it is some practical aspects of these experiments which lead to this improved performance, or the pretend context in itself. Furthermore, a recent review could not find a straightforward positive relationship between theory of mind development and participating in pretend play (Lillard et al., 2013). More specifically, studies investigating associations between pretend play activities—both solitary and social—and performance on theory of mind measures are inconsistent, and training studies were found to include methodological mistakes. Thus, further studies are needed to disentangle if and how engaging in pretense and theory of mind abilities are interrelated.

As detailed in the *General introduction* (section titled *Playing and Games*) and *Chapter 1* of this Dissertation, conventions and pretend stipulations share a number of attributes. These include being prescriptively powerful, contextually bound, arbitrary and created based on social agreement (Rakoczy & Schmidt, 2013). Based on these similarities and evidence that highlights that children indeed grasp many aspects of the socially defined nature of joint pretend scenarios (see section titled *Do children grasp the transient, socially defined nature of pretend episodes?* in *Chapter 1*), we have proposed that pretend play both manifests and supports children's ability to recognize and navigate the boundaries of social contexts shared with others, as well as to create novel social contexts. In other words, we have proposed that one of the developmental routes through which children come to understand that some information—such as conventions—are contextually-bound—is through participating in pretend play. This means that their experiences in pretend play may inform their reasoning about social conventions. Since pretend scenarios are transient and result in propositions which are true within the pretend context but false outside of it (Cosmides & Tooby, 2000), this may prompt children to pay attention to the boundaries of social contexts. Consequently, this could support them in identifying *who shares their knowledge* in these contexts.

Additionally, pretend play is not only linked to conventional forms of behavior through sharing some formal attributes, but also with regards to their content. Although the conceptual foundations of the first pretend acts are debated (see section titled *The roots of pretend play: individual or social?* in *Chapter 1*), early forms of pretending often involve objects that have widely accepted conventional uses in everyday life. These conventional uses are mainly determined and regulated by cultural communities and constitute an important part of cultural knowledge (Costall, 2012; Palacios & Rodríguez, 2015). This may influence, on the one hand, how children use objects in their play and also how their partners interpret their pretend acts. For example, pretend feeding can be understood in reference to the conventional use of a spoon. In this case, the rule about using a spoon could be detached from the object and applied in other contexts—while pretending, one can feed another person even if the spoon is empty or by using a key as a spoon (Palacios & Rodríguez, 2015). If the earliest pretend acts are indeed rooted in conventional knowledge, pretending with objects should initially be closely related to their conventional use. Later on, the rules of use could be transferred to other objects or even imaginary ones. Based on observational studies involving infants and their caregivers (Palacios & Rodríguez, 2015), the developmental course reflects this pattern: most of the earliest pretend acts performed by 12 month olds are closely connected to the conventional function of objects. Later during development, instances in which objects are used for a function distant from this conventional use, also appear.

However, there are also important differences between pretend games and conventional forms. Thus, while experiences in pretense could inform children's reasoning about social conventions, they also need to learn about how these forms differ from each other. One such difference is that stipulations created in pretense are transient and tied to the context of the pretend episode, and therefore, should not be generalized outside of it. On the one hand, this means that a stipulation in pretense does not change what is *true* outside of the game, which is not the case for conventions (Kalish et al., 2000). For instance, if we stipulate that a banana is a telephone during the game, this does not mean that the banana becomes a telephone in future contexts as well (or at least, this inference should be restricted to future games with the same people). However, if we stipulate that the banana now belongs to Anna, this has consequences for the "real" state-of-affairs as well (for instance, it further determines how others should behave with this object). The experiments of Kalish and colleagues (2000) show that this difference may be hard to grasp for preschool-aged children: they consider neither conventional stipulations (such as re-naming), nor pretend stipulations to change what

is real (Kalish et al., 2000, Experiment 2). However, older children—between the ages of 6 and 7—understand that changes in conventions result in changes in reality, and also, that this is not the case for pretending. Additionally, they also grasp that changes in conventions result in a framework according to which (others') claims could be considered true or false. Importantly, all of these tasks required children to respond to questions that may be difficult to understand (for e.g.: "*What about really? Since I decided to give you the doll is it really mine or really yours*?"). Thus, it would be important to design studies to investigate this question which may allow children to respond behaviorally (for e.g., protest paradigms). Nevertheless, based on these results, it seems that understanding how pretense and conventional forms differ with respect to their consequences for the "real world" still develops during the preschool years.

