Development of the sense of ownership : social and moral evaluations

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Présentée par

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Pour l'obtention du grade de Docteur de l'Université Paris Descartes

Development of the sense of ownership: Social and moral evaluations

Développement de la notion de propriété: Evaluations sociales et morales

Soutenue le 27 septembre 2012.

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SHORT TABLE OF CONTENTS

DETAILED TABLE OF CONTENTS

Résumé

La plupart des interactions sociales humaines font intervenir des objets, et ceci dès le plus jeune âge. Dans ces interactions, les enfants semblent prendre en compte qui est le propriétaire de l'objet. La notion de propriété ne concerne donc pas seulement une personne et un objet, mais constitue une relation entre différentes personnes vis-à-vis d'un objet. Cette relation est régie par un ensemble de règles ou droits de propriété. Nos travaux portent sur la compréhension qu'ont les enfants de la notion de propriété. A quel âge les enfants acquièrent-ils la compréhension des droits de propriété ? Avant de manier la notion de propriété de manière explicite, les enfants en ont-ils une compréhension plus implicite ? Plus particulièrement, nous avons exploré la compréhension et l'évaluation de transferts de propriété illégitimes et légitimes chez des enfants de 5 mois à 5 ans. Nous avons étudié deux types de transgressions de propriété : l'acquisition illégitime d'un objet (sans intention de transfert de la part du propriétaire) et l'absence de restitution d'un objet à son propriétaire. L'ensemble de nos études ont consisté à présenter aux enfants des transferts de propriété entre deux personnages de manière non verbale, dans des dessins animés ou des films mettant en scène des marionnettes, puis à mesurer la compréhension et l'évaluation de ces transferts par les enfants.

Les études du Chapitre 2 (Etudes 1 et 2) se sont intéressées à l'évaluation que font les enfants de l'acquisition d'un objet. Les deux expériences de l'Etude 1 ont exploré la compréhension et l'évaluation de transferts de propriété illégitimes et légitimes par des enfants de 3 ans et 5 ans, ainsi que des adultes (population contrôle). Cette étude est la première à examiner simultanément la compréhension explicite et implicite qu'ont les enfants de la notion de propriété. En effet, les questions posées concernent respectivement les droits de propriété, ainsi que l'évaluation sociale et morale des agents impliqués. Dans l'Etude 1a, les participants ont vu un personnage acquérir un objet soit de manière illégitime (condition vol), soit de manière légitime (condition réception par don). Dans l'Etude 1b, c'est une action illégitime (condition vol) qui était comparée à une action légitime (condition don). Les enfants de 5 ans (comme les adultes) ont montré une compréhension de la notion de propriété à la fois implicite par leur évaluation sociale/morale, en préférant l'agent de la condition légitime (receveur du don ou donneur) par rapport à l'agent de la condition illégitime (voleur), et explicite par leur capacité à attribuer des droits de propriété différents selon la légitimité du transfert. Les enfants de 3 ans n'ont pas distingué les conditions illégitime et

légitime, ni dans leur évaluation, ni dans leur attribution de droits de propriété. Ces résultats suggèrent que les enfants acquièrent simultanément les compréhensions implicite et explicite de la propriété. Dans l'Etude 1, aucune réaction émotionnelle n'était présente.

Nous avons examiné dans l'Etude 2 le rôle des émotions du premier possesseur dans l'évaluation que font les enfants de 3 ans de l'acquisition d'un objet. En présence d'indices émotionnels (les mêmes dans la condition légitime et illégitime : le premier possesseur étant triste après le transfert dans les deux cas), les enfants de 3 ans sont parvenu à distinguer les deux conditions dans leur évaluation sociale/morale. Cette distinction n'a pu être basée uniquement sur la présence de l'émotion négative étant donné que l'émotion présentée était la même dans les deux conditions. Nous suggérons que les enfants de 3 ans ont détecté la transgression morale dans le cas du vol, et se sont basés sur l'émotion négative pour la confirmer.

Les études du Chapitre 3 (Etudes 3 à 5) se sont intéressées à l'évaluation que font les enfants de la restitution d'un objet à son propriétaire. Les jeunes enfants (de 2-3 ans) ont un biais à considérer que le premier possesseur d'un objet est son « propriétaire » et que l'objet ne peut être transmis définitivement à quelqu'un d'autre. Nous avons donc cherché à déterminer si les enfants de 3 ans (Etudes 3 et 4) considèrent implicitement l'absence de restitution comme une transgression, et l'évaluent négativement en comparaison avec la restitution d'un objet au premier possesseur. Dans leurs réponses aux droits de propriété, les enfants de 3 ans ont considéré qu'après le transfert le second possesseur devait rendre l'objet au premier possesseur. Cependant, ils n'ont pas distingué la restitution de la non restitution dans leur évaluation sociale/morale, et ceci même en présence d'indices émotionnels (Etude 4). Les enfants de 5 ans (Etude 5) en revanche ont préféré un personnage qui rendait un objet à son potentiel propriétaire par rapport à un personnage qui conservait l'objet, que les situations aient été présentées avec ou sans indices émotionnels. Dans les transferts de propriété que nous avons étudiés, les adultes aussi ont considéré que le second possesseur devait rendre l'objet au premier possesseur, même lorsque nous avons voulu montrer que ce dernier ne voulait plus de l'objet (Etude 3). Les adultes montraient donc également un « biais pour le premier possesseur ».

Dans le Chapitre 4, nous avons analysé les réponses aux questions de propriété (concernant le droit de conserver l'objet) pour chacun des transferts légitimes présentés dans les études précédentes et déterminé les interprétations que les participants ont eu des transferts en termes de don ou de prêt. Nous avons mis en relation ces interprétations avec les indices présents dans chaque situation indiquant que le transfert était plutôt un don ou un prêt. Ces

analyses ont mis en évidence la difficulté à considérer un transfert de propriété comme étant un don, même chez des adultes. Par défaut (sans ajout d'indices pour montrer un don ou un prêt) les transferts de propriété ont été majoritairement perçus comme des prêts. Lorsque nous avons ajouté des indices visant à montrer que le propriétaire de l'objet renonçait à cet objet une grande proportion de personnes a tout de même considéré les transferts comme des prêts. Il semblerait qu'en l'absence d'indices spécifiques indiquant un don (tel qu'un paquet cadeau) un transfert unidirectionnel d'un objet est considéré comme étant un prêt. Ce qui confirme l'existence d'un biais au premier possesseur qui est présent même chez l'adulte.

Les études du Chapitre 5 (Etudes 6 à 9) ont exploré l'évaluation de transgressions de propriété par de très jeunes enfants (de 18 et 24 mois) et des bébés (de 5 mois). Les stimuli ont été rendus plus saillants par rapport à ceux qui ont été utilisés avec les enfants plus âgés. L'Etude 6 a testé chez des enfants de 2 ans la comparaison présentée dans l'Etude 1a entre une acquisition illégitime et une acquisition légitime. L'Etude 7 (comme l'Etude 2) a testé l'effet de la présence d'émotion sur l'évaluation. Nous avons partiellement répliqué avec des enfants de 2 ans et une mesure plus implicite de leur évaluation sociale les résultats trouvés précédemment avec des enfants plus âgés. En l'absence d'indices émotionnels (Etude 6), les enfants de 2 ans n'ont pas montré de préférence entre un personnage s'appropriant un objet de manière illégitime (par vol) et un personnage acquérant l'objet de manière légitime (par don). En présence d'indices émotionnels (Etude 7), un sous-ensemble seulement des enfants de 2 ans (ceux qui ont répondu rapidement) ont préféré le receveur légitime.

Les Etudes 8 et 9 se sont intéressées à l'évaluation de la restitution (comme l'Etude 3, mais en présence de réclamation de l'objet par le premier possesseur) chez des enfants de 18 et 24 mois, et des bébés de 5 mois, respectivement. Dans certaines conditions (en fonction de la rapidité et la clarté des choix), les jeunes enfants et les bébés ont eu tendance à préférer le personnage qui rendait un objet au premier possesseur par rapport au personnage qui gardait l'objet. Les résultats que nous avons trouvés montrent des variations considérables dans les comportements des enfants. Nous discutons des difficultés méthodologiques à mesurer les préférences sociales des jeunes enfants et des bébés en liaison avec des résultats similaires publiés dans la littérature.

Les études de cette thèse montrent un important développement de la compréhension explicite de la notion de propriété entre 3 et 5 ans. Chez des enfants plus jeunes, nos résultats montrent des tendances à évaluer implicitement des transferts de propriété illégitimes et légitimes. Nous soulignons également l'importance de la méthodologie dans le test des jeunes enfants.

Mots clés : *Propriété, droits de propriété, développement moral, jugement moral, cognition sociale, évaluation sociale, développement cognitif.*

Summary

Since a very young age, the majority of human social interactions involve objects. In these interactions, children seem to take into account who owns what. The notion of ownership thus does not involve only a person and an object, but is a relationship between several persons with respect to an object. This relationship is organized by a set of rules or property rights. Our work deals with children's understanding of the notion of ownership. At what age do children acquire the understanding of property rights? Before an explicit mastery of the notion of ownership, do children have a more implicit understanding of it? More precisely, we explored the understanding and evaluation of illegitimate and legitimate transfers of property in children from 5 months to 5 years of age. We studied two types of ownership transgressions: illegitimate acquisition of an object (without owner's intention to transfer it), and absence of restitution of an object to its owner. In all our studies, we presented to children property transfers between two characters using non-verbal animated cartoons or movies with puppets as actors, and then measured children's understanding and evaluation of those transfers.

The studies in Chapter 2 (Studies 1 and 2) assessed children's evaluation of different modes of acquisition of an object. The two experiments of Study 1 explored 3- and 5-year-olds's understanding and evaluation of illegitimate and legitimate property transfers. Adults were also tested as a control population. This study is the first one to investigate simultaneously children's explicit and implicit understanding of the notion of ownership, by asking questions about property rights, as well as social and moral evaluations of the characters implicated in the transfers, respectively. In Study 1a, participants saw a character acquiring an object either in an illegitimate way (theft condition) or in a legitimate one (gift-reception condition). In Study 1b, an illegitimate action (theft) was compared to a legitimate action (giving). 5-year-old children (as adults) showed both an implicit understanding of ownership through their social/moral evaluation (preferring the legitimate agent (gift recipient or giver) compared to the illegitimate agent (thief)), and an explicit understanding of ownership through their ability to attribute different property rights considering the legitimacy

of the transfer. 3-year-old children did not make any distinction between the illegitimate and legitimate conditions in their evaluation, neither in their attribution of property rights. These results suggest that children acquire implicit and explicit understanding of ownership at the same time. In Study 1, no emotional reaction was present.

We examined in Study 2 the role of the first possessor's emotions in 3-year-olds' evaluation of object acquisition. The same cue was present in the legitimate and illegitimate conditions: the first possessor being sad after both transfers. In the presence of this emotional cue, 3-year-olds managed to distinguish between the two conditions in their social/moral evaluation. This distinction could not have been based solely on the presence of a negative emotion, as the emotion displayed was the same in both conditions. We suggest that 3-year-old children detected the moral transgression in the theft condition, and used the negative emotion to confirm it.

The studies in Chapter 3 (Studies 3 to 5) examined children's evaluations of the restitution of an object to its owner. Young children (2-3-year-old) have a bias to consider that the first possessor of an object is its "owner" and that the object cannot be definitively transferred to someone else. We thus investigated whether 3-year-old children (Studies 3 and 4) implicitly evaluate the absence of restitution as a transgression, and evaluate it negatively compared to the restitution of an object to its first possessor. In their answers to questions about property rights, 3-year-olds considered that the second possessor should return the object to the first possessor. However, they did not make the distinction between the restitution and no-restitution conditions in their social/moral evaluation, even in the presence of emotional cues (Study 4). In contrast, 5-year-old children (Study 5) preferred a character restituting an object to its potential owner compared to a character keeping the object, both when situations were presented with and without emotional cues. In the property transfers that we studied also adults considered that the second possessor should return the object to the first possessor, even when we added cues intending to show that the first possessor did not want the object back (Study 3). Thus, also adults showed a "first possessor bias".

In Chapter 4, we analyzed the answers to the questions about property rights (dealing with the right to keep the object) for each of the legitimate transfers presented in the previous studies. We deduced participant's interpretation of each transfer as gift or loan. These analyzed revealed the difficulty to consider a property transfer as a gift even by adults. By default (without adding cues to show a gift or a loan) the property transfers were perceived as loans. When we added cues intending to show that the first possessor relinquished the object, an important proportion of people nevertheless considered the transfers to be loans. It seems

that in the absence of specific cues showing a gift (such as a gift-wrapping) a unidirectional object transfer is considered to be a loan. This confirms the existence of a first possessor bias that is present even in adults.

The studies in Chapter 5 (Studies 6 to 9) explored the evaluations of property transgressions in very young children (18- and 24-month-old) and infants (5-month-old). The stimuli were made more salient compared to those used with older children. Study 6 tested with 2-year-olds the comparison presented in Study 1a between an illegitimate and a legitimate acquisition. Study 7 (as Study 2) tested the effect of the presence of emotion on the evaluation. Using a more implicit measure of children's social evaluation, we partially replicated here with 2-year-olds the results found earlier with older children. In the absence of emotional cues (Study 6), 2-year-olds did not show any preference between a character acquiring an object illegitimately (by theft) and a character acquiring the object legitimately (by gift). In the presence of emotional cues (Study 7), only a subgroup of 2-year-olds (those who answered quickly) did prefer the legitimate recipient.

Studies 8 and 9 were interested in the evaluation of restitution (as Study 3, but with the first possessor begging for the object back) in 18- and 24-month-old children, and 5-month-old infants, respectively. In some conditions (depending on the rapidity and clarity of choice), the young children and infants showed a tendency to prefer the character returning the object to its first possessor compared to the character keeping the object. Our results show important variations in children's behaviors. We discuss the methodological difficulties of measuring young children's and infant's social preferences in relation with similar results published in the literature.

The studies of this dissertation show an important development in the explicit understanding of ownership between 3 and 5 years. With younger children, our results show tendencies to implicitly evaluate illegitimate and legitimate property transfers. We also underlie the importance of the methodology used to test young children.

Key words: *Ownership, property rights, moral development, moral judgment, social cognition, social evaluation, cognitive development.*

PART 1 – THEORETICAL BACKGROUND

CHAPTER 1: Introduction

1. The notion of ownership and its development

1.1. What is Ownership?

Ownership is an unobservable, abstract characteristic of objects. When perceiving an isolated object, one cannot know whether it is owned and by whom. Also, the privileges conferred by ownership are not directly observable. However, children come to take ownership into account in their behaviors. How do they recognize it? Ownership regulates social interactions involving objects both in adults and children. Whether one can take or use an object depends on who owns it. The owner can be a person, or a group of persons, such as a family, or a society. Also, different kinds of "objects" can be owned, including material objects, territories, ideas, songs, persons, and relationships. Despite this variety in owners and owned objects, and certainly also in the relation between persons and objects that defines ownership, the notion of ownership has been found to exist in all human cultures (Brown, 1991), and elements or precursors of it have been described in non-human animals (Brosnan, 2011).

Theories of ownership have been debated for more than two millennia (see Rudmin, 1988; 1991 for an extended historical review about property theories). In ancient Greece, Pythagoras followed by Plato (in his *Republic*) lauded common property, arguing that private property was socially divisive. On the contrary, Aristotle (in his *Politics*) proclaimed that private property was necessary in order to achieve individual moral development and thus social harmony. Influenced by Pythagoras and Plato, the Romans and early Christians considered that property has to be communal. In the late Middle Ages, Thomas Aquinas developed Aristotle's idea that private property is a moral necessity, and that it is natural. Cross-cultural research examined property relations in "primitive" societies, where communal ownership was found to prevail. Beyond the debate of the best property regime, the fundamental question to ask is "what is property or ownership?"

Here, we briefly review some philosophical and psychological theories about the concept of ownership, as well as some anthropological research, and legal considerations on property (see also Noles & Keil, 2011, for a recent review of theories of ownership in a developmental context). We first examine ownership as a dyadic relation: a relation between

an individual and an object. We see that ownership is more than possession; it is linked to the self, may involve a relation of attachment, and is defined by the notion of control. We examine then ownership as a "triadic" relation: a relation between several individuals (the owner, and "the non-owners") with respect to an object, which involves in particular the notion of exclusivity. Later, we turn into psychological studies of how adults, children, and infants understand ownership, looking at the ontogeny of ownership, and at its potential developmental bases. We examine as potential bases of ownership its previously identified components: possession, control including the notion of self, attachment, and exclusivity, and consider in addition the notion of reciprocity.

1.1.1. Ownership: a dyadic relation

Even though ownership is not observable, some cues of ownership are observable, such as an object being "possessed" or held by a person. In property law, possession is considered not only to involve physical contact at one instant, but also control over the displacement of the possessed object over time. The utterance "possession is nine-tenth of the law" shows the importance of possession in attribution of ownership. In philosophical theories of ownership, possession is also considered as a constituent of ownership, but not as defining ownership in itself: "My merely partial or temporary use of a thing, like my partial or temporary possession of it (a possession which itself is simply the partial or temporary possibility of using it) is therefore to be distinguished from ownership of the thing itself" (Hegel, 1821/1952).