Furthermore, this limitation in context is also relevant with regards to who is knowledgeable about the stipulations. Pretend stipulations are bound to the ad hoc community in which these were created. Accordingly, as mentioned before, the findings from this study, as well as further investigations suggest that children grasp this attribute of pretense, and restrict their generalizations about transient pretend stipulation to knowledgeable others (Hickling et al., 1997; Kalish et al., 2000). At the same time, conventions are tied to wider communities, such as members of a (sub)culture. Thus, conventions are also context dependent—meaning that these should not be generalized universally—, but are stable and could be known by members of a community, without specific experience (i.e. being part of the game episode). In other words, knowledgeability could be assumed based on further factors, not just knowledge from the specific game—but based on, for instance, cultural group membership. Therefore, it would be interesting to explore how children would behave if in a playful scenario, an attribute of the object was not introduced as a stipulation, but as an "actual" attribute (for instance, "*This pencil is magnetic. Let's play and lift this object with it!*" in contrast with "*Let's pretend that this pencil is magnetic. Let's play and lift this object with it!*"). In this scenario, in case their interactive partner is a member of their cultural group, children could reason that even though this information was novel to them, an adult may have knowledge about this attribute (through having access to cultural knowledge). If the adult indeed knows this novel information, they could be aiming to use the object in a way that aligns with this novel attribute—even if it was introduced in their absence. However, they should not be familiar with this attribute if it was

only stipulated in pretense (similarly to what has been found in the study described in *Chapter 2*).

A novel study in our lab has set out to investigate this question. The data collection is still in progress, but the current findings (n = 16) suggest that children's inferences about an absent adult's knowledge state differs based on the introduction of the object's attribute. If it is introduced as an actual property, children are at chance selecting between the prop that could be used if the novel property was known by the adult, and the other prop (related to the object's canonical function) (in 44% of the cases, they select the prop connected to the canonical function, while in 56% of the cases, the one connected to the novel property). The pattern differs in the pretend scenario: the majority of children select the prop connected to the canonical function (72%), while a smaller proportion select the prop connected to the novel property (28%). Thus, the pattern in the "real" condition somewhat resembles the pattern we find in the Present condition, while children's behavior in the "pretense" condition resembles that of the Absent condition of the study introduced in *Chapter 2*. In other words, children might believe that while this information is new to them, it could be known by another adult—regardless of them being involved in the specific episode in which the children themselves have learnt this novel fact. A further question could be to examine how children would behave in case their partner was not part of their cultural group. As it was explored in detail both in the section titled *Cues about the knowledgeability of others* in the *General introduction*, as well as *Chapter 3* and *4* of this Thesis, children seem to rely on a number of cues to discern whether another person is culturally knowledgeable—which is reflected in what and how they learn from other people. Among others, age and linguistic information constitute such cues. Based on these cues, children could infer whether the other person has access to knowledge in their culture or not. Relatedly, children may make different inferences during the same scenario—described in the above paragraph—if their partner belonged to a different cultural group than their own. Namely, if they considered the newly learnt information about the object to be conventional in the "real" condition—and thus, shared with others, but only within a cultural group—they should not generalize it to members of different cultural groups. Thus, in case their partner belongs to a different cultural group, neither information from pretense, nor novel conventional information should be generalized to shared knowledge with them. In a somewhat similar scenario, it has been demonstrated that 3 and 5-year-old children could discern what is novel to their partner based on attributed cultural knowledge (Liebal et al., 2013). These extensions to the study described

in *Chapter 2* would further elucidate how children reason about pretend play and conventional forms of behavior, as well as how these may differ from each other.