Etymologically, "property" means "one's own". It implies a link between an individual and the object of property. Locke (1690/1881) argued that the relation of ownership originates from a man's investment of his labor onto an object. Locke's Desert Labor Theory stated that a piece of property belongs to the person who created it. Thus, property of objects firstly comes from the involvement of oneself in their fabrication. One owns one's body, one's labor, and the product of one's labor. In this view, self-ownership seems to be the foundation of ownership of external objects, i.e. self-ownership is taken as a primitive notion from which onwership of objects that are not part of the self can derive. Locke's statement that private property originates from the application of man's labor onto common resources had not been found valid in cross-cultural research (e.g. Rudmin, 1996). However, the existence of a strong link between property and the self was discussed by many other philosophers. In his Personality Theory, Hegel (1821/1952) discussed the importance of appropriation of objects in the construction of the self. Following Hegel's ideas, more recently, Radin (1982)

developed a psychological Theory of Property and Personhood. She argued that control over resources, thus ownership of objects, is important in the definition of personhood. James (1890/2007) wrote that "between what a man calls me and what he simply calls mine the line is difficult to draw […] a man's Self is the sum total of all that he CAN call his". Considering that possessions are part of the self, a property loss leads to a weakening of the sense of self. Different objects of possession represent a man's identity and "give him the same emotions. If they wax and prosper, he feels triumphant; if they dwindle and die, he feels cast down" (James, 1890/2007).

Another characteristic of the relation of ownership is the notion of attachment. The link between an individual and an object of property can be considered as a link of attachment to a particular object. Attachment to an object would be a form of affective attitude directed towards the object. Hume (1739/2003) stated "such is the effect of custom that it not only reconciles us to any thing that we have long enjoy'd, but even gives us an affection for it, and makes us prefer it to other objects which may be more valuable, but are less known to us".

In his anthropological work, Hobhouse (1906; 1922) found control to be a fundamental characteristic of property (in Rudmin, 1988). Control over property also allows exercising control over people. Ginsberg (1934) also stated that property gives power not only over things but also over people through things (in Rudmin, 1988). In any case, control of an object has to be exercised against others. Thus, the notion of exclusivity needs to be added in the understanding of what ownership is. Ownership cannot be described merely as a relationship between a person and an object, but has to be considered also as a social relation. Ownership is then a relationship between persons with respect to an object.

1.1.2. Ownership: a "triadic" relation

The lay notion of ownership describes it as a relation between a person and a thing. In the law, property is seen to be a relationship among individuals with respect to a thing (e.g. Blumenthal, 2009). A whole branch of law, property law, is devoted to the regulation of people's relations to objects. This idea that the notion of ownership includes a social consensus was already present in Hume's discussion about property. We can also consider Locke's concept of private property as the exclusive right of a person over a thing. Ownership is a social institution; it can only exist in the context of conventions (Kalish, 2005; Kalish & Anderson, 2011; see also, Rose, 1985). Some psychological theories of ownership also considered it as a social relationship (Litwinsky, 1947; Heider, 1958). To exist ownership has

to be recognized by others. A person owns something only if others respect his claim of ownership and enforce it. This relationship between persons with respect to things involves rights and duties. The philosopher Snare (1972) proposed that owners have three main rights with respect to their property. These rights are held only by owners, and are recognized by others. Firstly, an owner has the *right of possession and use*. An owner can use his possessions whenever he wants and non-owners are not allowed to interfere with the owner's use of his property. Secondly, an owner has the *right of exclusion*. An owner can exclude anybody else from the use of his possessions; he can decide who is given permission of use. Non-owners are allowed to possess and use the owner's property only if the owner agrees. Thirdly, an owner has the *right of transfer*. An owner can decide to give his property to someone else, and by doing so he permanently transfers all the rights of ownership. The new owner acquires the right of possession and use, the right of exclusion, and the right of transfer. The previous owner relinquishes his rights; he becomes a non-owner. It is important to understand that in a transfer of ownership, the new owner gains rights, but also the previous owner relinquishes rights.

1.1.3. Summary

We have seen that philosophers described ownership as a relationship between an individual and an object. Ownership is linked to the individual's identity. Objects of possession are often cherished, and the owner has control over his objects, as well as their access. However, in our social world, it is not only important to know what it means to own something for the individual, but how ownership is recognized by others. Without the recognition of the ownership relationship between an owner and his possessions, there would be no ownership at whole. Thus, ownership has to be seen not only as a relationship between persons and things, but also as a relationship among persons with respect to things. This view of ownership is the one considered in property law. However, it is also present in philosophical and psychological research. The main property rights state that: an owner has a right to (1) use his property, (2) exclude others from the use of his property, and (3) transfer his property and the associated property rights.

We consider "possession" as characterized by physical contact with, use of, and possibly control over an object. We also discuss "ownership" with the meaning of possession, but implying control over objects with respect to others, and the recognition of ownership claims by others. We consider "property" as including the notions of rights, duties and

responsibilities in use and transfer of owned objects. “A possession” and “a property” are considered as objects of possession, ownership or property. We are interested in the development of the notions of ownership and property in children.

1.2. Ontogeny of ownership

1.2.1. Importance of ownership in children’s social interactions

Ownership is important in social interactions since infancy. The majority of conflicts among young children involve objects of possession (Hay & Ross, 1982; Ramsey, 1987). Children want to maximize their possessions. However, despite the large amount of disputes about possessions, the frequency of disputes is context-dependent. Lakin et al. (1979; cited by Furby, 1980) observed less disputes between 1-year-old children in a “total care” kibbutzim (where they spend their days and nights together) compared to children in a “day care” kibbutzim (where they only spend day time together). It seems that children spending more time together minimize their disputes about possessions.

The fact that young children engage in conflicts about objects may be interpreted as a lack of a sense of triadic ownership allowing them to recognize which objects they can use, or as a disagreement concerning the implications of ownership. However, even young children consider a common notion of ownership to resolve their conflicts (Ross et al., 2011). Already at 6 month of age, when two infants touch a toy at the same time, more often the first possessor retains it (Hay et al., 1983). At 2 years of age, children are more likely to win a dispute about the use of a toy if they were the first possessor of the toy (Ross, 1996; Ramsey, 1987; Weigel, 1984). Children often resolve their conflicts without intervention of the parents, and according to first or prior possession, which is a way to determine ownership (Ross, 1996). On the contrary, parents sometimes end the conflict without consideration for ownership rights but rather trying to maximize social harmony (Ross et al., 1990; Ross, 1996). Children’s attribution of ownership to the first possessor is not only due to personal attachment to the object leading to fighting more for it. Indeed, in third-party evaluations, children and adults also exhibit a “first possessor bias”, i.e. when explicitly asked about the ownership of an object, they tend to attribute it to the first possessor (Friedman & Neary, 2008; Friedman, 2008; Friedman & Neary, 2009). When children are told who is the owner (and do not have to infer it from first possession), they also exhibit an “ownership bias”, i.e. they attribute the right to use the object to the owner. Neary (2011) presented to 3- to 7-year-

old children and to adults disputes between an owner wanting his object (but with no need of the object of dispute) and a current possessor (needing the object), and asked participants who should get to use the object. Neary showed that children considered the owner to be more entitled to the object. Children uphold the rights of the owner even if he had no reason for requesting the object or for refusing the use of the object to someone who needed it. Children considered ownership more important than possession or need. They entitled the possessor in need to use the object only when no ownership was involved in the dispute (i.e. when none of the "wanter" and current possessor were the owner of the object). In contrast, adults gave entitlement to the object to the possessor in need independently of the presence of the owner in the dispute. Only when the non-owner's need for the object was extremely strong (e.g. to prevent harm) did children disregard ownership rights. This shows at least some flexibility in children's ownership bias.

1.2.2. Development of the sense of ownership

Children have some notion of ownership very early. This notion develops to become a mature understanding of ownership around 5 years of age (see Rochat, 2011a, for a detailed description of different levels of possession from birth to 5 years; see also Rochat & Passos-Ferreira, 2008). Table C1-1 presents the notion of ownership at different ages, when children are involved (as the owner or a non-owner) in an interaction involving property or when they are only third-party observers of the interaction. We do not fully consider the development of the understanding of ownership transgressions here, as we will discuss it in details later.

Newborns show minimal possession in the sense of physical binding to things by preferentially latching onto nutritious things (breast) and sources of comfort (soft objects) (see Rochat, 1987; 2011a; Rochat & Hespos, 1997).

At **2 months**, infants can be seen as owning the effects of their movements (Rochat, 2011a). We discuss the link between a sense of possession and the control of body and objects from 2 months of age on in the next section. Between **3 and 6 months of age**, property consists in use and possession (Faigenbaum, 2005). At **6 months**, infants take into account first possession in their interactions with other infants involving objects (Hay et al., 1983).