In *Chapter 3* and *4*, we introduced two empirical studies which aimed to uncover how children's learning of conventional information is influenced by the cultural group membership of the information sources. In the first study, we explored how they retain sources of their knowledge in an intergroup context, while in the second study, we investigated how they retain conventional information previously shared by in-group and out-group members. Since conventional knowledge is usually conveyed by other people, identifying those who possess the relevant knowledge with regards to children's own culture is important. Both of these studies found an advantage for the in-group demonstrators when it comes to learning about artifacts: children tended to be better at recalling information about objects from videos if these were demonstrated by Native speakers (*Chapter 3;* overall analysis) and they were more accurate in retaining information shared by a Native speaker following a delay (*Chapter 4*, Experiment 2). However, in the second study, children reproduced the actions of both Native and Foreign speakers at similar rates if they were allowed to imitate their actions immediately (*Chapter 4*, Experiment 1). Additionally, children tended to recall information sources more accurately if they belonged to another cultural group than their own (*Chapter 3*; subgroup analysis). In the following sections, we further discuss these findings as well as their implications.

In *Chapter 3*, we introduced an empirical study which aimed to uncover whether the cultural group membership of an information source has an influence on how well children could identify such a source in hindsight. With regards to children's memory for the source, we found that children tended to remember better those sources who belonged to another cultural group than their own. This was found in the group of participants who were better at identifying the group membership of the characters following the test phase and the difference was not significant. Nevertheless, the pattern points in the predicted direction. Therefore, the proposed modifications with regards to the study of Greenstein and colleagues (2016)—children as participants, sources demonstrating conventional information in the case of which cultural background is relevant—may have shifted the pattern of findings from an in-group to an out-group advantage. We believe that with the introduction of some modifications to the experimental procedure—see the Discussion in *Chapter 3*—it would be possible to explore this phenomenon more conclusively.

In addition to this, we also attempted to measure in this study whether there would be any difference in how well children remember the content of the videos; namely, how the objects were used by the demonstrators. In this case, we had the opposite prediction: we hypothesized that children would retain more information if these were shared by in-group sources. We could not conclusively confirm this assumption, as we only found a tendency: children performed better in case the information about the objects were shared by in-group members, but the difference was not significant. Furthermore, this pattern was only found in the overall analysis—involving all participants, even those who were worse in identifying the group membership of the demonstrators at a later stage of the experiment. Additionally, the analyses concerning whether children remembered the content of the videos were carried out on a smaller sample compared to the source memory measure, since there were quite a number of participants who did not complete this part of the experiment or were excluded due to parental interference. We would suggest that an offline replication with some changes introduced in the experimental design may remedy these issues, and thus could have more conclusive findings in this aspect of the study as well. Keeping all these limitations in mind, we find both patterns of results promising with regards to the initial assumptions.

In *Chapter 4*, we investigated another aspect of how the cultural group membership of a source may impact children's learning. More specifically, we investigated in two experiments: 1, if there is a difference between how accurately children reproduce the actions of a Native speaker or a Foreign speaker if they have the opportunity to do so immediately, and 2, whether there is a difference in this respect if children are only allowed to interact with the objects following a delay (one week). In sum, we found that linguistic group membership figured into how accurately children reproduced the actions following a week of delay: they reproduced more steps from the events, as well as retained the order of event sequences more accurately following a demonstration by a Native speaker. However, we did not find a difference in the experiment in which children had the opportunity to interact with the objects immediately. Notably, in this experiment, children tended to be more accurate in reproducing the order of event steps and received higher scores numerically following a demonstration by a Native speaker. Additionally, the overall analysis of the two experiments also showed that children reproduced the actions more accurately following an in-group demonstration. Thus, cultural group membership—here, indicated by the language one speaks—figures into what children learn, with a more profound difference emerging in terms of what children retain in the longer term.

These findings support the claim that the cultural group membership of teachers substantially shapes children's learning processes. We would argue, based on our own findings and those of other studies, that children are more likely to consider information shared by in-group members as culturally relevant, generalizable knowledge and as a consequence, they are more likely to integrate it in their long-term semantic knowledge. These are reflected, among other things, in that preschoolers are more likely to generalize newly learnt object functions to similar looking, but bigger objects following a demonstration by a Native speaker (Oláh et al., 2016) and they tend to exclusively assign the function demonstrated by a Native speaker to the object kind (and use a different looking object for carrying out another function) (Pető et al., 2018). Findings from our own study (*Chapter 4*, Experiment 2) further support this claim, since preschoolers also seem to more accurately retain information for longer term following an in-group demonstration.

The fact that we did not find a significant difference in the immediate imitation experiment may seemingly contradict previous findings which have demonstrated that children selectively imitate in-group members (such as, Buttelman et al., 2013; Altınok et al., 2022; Kinzler et al., 2011), while supporting those which did not find such a difference (for e.g., Altınok and colleagues, 2020). Note that in *Chapter 3*, we also found that preschoolers tended to remember more information about the objects if these were introduced by an in-group member. At this point, we could only speculate about the reasons for these different patterns of findings. In the table below, we describe and compare some aspects of these studies, to highlight the potential reasons for these differential findings.

Table 3.

An overview of a number of studies which included an immediate imitation task based on cultural group membership

	Is there a selectivity ?	**Age of participants**	**Important contextual information**	**Experiment type**	**Imitation prompt**
Study					
Buttelman et al., 2013	Yes.	14 months	Stimuli presented on video. Some ostensive	Between subject design.	"You can play with it"

Native / Foreign speaker			elements.		
Howard et al., 2015 - younger group Native / Foreign speaker	No in a live setting, yes from video.	19 months	Both live and video presentation. Highly ostensive.	Both between and within subject design.	“What is this for / what can you do with it?”
Howard et al., 2015 - older group Native / Foreign speaker	Yes in both settings.	3-year-olds	Both live and video presentation. Highly ostensive.	Within subject design.	“What is this for / what can you do with it?”
Altinok et al., 2022 Native / Foreign speaker	Yes.	18 months	Presented live. There is eye contact and smiling.	Between subject design.	No instruction.
Kinzler et al., 2011 Native / Foreign accent	Yes.	4-year-olds	Presented on video. Neutral demo with eye contact.	Within subject design.	“How can it be used?”
Altinok et al., 2020 Native / Foreign speaker	No, but there is a difference in strategy switching.	4-year-olds (5 and 6 year-olds show no difference.)	Presented live. Non-verbal ostensive demonstration.	Between subject design.	“It is your turn now.”
Chapter 3 Native / Foreign speaker	No, but there is a difference after a delay.	4-year-olds	Presented live. Non-verbal ostensive demonstration.	Between subject design.	“Now you can play with it!”

On the one hand, the studies of Buttelman and colleagues (2013) and Altınok and colleagues (2022) targeted younger children (below the age of 2). It may be the case that younger children are more selective in who to learn from, while preschoolers are more flexible. However, the studies of Howard and colleagues (2015) did not find a selectivity at the age of 2 which suggests that other factors may also have a role. For instance, children at different ages may respond to ostensive signals differently, and thus a highly ostensive demonstration may lead them to imitate the actions regardless of group membership. As to why the influence of group membership may change as children age, one explanation was suggested by Altınok and colleagues (2020), according to which older children could have more experience with the fact that people may speak multiple languages (Altınok et al., 2020). It is also a possibility that younger children are more selective since they have a more limited working memory capacity which may prompt them to filter out information coming from out-group sources more generally. Additionally, if older children are faced with a higher amount of information to be retained which could tax their working memory to a greater extent—such as in the study described in *Chapter 3* during which they saw videos about 8 object sets—, they may be more inclined to immediately identify which information seems more relevant. The cultural group membership of a source is one of the factors which may support them in selecting what to pay attention to in such a situation. Thus, an advantage for information shared by in-group members may emerge. The findings from the study described in *Chapter 3* point in this direction, although the difference was not significant.