At **9 months**, infants engage in triadic interactions by including objects in their interaction with another person. They use objects to control their social environment; they try to gain attention from others by pointing towards or grabbing objects (see Rochat, 2011a). At that age, infants also develop a sense of exclusive possession of their mother's attention, and

of some particular objects (blankets, teddy bears), called *transitional objects* and seen as objects of substitution for their mother in her absence (Winnicott, 1982).

By **18 months to 2 years**, children explicitly identify possessions as part of themselves (Rochat, 2011a). Children show exclusivity towards more and more objects, by claiming that something is "mine", they exclude the other meaning "it is not yours". 12-month-old infants already understand the meaning of "my" in adults' speech (Saylor et al., 2011), but by 18 months, children are able to express their own possession in words. The use of possessive pronouns is recurrent in 2-year-old children (Bates, 1990; Tomasello, 1998). With language, ownership can be clearly expressed, and children do not need to be in contact with the object to express their ownership of it with possessive pronouns. First, owner and object need to be present at the same time for children to recognize ownership (Tomasello, 1998), but from 18 months, children can recognize ownership of absent owners (Tomasello, 1998; Blake el al., 2010). By 2 years of age, children consider ownership as distinct from physical possession. They recognize owners that are not in possession of the objects (e.g. Fasig, 2000), and can even recognize owners of objects shown on pictures and not for real (e.g. Rodgon & Rashman, 1976). Ownership is not only expressed in children's use of possessive pronouns, but also in their actions. When told that they have ownership of an object, from 2$_{1/2}$ years, children share it less and defend it more. They claim control and exclusivity over the object (Eisenberg-Berg et al., 1979; Eisenberg-Berg et al., 1981). In peer interactions with objects, we can notice that children do grant a peer, who is not in current possession of an object (but was in prior possession of it), entitlement to having the object (e.g. Ross, 1996). At 2 years, children also exhibit a first possessor bias when observing property transfers between third-parties (Friedman & Neary, 2008; Blake & Harris, 2009).

At **3 years,** children still exhibit a first possessor bias (Friedman & Neary, 2008; Blake & Harris, 2009). However, under some conditions, they come to see possessions as alienable (Friedman & Neary, 2008; Rochat et al., 2009), but try to maximize their resources (Rochat et al., 2009; Rochat, 2011a).

At **4 years**, children not only consider their own control of objects, but also recognize control in others, whom they see as owners (Neary et al., 2009; see also Kim & Kalish, 2009). At this age, children also partly understand property rights (Blake & Harris, 2009).

At **5 years**, children understand the feelings of others towards possessions, and base their exchanges on fairness (Rochat et al., 2009). At this age, ownership is linked to moral values (Rochat, 2009b; Rochat, 2011a). From 5 years of age on, children also have a mature understanding of property rights. They acknowledge that only a legitimate acquisition gives

the right to keep the acquired object (Blake & Harris, 2009; Kim & Kalish, 2009; see also Cram & Ng, 1989 finding a later understanding of transfers).

Age	**(*)**	**Conditions/Sense of ownership**	**Objects of ownership**	**References**
birth	1	Physical contact	Things on which physical binding is expressed	Rochat, 2011a; Rochat, 1987; Rochat & Hespos, 1997
2 mo	1	Control of body	Effects of own movements	Rochat, 2011a
3-6 mo	1	Use and possession – control of objects	Various objects	Faigenbaum, 2005
6 mo	2	1st possession		Hay et al., 1983
9 mo	1	Control of people's attention. Exclusive possession	Particular people (mother) and things (*transitional objects*)	Winnicott, 1982
18 mo - 2 y	1	- Explicit claim of possessiveness (no need for physical possession). - Exclusivity	Objects explicitly stated as linked to self ("mine") All kinds of objects	- e.g. Rochat, 2011a; Tomasello, 1998; Fasig, 2000 - Eisenberg-Berg et al., 1979; 1981
2 y	2	1st possession / prior possession		e.g. Ross, 1996
	3	1st possession		Friedman & Neary, 2008; Blake & Harris, 2009
3 y	1	Alienable property	All kinds of objects	Rochat et al., 2009
	3	- 1st possession. - Possibility of transfer under restricted conditions		- Friedman & Neary, 2008; Blake & Harris, 2009 - Friedman & Neary, 2008
4 y	2	1st possession / prior possession		e.g. Ross, 1996
	3	- Controlled possession. - Possibility of transfer under restricted conditions. - Set of rights (partly understood).		- Neary et al., 2009 (see also Kim & Kalish, 2009) - Neary & Friedman, 2008; Neary & Friedman, 2009; Blake & Harris, 2009 - Blake & Harris, 2009
5 y	1	Alienable property. Link to fairness	All kinds of objects	Rochat et al., 2009
	3	- Set of rights (fully understood). Possibility of transfer. - Link to moral values.		- Blake & Harris, 2009; Kim & Kalish, 2009 - Rochat, 2009b; Rochat, 2011a

Table C1-1. Experience of possession/ownership (*1) and recognition of ownership of others (*2; 3) at different ages (mo: months, y: years).
(*) Perspective (1, in yellow): 1st person – the child is the owner; (2, in blue): 2nd person – the child is involved in the interaction as a non-owner; (3, in green): 3rd person – the child is a third-party observer.

1.2.3. Summary

From birth, infants can be seen as having a minimal sense of ownership. Since infancy, ownership issues have a strong impact on social interactions. Most of young children's social conflicts between peers concern property disputes. A large body of research has used observational paradigms to study pair interactions in which the target child is involved first hand in some property issue. To investigate children's sense of ownership, it is important to consider children's understanding and evaluation of ownership when they are not directly involved in the property issue, but are third-party observers. Researchers investigated children's understanding of third-party interactions from 2 years of age on. At 2 and 3 years, children have a first possessor bias, preventing them to see property as alienable. At 5 years, children acquire a mature concept of property rights. This concept may develop from the earlier sense of ownership. We review now the potential bases of the sense of ownership.

1.3. Developmental bases of the concept of ownership: possession, control, attachment, exclusivity, and reciprocity

We examine here the psychological bases of the sense of ownership from a developmental point of view, i.e. we wish to examine whether ownership could, through development, emerge out of a set of more elementary components that would be already present in early infancy and even in animals. The question is whether prior to the *explicit* mastery of the concepts of ownership and property rights, young children have an *implicit* or intuitive knowledge about them. A similar approach was performed in domains dealing with numerical, physical, biological or psychological/intentional entities (e.g. Spelke, 2000; Carey, 2009). For example, it has been shown that before infants master the explicit representation of abstract numbers, they have a core number sense (Dehaene, 1997). More precisely, they have representations of approximate numerical magnitudes. At 6 month of age, infants are able to discriminate between large sets of different magnitudes (Xu & Spelke, 2000; Lipton & Spelke, 2003), which is much earlier than the ability to precisely determine the cardinal value of each set. In addition, young infants are able to track the cardinality of small sets of objects (for a review, Feigenson et al., 2004). This number sense does not map one-to-one to the adult concept, but give infants an intuitive base on which to construct symbolic representations and exact counting. Do young children have a core ownership sense in a similar way they have a core number sense?

We describe five candidate components at the basis of ownership, which arise principally from the philosophical analysis discussed above: possession, control, attachment, exclusivity, and reciprocity (see Pierce et al., 2003, for a similar approach, exploring the roots of what we have called dyadic ownership). These components, such as attachment or reciprocity, may not all be primarily linked to a system of ownership. We first examine the notion of possession as a candidate for the emergence of ownership. Possession is often related to control. Control is a second candidate for the emergence of ownership. The relation between a person and a thing also involves attachment, which is examined as a third basic component of ownership. We see then that ownership is experienced in a social context. The control that an individual applies to his possessions depends on the environment and the presence of others. Thus we proceed to the examination of the notion of exclusivity. Finally, ownership is an important concept for transactions. We see that transfers are based on reciprocity, and we examine social reciprocity as an elementary component at the basis of the sense of ownership. For each component, we review studies in human adults, children, infants, and partially in animals. The main focus is on children's conception of ownership. In children, we distinguish the role of each component in their own actions from its role in their evaluations of the behavior of others. We mainly focus here on one type of possession: physical objects, but we also discuss some examples involving the ownership of physical place (territory). These two types of possessions are considered here to be under the same rules of ownership.

1.3.1. Possession

We first consider ownership as a dyadic relationship between a person and an object. This relationship is the most obvious when a person is in possession of an object. By possession, we mean physical contact or proximity between an individual and an object.