Nevertheless, older children also build on information about cultural knowledge to guide their learning—in our own study, this is reflected in the results of the overall analysis and Experiment 2—, but the immediate effect may be less robust than others, such as its effect following a delay. Thus, in the case of older children, the influence of group membership may not be reflected in an overall selectivity for learning only what in-group members demonstrate, but in other ways. For example, if they receive contradictory information about the same object, they endorse information provided by a Native speaker (Kinzler et al., 2011), update their previous behavior to a more efficient one if it was shown to them by a Native adult (Altınok et al., 2020) and make different inferences based on information shared about object functions if these are shared by Native speakers, compared to Foreign speakers (Oláh et al., 2016; Pető et al., 2018). Here, we show that they retain more information from events demonstrated by Native speakers. As the findings diverged in the two experiments (*Chapter 4*, Experiment 1 and 3), the results also highlight the importance of

studying both the short and long term effects of various situational factors on children's imitation and learning more generally. It may be the case that some effects are found in immediate recall situations—such as overimitation of inefficient steps—which are not present in the long term (Simpson & Riggs, 2011; Kline et al., 2019). However, the opposite might also be true: the influence of other factors could emerge over time. This has been demonstrated in other domains of learning as well, for example, that a period of consolidation is required before a new word is integrated in the lexicon both in the case of young, school-aged children and adults (Henderson et al., 2013).

Further studies could strengthen these claims. If children indeed consider information shared by in-group members to be culturally relevant and generalizable, this should be reflected in how they react to information that contradicts what they have learnt via these sources. On the one hand, the study of Altınok and colleagues (2020) explored a similar question, and the results show that if in-group and out-group members demonstrate different information, children change their behavior from what they have learned from an out-group member to match that of an in-group member. However, it would also be interesting to explore how they behave if they discover information during exploratory play that contradicts what was shared previously by in- or out-group members. In similar experiments (see Butler & Markman, 2012, 2014), children learn new information about an object (for e.g., that a block is magnetic). Later on, they have the opportunity to try further objects which look identical, but lack this attribute. Children's perseverance is measured with regards to both how much time they spend attempting to elicit this attribute and how many further objects they try out. A higher number in both of these scores would reflect that children have generalized the learnt attribute to other exemplars from the same category. Experiments employing such methods have demonstrated that preschoolers interpret pedagogically demonstrated information about objects as generalizable (Butler & Markman, 2012) and as reflecting essential object properties (Butler & Markman, 2014). These experiments could be modified to explore differences based on the demonstrator's group membership. If children consider knowledge shared by in-group members to be generalizable and an essential property of the object kind, this should be reflected in them being more persistent in the face of counterevidence, compared to situations in which the information was shared by out-group members.

Other investigations could also target how children react to someone violating a norm taught by in-group or out-group members. One previous study has shown that children protest against in-group members if they violate a conventional norm, but they do not do so if the one who breaks the rule belongs to another group (Schmidt et al., 2012). Children's reasoning is this respect could be examined in more detail: would they protest a norm violation if the norm was introduced by an out-group member (Foreign speaker) and it was violated by an in-group member (Native Speaker), and vice versa? If children understand that conventions only set the standards for those belonging to the same cultural group, they should not protest against rule violations in these two cases. A further question is whether they would attribute knowledge about the conventional norm to ignorant others—who did not witness the introduction of the norm—, if they belonged to the relevant cultural community. In the original experiment (Schmidt et al., 2012), the puppet (who was either in-group or out-group) always witnessed the relevant conventional norms, but violated these anyway. Would children also protest if an in-group person broke a conventional rule, even if they did not witness its introduction? Arguably, this could be the case, since they could attribute knowledge to them about this rule regardless of specific experience—if it is indeed a social convention. However, children should not attribute knowledge about conventional norms to ignorant out-group members—thus, they should not protest against their behavior (as partly demonstrated by Schmidt et al., 2012).

As shown by the findings of these studies, there is now a growing amount of evidence suggesting that children's learning of conventional information is influenced by the cultural knowledgeability of the demonstrators. However, less is known about how children's learning on other domains is shaped by such teacher attributes. As mentioned previously, monitoring the cultural knowledgeability of others is especially important when it comes to conventional knowledge since it is only shared within the cultural community. However, this selectivity or bias in learning may not be warranted on other domains: for example, some information in children's environment is universal in the sense that it could be known by all people (for e.g., things get wet when it rains) (see the beginning of the *General Introduction* of this Dissertation). At the same time, other information may have a narrower scope (for e.g., the proper name of pets), or may not constitute cultural knowledge (personal preferences) (Diesendruck & Markson, 2011). Thus, sensitivity to cultural knowledgeability should only limit children's learning on the domain of cultural information—such as while acquiring conventions.

To our knowledge, no published study has directly contrasted how the cultural background of the teacher would influence children's learning in domains which could be considered universal (such as biological kinds) or conventional. Previous experiments in our research lab have targeted this question, but found mixed results. In the most recent study (Nguyen, 2022), children saw both in-group and out-group demonstrators teaching novel information, some of which were conventional (for e.g, "*I use this because this is how we usually do it"*), while others were more universal in scope (for e.g., "*I use this because it can cool my drink"*). The results show that children were significantly more likely to acquire universal knowledge (75%), compared to conventional knowledge (40%). Additionally, they were most likely to acquire information if it was universal and taught by an in-group member (78%). Importantly, they were more likely to learn universal information from an out-group member (73%), than if the information was conventional, but taught by an in-group member (48%). Learning was the least frequent when the teacher was an out-group member sharing conventional knowledge (32%). Thus, the pattern of results point in the direction that children acquire universal knowledge from all teachers—regardless of group membership. Importantly, in this study, no main effect of group membership and no interaction effect between group membership and knowledge type was found. Therefore, it cannot conclusively be stated that group membership has a different influence on learning in the cases of universal and conventional information. Nevertheless, the pattern of finding highlights that it would be interesting to study how attributes of the content itself (such as, being from the domain of artifacts or biological kinds) interact with information about the teachers, and how this impacts children's learning processes. The claim that children grasp the community-bound nature of conventions and its consequences for learning would be strengthened by findings which show that they differentiate these forms of behaviors from those that could reflect universal knowledge. In other words, if we could identify cases—for e.g., from the domain of biological kinds—in which children learn equally and make similar inferences based on the information demonstrated by cultural in-group or out-group members, it would further demonstrate their understanding that not all information is conventional and bound to cultural communities.

Conclusions

Children are members of multiple, wider or smaller communities—such as their family or their kindergarten. Customs and rules may vary in these communities, therefore, they often need to adjust their behavior while navigating between these contexts. Thus, learning what knowledge is valid in these different contexts and flexibly switching between these is important in order to successfully interact with others. In this Thesis, we have proposed that engaging in pretend play may allow children the exploration of both how to create and participate in such social contexts with others and to grasp the importance of contextual boundaries. A related study has shown that children consider others' ignorance about a pretend stipulation as a contextual boundary of its validity. Furthermore, we have also extended previous findings by showing that children rely on cues about the cultural group membership of others to guide them in what to integrate into their long term semantic knowledge. Thus, it seems that children build on information about whether another person belongs to their cultural community in order to identify conventional knowledge that is valid in their own culture. However, the question remains whether considering information shared by members of one's own cultural community as relevant and generalizable may hinder children's memory for the specific sources.

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