1.3.1.1. Possession is used to attribute ownership

Contrary to ownership, which is abstract and invisible, possession – considered as physical contact - is visible, and can be perceived by others. Various experiments investigated children's understanding of ownership through their evaluation as a third-party observer of interactions involving objects. Friedman & Neary (2008) showed that young children rely on first possession in their judgments about ownership. When asked "whose object is it?",

children consider that the first character known to possess an object is its owner, from 2 years of age on when they have to discover who is the owner of a ball that has been possessed sequentially by two characters (Friedman & Neary, 2008) , and from 4 years of age on when deciding who should be the owner of an object not previously owned, such as a wild animal (Friedman & Neary, 2009; see also Friedman et al., 2011). When the physical possession of the object is not seen by children but only described to them, it is harder for young children to determine the owner. Adults also use this first possession criterion to allocate ownership when they lack other information (Friedman, 2008). We have already seen that young children also use first possession to attribute the use of an object to one of them and thus resolve conflicts in which they are involved (e.g. Ross, 1996).

First possession is also used in animals to allocate resources. A drive to possess has been described in humans since infancy, as well as in animals. From an evolutionary point of view, possessive behavior towards food and territory is evident for survival. Stake (2004) considers that humans share a core "property instinct", having its roots in an evolutionary stable strategy determining how to allocate resources without entering in a fight. This strategy has to provide a unique winner, and the criterion used to determine possession has to be clearly perceived. The first to be in physical contact with a property can be easily recognized. For example, speckled wood butterflies use a first-in-time-wins rule for the possession of sunspots (Davies, 1978). The first to touch the sunspot will fight harder to maintain possession. If two butterflies touch it at the same time, they would fight longer. For butterflies, actual contact, not only proximity, was required to fight for the spot.

1.3.1.2. Possession is experienced by physical contact

At a basic level, possession is expressed through direct physical contact. Newborns can be seen to express possession by binding onto things. They are already selective in their behavior, and will prefer to bind onto nutritious and comfortable things, looking for feeding and care (Rochat, 1987; 2011a; Rochat & Hespos, 1997).

"To hold" and "to have" an object refer to direct physical contact. "He has an object" is usually used to describe physical possession. Young children use "I had it" as an argument for their ownership claims. Studying the semantics of ownership, Rudmin & Berry (1987) asked adults to judge how much different criteria apply to objects listed by the participants as owned or not owned, and how much these criteria could be used as general arguments for ownership claims. Possession was almost always considered as applicable to the owned objects.

However, even houses and cars were considered to be in possession, thus possession did not mean only physical contact.

In humans, throughout life, owners have at least periodical contact with their possessions, but ownership of property is extended beyond physical contact. Another clue to ownership is a person's proximity to an object.

1.3.1.3. Proximity is sometimes sufficient to manifest possession

When seeing a person close to a valuable object, we will usually consider the person to be its owner and avoid to take the object. The distance observed between the person and the object to consider that the two are connected may depend on context and culture. Animals also recognize proximity as an indication of possession. Russ et al. (2010) studied experimentally recognition of possession in free-ranging rhesus monkeys. In a competitive setting, where monkeys had to choose between two food options, they avoided to take food with which the human competitor had physical connection through a rope attached to the food item (and towards which he simultaneously attended). Monkeys also avoided food that was not in physical connection with the experimenter, but close to him, compared to a more distant food item. Thus physical connection (other than direct body contact), and relative proximity are considered as cues of possession. This respect for possession by proximity is also expressed between conspecifics. Hamadryas baboons (Sigg & Falett, 1985) and longtailed macaques (Kummer & Cords, 1991) do not attempt to take an object from a conspecific that is close to it. We can consider that proximity could be analyzed in terms of peripersonal space so that an object in an agent's peripersonal space, that could be reached and grasped by the agent, would be seen as being possessed by the agent.

Not only visual markers of physical contact or proximity can be used to determine possession, but also olfactory ones. Marking also enables animals to assert their property claims and avoid object or territory appropriation by others (Ellis, 1985). It is the alteration of the object that can be perceived as a manifestation of possession.

We discussed here only the possibility of possession of material objects or territories. The notion of possession of immaterial objects such as ideas or songs remains to be reviewed. A more abstract cue than contact or proximity is control. An owner has control over his property. This notion of control is already present in the notion of possession. Indeed, physical contact and distal physical connection with an object assure to the owner the control

of the object. Also, we can consider that proximity is a cue of possession if the agent is close enough to assure his control over the object. However, the notion of control is wider than the notion of possession.

1.3.2. Control

A person can be seen to control an object if the object's motion, use, or access depends on his actions or decisions.

1.3.2.1. Control is used to attribute ownership

Premack & Premack (1995) mentioned that children seeing a pair of entities, the motion of one being controlled by the other, consider the former as the possession of the latter. When they are mere observers, children seem to recognize control as an indication of ownership. Neary et al. (2009) presented to 3- to 5-year-old children situations were one character controls the use of an object by another character. 4- and 5-year-olds considered that the owner of the object was the character controlling (granting or denying) permission to use the object. When comparing prevention occurring through control or through information, older 3-year-old children attributed ownership to the character preventing the use of the object only when it was done through control.

When first possession and first control compete to attribute ownership of an object previously not owned, the owner is judged by adults to be the person who was probably necessary for the object to become possessed, i.e. the person who established control over the object (Friedman, 2010). In Friedman's study, people judge for example that Mike, who dislodged a wanted gem from a cliff wall by throwing a rock at it, should be the owner, even if Dave took the gem first. Mike was here necessary for the gem to be possessed, but Dave was not as Mike would have taken the gem anyway. Mike was the first to establish control over the gem by dislodging it. The idea that control gives entitlement to ownership is found in various cultures. For example, the Huaorani Indians of Ecuadorian Amazon were used to consider that a "when a Huaorani encounters a rodent and chases it into a hole, the prey belongs to the person who initially found it, although other people may help in flushing out the animal and killing it" (Lu, 2001). In this case, the owner of the animal can be different from the person actually killing and first possessing it. The owner is the person who establishes certainty of capture. Eskimos consider that "a seal which escapes with a harpoon

head in it belongs to the hunter who actually succeeds in capturing and killing the creature", however, "a seal harpooned with a bladder float attached to its line goes to the owner of the float no matter who captures it, since it is reasoned that the capture is made possible by the drag and visibility of the float" (Hoebel, 1954/2006). The involvement in establishing possession of food is also considered by chimpanzees to attribute the resource. The individuals most involved in a hunt, and particularly those most important for securing the capture, get more food than other hunters and non-hunters (Boesch, 1994; Boesch, 2001).

1.3.2.2. Satisfaction by control of the environment motivates to possess

Control over the use of an object is an important dimension in the definition of ownership. Furby (1978) investigated the meaning of possession and the motivation for possession in children (from 6 to 16 years) and adults from different cultures (American, Israeli kibbutz, Israeli non-kibbutz). One of the most important dimensions in the definition of possession for all ages and cultural groups was that of control of possessions. It was also found to be one of the motivations for possession. We acquire possessions because they "have an instrumental function – they make possible certain activities and pleasures. In other words, they enable one to effect desired outcomes in one's environment". The desire to affect the environment would lead to the exploration of the environment since birth, and to attempts to take possession of objects. Acquisition of possessions will induce feeling of efficacy and satisfaction as they represent control over the environment (White, 1959; Beggan, 1991). By exploration and manipulation of the environment, children can feel their causal efficacy, as changes in the environment occur through their control.

Piaget (1936/1952) described infant's motivation for causal efficacy during the infant's "sensorimotor stage". Infants engage in "circular reactions" – repetition of behaviors that caused an event. From 1 to 4 months, infants exhibit "primary circular reactions", involving only the infant's body. From 4 to 8 months, infants engage in "secondary circular reactions", involving also external objects: they shake, hit, kick things to trigger outside events.

1.3.2.3. Infants seek contingency

The desire for being the cause of changes in the environment is expressed in infants' contingency preferences. Very young infants not only perceive contingency, but they seek it (Gergely & Watson, 1999). Newborns and infants change their sucking behavior on a pacifier

when it produces a stimulus, e.g. an image on a screen or a particular sound (DeCasper & Fifer, 1980; Kalnins & Bruner, 1973; Siqueland & DeLucia, 1969; Walton & Bower, 1993). Infants increase the behavior that is contingent with the external event, appearing to like exerting control over the environment. Rochat & Striano (1999) investigated whether newborns and infants not only suck on a pacifier to obtain a contingent stimulus, but whether they modulate their behavior according to the analogy between this behavior and the stimulus. They found that 2-month-olds, but not newborns, modulated their sucking response depending on a contingent sound whose pitch variation was matched or not with the pressure variation they exerted on the pacifier. This suggests that 2-month-olds not only detect temporal contingency, but also explore the causal link between their actions and the effects on the environment. Rochat & Striano argue that 2-month-olds engage in exploration of the self as agent, demonstrating voluntary control.

This control can also be experienced on objects (Rovee-Collier, 1987). In a study by Watson (1972), 2-month-olds modify their kicking behavior when it is contingent with the movement of a mobile. After 3 to 5 days of this contingent behavior, infants smile when they are presented with the mobile whose movement they controlled. According to Watson, smiling is elicited by the recognition of the mobile as a social stimulus. As this kind of stimulus is usually considered in the perspective of an interaction, infants could also be seen as recognizing the relationship between themselves and the mobile; attachment to the mobile could also be hypothesized. Thus contingency appears as a good candidate for being at the origin of the psychological sense of ownership. The experience of causal control on the environment is positive. But, 4-month-olds not only experience joy during the learning of a contingency between their behavior and an external stimulus, they also show anger during extinction of this contingency (Lewis et al., 1990). Infants are not only seeking control of the environment and satisfied when they experience it, but they are also affected by the loss of this control – as adults exhibit "loss aversion" for their possessions (Kahneman et al., 1991; see Brenner et al., 2007, for the distinction between "valence loss aversion" and "possession loss aversion").

Children seek contingency even if it is costly. They prefer an object for which they control the acquisition over a freely available one even if the former is acquired through work (Singh, 1970). Contingency preference is also observed in animals. Singh showed that rats also have preference for earned food (obtained by bar pressing) compared to free food.

The pleasure of contingency can be seen as the source of the sense of ownership of the object whose behavior is contingently dependent on the infant's behavior. Differently, the

pleasure of contingency could be the source of the sense of the authorship of the infant's action. The sense of agency can also be considered as a component of the sense of ownership. Both agency and ownership are linked to the sense of self.

1.3.2.4. Possessions and controlled objects are part of the Self

By 21 months, the claim of possession – "it's mine" – explicitly incorporates the object into the self. This level of self-assertion through possessions develops from the possession by 2-month-olds of the "perceptual effects of their own embodied actions" by the exploration of contingency (Rochat, 2011a). As just mentioned, from 2 months of age, infants explore the self as agent through control over objects (Rochat & Striano, 1999; for reviews, see Rochat, 2001; 2011a; Rochat & Passos-Ferreira, 2008; see also Rochat, 2009a, 2011b, on the development of self-consciousness). Seligman (1975, cited by Furby, 1978), referring to body parts as 'objects', stated that "those 'objects' become self that exhibit near-perfect correlation between motor command and the visual kinesthetic feedback; while those 'objects' that do not become the world". McClelland (1951) suggested that control of possessions can be assimilated to control of body parts. Thus the objects that we control become viewed as part of the self.

Self – with one's own body as a constituent – is one of the categories of human possessiveness (Ellis, 1985). We also behave possessively towards our own personal space, which consists of our space of actions. Tools allow us to extend our body structure – the physical component of self – and thus our space of action. In macaques, some premotor parietal neurons, called bimodal neurons, code both for the somatosensory information from the hand (distal neurons) or elbow (proximal neurons) and respectively for the visual stimuli appearing close to the hand or the space within reaching distance of the hand. Researchers (Iriki et al., 1996; see Maravita & Iriki, 2004, for a review) trained macaque monkeys to retrieve a distant object by using a rake. They showed that the visual receptive fields (vRFs) of the distal neurons are extended to include the length of the rake, and the vRFs of the proximal neurons expand to respond to the new action space of the macaque, which includes the space reachable by the rake. Thus manipulated objects are incorporated into the representation of the body. The change in the body schema of the macaques appears only if the tool is intentionally used and not only grasped. This refers to the importance of the notion of control – possibly expressed by use – to consider possessions as part of the self in humans.

Dittmar (1992) suggested that through the exploration of an object, people experience the relation between the object and themselves, and come to redefine the self, including the object as part of it. Belk (1988) pointed out that our sense of self is diminished when our possessions are unintentionally lost or stolen. Previously controlled objects over which we loose control become separated from the self. Items over which we have control are more likely to be perceived as part of the self and items for which we lack control as non-self (Prelinger, 1959, cited by Belk, 1988; see also Dixon & Street, 1975). Beggan (1992) proposed that people value more their possessions because they want to have a positive image of themselves. Items relevant for the self are better remembered, also are self-owned objects, suggesting their importance for the self (Cunningham et al., 2008). Furby (1978; 1980) found the self to be a component of the meaning of possession. The association between possessions and the sense of self was present in participants from 6 years of age to adulthood, and in various cultures (American and Israeli). Furby discussed the relation between the self and the control of an object by one's actions.

Investment of the self into objects is also recognized by children as part of the relationship between an owner and his possessions. In a real-life scenario with involvement of the participants, Kanngiesser et al. (2010) showed that 3- and 4-year-old children recognize creative labor, but not mere physical possession, as a source of ownership of a borrowed object. The critical component in ownership allocation was the investment of effort in manipulating the object, but control of the object's identity through its transformation also played a secondary role. Adults were more reluctant to transfer ownership to the second possessor who performed labor on the borrowed object, and endorsed the original owner (see also Hook, 1993), but still distinguished between labor and mere possession. In a conflict between a first possessor who abandoned temporarily an object and a second possessor, adults considered the first possessor to have stronger claim of ownership if he invested labor in the object compared to when he did not (Beggan & Brown, 1994).

We have seen that control is used to attribute ownership. Also, control is important in our own feeling of ownership; it is at the basis of our tendency of appropriation. Control seems to be a core concept of the physical self, arising from self-contingency and extending to objects. The notion of self develops through the incorporation of objects to it. Those objects for which we experience familiarity may be seen as more closely related to the self. Possession and familiarity to objects lead us to attachment to these objects. Attachment reflects the intimate relation between an owner and his property. In a study of semantics of

ownership, attachment is found to be a criterion applied to owned objects (Rudmin & Berry, 1987).

1.3.3. Attachment

There is attachment to an object when a person gives sentimental value to the object. The loss of this object would be harmful to the person and lead to a feeling of sadness.

1.3.3.1. Familiarity leads to attachment

Familiarity with an object through time may lead to attachment. This is recognized in the law, through adverse possession, when a possessor receives legal ownership of a land for which the owner shows a lack of possessiveness and defensiveness. Adverse possession is a doctrine that takes a property from the current owner to give it to the current possessor (Stake, 2001). It is based on the assumption that with time a current possessor gets more attached to a territory than the absent owner, and would be harmed more if he had to lose possession of the land.

This doctrine could find its roots in evolution. Several authors showed that birds get "attached" to their territory (Krebs, 1982; Beletsky & Orians, 1989; Tobias, 1997). Resident birds were removed, and then reintroduced only after new birds have settled in their territory. The longer the new birds were in possession of the territory, the more "attached" they got, and the more aggressive they were against intruders. If the new birds stayed long enough in possession of the territory (about 6-7 days in the study by Beletsky & Orians, 1989), they even defeated the previous owners. The authors consider that the birds' willingness to fight to keep possession of the territory can be seen as a willingness to avoid a harmful loss of possession. The idea is that the longer is the stay, the stronger is the "attachment", and the greater would be the loss of possession.

Economists and psychologists have extensively studied this phenomenon in humans. When asked to trade, people are willing to sell an owned object for a higher price than they would be willing to pay to buy the exactly same object. An object acquired through ownership becomes part of a person's endowment and increases in value. This is called the *endowment effect* (Thaler, 1980). The endowment effect is supposed to occur because of the asymmetry between gains and losses. The pleasure of receiving a new object is smaller than the pain of losing an already possessed object. Thus, people exhibit *loss aversion* (e.g.

Kahneman et al., 1991). The endowment effect was also shown to exist in children (Harbaugh et al., 2001; Lucas et al., 2008) and non-human primates (e.g. Brosnan et al., 2007; Lakshminarayanan et al., 2008). Beggan (1992) proposed an alternative explanation to the fact that people value more owned objects. He called this preference for owned objects the *mere ownership effect*, and showed experimentally that it is due to the motivation to increase the value of the self. This effect can be seen about an owned object at any moment and not only when the object risks to become a loss. Contrary to what is considered in the law and was described in bird territoriality about the importance of the duration of possession for attachment, Beggan showed that humans' higher ratings of owned objects are not due to familiarity with the object (longer exposure), but merely to ownership. Reb & Connolly (2007) showed that the endowment effect may be due to feelings of ownership (attachment) elicited by possession and not factual ownership. In children, preference for owned objects has been inferred from a study showing that children prefer an object given to them compared to an object given to a peer (Irwin & Gebhard, 1946).

1.3.3.2. Attachment to special objects (transitional objects) is an early form of possession

The first possessive behaviors towards objects distinct from the self are expressed towards special objects. Around 9 months of age, infants express a particular relationship to *transitional objects*, objects such as blankets or teddy bears having a soothing function (Winnicott, 1953; 1982). According to Winnicott, attachment to transitional objects is normal in children's development. Observation of children's behavior with attachment objects showed that the objects are used to comfort the child and cope with separation, particularly at the time to go to sleep. School-aged children also have attachment objects. Lehman et al. (1995) investigated children's attachments to transitional objects by interviewing 4- to 8-year-old children about their conceptions of attachment objects. About half the participants had an attachment object, while the other half had never been attached to a particular object having a soothing function. For some questions and for the unattached participants, children had to conceptualize attachment in others. The younger unattached children could not say what makes an object special to an attached child. The older unattached children considered that the duration of possession is the characteristic that makes the object special. In contrast, the majority of children with attachment said that what makes their attachment object special is its texture. Attachment objects may allow the children to experience control. Some children

reported that the object does what they say when talking to it. A majority of the younger unattached children were willing to trade the object for a new one, whereas younger and older attached children were not willing to trade their attachment object, almost half of them was not even willing to lend his object to a friend. For attached children, the attachment object is unalienable, as it represents a part of themselves. Attached children are aware that the attachment object of a friend would not help them to feel comfort, but a lot of them are egocentric and consider that their attachment object can have a soothing function for someone else.

In the interview by Lehman et al. (1995), few children considered that their object reminded them of their mother or father. In this study, attachment objects do not seem to represent – at least explicitly - a substitute to parent when the parent is absent, which could depend on the familial context (intact vs. divorced family). On the contrary, Winnicott (1953) suggested that attachments to transitional objects would arise from an association with a parent. Secure attachment between the child and his parents is important for later social relations.

1.3.3.3. Attachment to objects may come from attachment to people

Bowlby (1958, 1969/1982) has proposed hypothetical models of infants' attachment behaviors toward caregivers. Johnson et al. (2007; 2010) investigated experimentally such models of attachment in infancy. More precisely, they studied 12- to 16-month-olds expectations of caregivers' responsiveness to the distress of their child, by measuring infants' looking times toward responsive and unresponsive caregivers. They were interested in differences between securely and insecurely attached infants. The infants were habituated to a separation event, seeing a large ellipse, the "mother", moving away from a small ellipse, the "child", who began to cry. After habituation (once the infants became bored with the event), they were presented with two outcomes. In the *responsive* outcome, the "mother" came back close to the "child"; in the *unresponsive* outcome, the "mother" moved further away from the "child". The securely attached infants looked longer, i.e. were more surprised, at the unresponsive outcome than at the responsive outcome. In contrast, insecurely attached infants looked at both outcomes equally. This study showed that securely attached infants have expectations about caregivers' reactions to the distress of their child. Johnson et al. (2010) also showed that infants have expectations about the child's reaction if the mother comes back near the child but not completely close to him. Securely attached infants expected the child to

approach the mother, contrary to some insecurely attached (*insecure-avoidant*) infants. These results show that infants have mental representations of human interactions including attachment relationships.

To sum up what we have reviewed so far, the concept of ownership implicates aspects of possession, control, and attachment. Possession as a perceptible cue is a plausible elementary component of the notion of ownership. However, it cannot explain the emergence of the abstract sense of ownership (see Blake & Harris, 2011, for a discussion about the representational nature of ownership in children). Indeed, one can physically possess an object (be in physical contact with it) without being the owner, for example, if the object was borrowed or stolen. On the contrary, one can own an object that is not in one's possession (not in contact, nor in proximity), as money in the bank. These remarks also apply to control over an object. Similarly, one can be sentimentally attached to an object without being its owner, and on the contrary own an object to which we do not give any sentimental value. Even if ones own feeling of ownership (as a particular relation between oneself and an object) is often reflected by those three components, they do not explain the social aspect of ownership, i.e. the fact that ownership does not exist unless it is recognized by others. In the following sections, we examine two potential components of the social aspects of ownership: exclusivity and reciprocity (in transfers based on reciprocity in social interactions).

1.3.4. Exclusivity

As we have seen, control over the environment implies control of the object of possession, control of the use of this object and eventually control of the surrounding environment through the use of the object. These actions may involve only the subject and the object once the object is effectively possessed or owned, but one cannot have control over the whole environment. According to Furby (1980), the notion of possessiveness does not emerge solely from the motivation to affect the environment, but from its combination with a restricting environment. Indeed, infants are not allowed to explore their whole surroundings. Adults restrict the access to some places and objects. It is through the distinction between the objects, which the infant is allowed to explore and the ones put out of his reach by his parents that the child comes to consider the former objects as "mine" and the latter as "not mine". What is "not mine" will later be considered as being "yours", when the child will be able to represent others as also having possessions. This leads us to reconsider the definition of

ownership as not only the expression of the self and of a relationship between an individual and an object, but as the relationship between several individuals with respect to an object. As soon as others may interfere with the child's exploration of the environment or manipulation of an object, the relation between the subject and the object of possession involves a social component; it becomes triangular involving self-object-other. As Dittmar (1992) emphasizes, "the relationship between a person and her or his possessions always has reference to other people; s/he can lay exclusive claim to them only because other people do not". Control is important for possession, but to fully understand ownership we need to add the notion of exclusivity. People not only want to control the environment, but they seek exclusive control of it. This control may be applied to a variety of possessions: objects, territories, persons. We mainly examine exclusive control over objects, but we introduce territory claims in animals. Moreover, exclusivity is expressed in the control of access to possessions, which can be considered as control of others. We do not develop this latter aspect. We come back to several points discussed previously, but examine them here considering the social component of the notion of ownership.

1.3.4.1. Owners defend their possessions against others

Possessors defend their belongings against the threat represented by others. At 8 months, infants claim exclusivity over their mother's attention (Rochat, 2011a). They act as if their mother was their possession and they had to control access to her attention by excluding others. As seen previously, they also claim exclusive possession toward transitional objects, which are particular objects of sentimental value (Winnicott, 1982). At 2 years, when children have acquired language, they use possessive pronouns for their property claims (e.g. Hay, 2006; Imbens-Bailey & Pan, 1998; Tomasello, 1998). When saying "this is mine", children seek to assert their possession. Here, "mine" means "not yours". Children claim exclusivity over their possessions in order to exclude others from the use of the objects. For example, 2-year-olds make this claim to defend their toys and exclude their older 4-year-old siblings from using them (Ross, 1996).

A claim of exclusivity can lead to conflicts if others do not acknowledge it. A lot of conflicts among infants and children are about possessions (Dawe, 1934; Dunn, 1988; Hay & Ross, 1982; Ramsey, 1987; Shantz, 1987; but see Licht, 2008). 2-year-olds cite first possession to win disputes about current use but ownership arguments prevail over possession ones (Ross, 1996). Children ($2_{1/2}$- to 5-year-olds) exhibit more possessiveness and

defensiveness of a toy – they are more likely to maintain possession of the toy and prevent others from using it – when they are told that they own a toy than when they are told that the toy belongs to the class (Eisenberg-Berg et al., 1979; Eisenberg-Berg et al., 1981).

When older children (from 3-4 years of age) are mere observers of a situation involving ownership, they recognize owners' claims of possession. Second possessors are judged negatively if they do not return an object to the original owner who requests it – claims his control of the other's use of the object (Hook, 1993). Children protest if non-owners want to keep or throw an object when the owner is not looking; non-owners are not allowed to control the object (Rossano et al., 2011; Vaish et al., 2011). When a character steals an object, he is not allowed to keep it or take it home (Cram & Ng, 1989; Blake & Harris, 2009). Kim & Kalish (2009) investigated children's (4-5-year-olds and 7-8-year-olds) and adults' evaluation of who detains the control over property in a dispute. Subjects were presented with two characters and an object. Either the owner or the non-owner proposed an action on the object, and the other character objected. Subjects had to decide who can control the object (through novel use, alteration, throwing, lending). When subjects were asked who should decide when the non-owner proposed an action and the owner objected, the owner was given control at all ages. So, participants considered that non-owners are not allowed to use the owner's possession against his wishes, i.e. the owner has exclusive control over others' access to or use of his possessions. Participants were also asked who should decide when the owner proposed an action and the non-owner objected, thus they had to evaluate a situation were the non-owner intervened in the owner's use of his possession. We discuss this situation in the next section about "deference to possessors".

The exclusive control over possessions is also expressed in granting and denying permission of use to others. Newman (1978) (cited by Faigenbaum, 2005) reported the observation of a 3.5-year-old child who denied permission to another to play with an arrangement of boxes she made. Neary et al. (2009) investigated whether children take into account who controls another's use of an object to infer who is the owner. Two characters and a toy were presented to the children. One character wanted to play with the toy, and the second character permitted or prevented him to use the toy. Children had then to decide whose toy it was. In a first experiment, 4- and 5-year-olds identified as the owner of the object the character who granted or denied permission to the other to use the object, whereas 3-year-olds made no distinction between the two characters. In a second experiment, older 3-year-olds but not younger ones, considered the owner to be the character who prevented the other from using the object when prevention occurred through interdiction, i.e. control of

permission, but not simply information. The ability to determine ownership from control of permission seems to develop in children between 3 and 4 years of age, at least when they are not involved in the interaction. From 3.5 years of age on, children seem to consider control of another's access to objects as defining ownership. Younger children and infants may be sensitive to social control, but attribute it to dominance.

In animal control of the territory, there is necessarily the involvement of another individual. Animals mark the territory to inform others of their claim for that territory. Control of territory is a defensive behavior involving a resident and an intruder. Residents control the access of others to "their" territory. Usually, physical characteristics or hierarchy of competitors are determinant in disputes among resources, but in territorial conflicts, the resident mostly defeats the intruder (e.g. Maynard-Smith &Parker, 1976). This behavior has been reported in a variety of species. For example, as already mentioned, Krebs (1982) reported that great tits fight more and longer if they have been in possession of the territory for a longer period of time. In order to avoid costly fights, this status of residency is often recognized by others, who defer to residents (see Stake, 2004).

1.3.4.2. Non-owners recognize and respect owner's claims of possession and ownership

Children claim exclusivity over their possessions and defend them, but they also appear to recognize and respect others as possessors. At 6 month of age, infants do not fight over objects. When two peers touch the same object, the first possessor tends to retain it (Hay et al., 1983). First or previous possession gives entitlement to use. Older children follow this first or prior possession rule to resolve conflicts, recognizing the right of exclusivity to the first or prior possessor. Children tend to win a conflict over the use of an object when they were in initial possession of the object (Ross, 1996; see also Ramsey, 1987; Weigel, 1984; Bakeman & Brownlee, 1982). According to Newman (1978, cited in Faigenbaum, 2005), recognition of ownership is also expressed in others' requests to owners of permission to use their possession. Request behaviors are also seen in animals (Ellis, 1985).

In the animal kingdom, the principle of the lion's share often prevails. Weaker animals do not have access to possessions of stronger ones. Non-human primates usually defer to the dominant member of the group, but under certain circumstances they respect the possessor's claims of exclusivity. They do not attempt to take an object from a conspecific (Sigg & Falett, 1985; Kummer & Cords, 1991) or a human (Russ et al., 2010) that is close to it. Proximity is

recognized as a cue of ownership. Ellis (1985) suggests that marking plays the same role. It "tends to reduce the probability of subsequent possessive behavior toward the object by other conspecifics" because others seek their own exclusivity. Kummer & Cords (1991) argued that real proximity and capacity to hold the object is necessary to assure that others will not threaten one's possessions. So, some animals seem not to respect the owner-object relationship when the owner is absent. On the contrary, human children consider absent owners (Tomasello, 1998; Blake et al., 2010), and come to recognize owner's rights to control and exclusivity independently of the proximity with his possessions.

In the study by Kim & Kalish (2009), subjects had to judge whether non-owners can interfere with the owner's use of his possessions or have to defer to owner's wishes about the use of his possessions (see also Neary, 2011). When an owner proposed to execute an action on his possession and a non-owner objected, 4-5-year-old children were at chance in deciding who has control over the object. So, according to 4-5-year-olds, the owner does not have a complete right of exclusivity when it concerns his own use of the object, non-owners are allowed to challenge the owner's control over the use of the object. We have seen before that when it is the non-owner who proposed the action and the owner who objected, children considered that the owner could decide. Thus, the owner's right to control other's use of his property seems to be stronger than his right to control the object. This applies particularly to a situation where ownership is transferred. In the absence of ownership transfer, an owner has the right to control his property. It gets more complicated for children when there is a transfer of ownership and a quarrel about the control of the transferred object. The original owner may be seen as retaining some control of the object even in the case of a legitimate transfer.

1.3.4.3. Non-owners enforce owner's property rights

Non-owners not only respect an owner's claims of ownership, but they also act on behalf of owners to protect owners' rights against transgressions. From 3 years of age, children protest when an actor takes and tries to throw away another's piece of property (Rossano et al., 2011). 3-year-olds also protest against and tattle on a transgressor who destroys another's property (Vaish et al., 2011). Children enforce the property rights of a third-party by intervening against a property transgression.

This behavior is also observed in animals. Heinrich (1999) described how ravens form groups to attack intruders (humans or other ravens) entering or wanting to feed or to nest in

their territory and even in the territory of neighbors. Protecting another's property can be an instance of reciprocal behavior.

Exclusivity seems to be a core concept, present very early. In humans, we only considered ownership of a single individual, who excludes all other individuals from the use of his object. We have just seen that in animals (at least in ravens), when a territory belongs to a group of individuals, they all protect it against intruders. It would be interesting to investigate whether children can also have a concept of joint ownership, where they share an object within their group but exclude individuals of another group. Already, when children are told that a toy belongs to the class, they share it more than when they are told that it is their own toy (Eisenberg-Berg et al., 1979).

We have seen that children defend their possessions, respect other's claims of possession, and help owner's to protect their possessions from an early age. They seem to have an implicit understanding of property rights. However, it is harder for them to understand that property rights may be transferred.

1.3.5. Transfer of ownership, exchange, and reciprocity

There is transfer of property when an object possessed by an individual A comes to be possessed by an individual B. However, a transfer of property does not mean that there is transfer of ownership. For ownership to be transferred, an owner has to intentionally give his property rights to another person. An illegitimate transfer of property, such as in the case of theft, does not constitute a transfer of ownership; the legitimate owner is still the person possessing the object before the transfer. In the case of an exchange, there is at least two transfers, which are not necessarily property transfers. The notion of exchange includes a notion of reciprocity. A first transfer from A to B has to be reciprocated by a second transfer from B to A.

1.3.5.1. The full concept of ownership transfer is acquired late

A lot of early social interactions between peers involve objects. Those interactions do not only imply competition over resources, but also cooperation and sharing. Property interactions depend on children's claims of exclusivity to their possessions and on the recognition of these claims by others. Making the distinction between one's possessions and

those of others - acknowledging that others are also possessors - is important in transfers of ownership. There is a variety of possible transfers of goods. Understanding intentions is crucial to distinguish between legitimate and illegitimate transfers of property. Winegar & Renninger (1989) observed that 3- to 4-year-old children accepted slightly more to take offered objects if the giver had prior possession of the object. This result suggests that they understand that in order to transfer an object one has to be the legitimate possessor. Children were also more likely to initiate offers if they had prior possession of the object. In Furby's study (1978), the acquisition process allows to define ownership. It shifts from passive acquisition (being given an object) at 6 years of age to active one (taking an object) at older ages, showing the growing importance of control not only in already possessed objects but also in the way of acquiring them.

The majority of studies investigating children's understanding of ownership as observers involved transfers of objects between two characters. Researchers were principally interested in discovering when children accept transfers of ownership, eventually resulting in transfers of control. Hook (1993) found that children do not accept that the original owner looses his right to control the object in the case of gift-giving before 8 years of age. Cram & Ng (1989) focused on the right of control of the recipient and also found that children younger than 8 years of age refuse to the recipient of a gift the right to keep and take the object home. Kim & Kalish (2009) reported that even if the original owner of a legitimate transfer seems to retain control over the object, some transfer of ownership is acknowledged from 4-5 years of age on, when children are asked who is the owner. In all observations and experiments about the understanding of ownership, it is important to distinguish between the label of ownership ("A owns P") and what it means at different ages.

In the context of a birthday present, ownership transfer of the gift is accepted by 4-year-olds; the recipient is considered as the owner and allowed to keep and take the object home (Blake & Harris, 2009). Even 3-year-olds consider the recipient as the owner if the birthday present is wrapped (Friedman & Neary, 2008). In the absence of a ritualized context (as gift-giving at birthdays), one need to read the intentions of the characters involved in the transfer of an object in order to determine if it is legitimate and thus accompanied by the transfer of ownership, which may be difficult for the younger children.

Before accepting transfers of ownership, children exhibit a first possessor bias: they attribute ownership (Friedman & Neary, 2008; Blake & Harris, 2009) or control of others' use of the object (Hook, 1993) to the first character in possession of the object (i.e. the original owner), independently of the type of transfer – gift-giving, finding, borrowing, stealing (but

see Kim & Kalish, 2009). Apart from the case of transfer of a wrapped gift, but still in the context of a birthday present transfer (of a non-wrapped gift), children can accept a definitive transfer of property at 3 years when not seeing the object possessed by the gift-giver before the transfer, i.e. not seeing a first possessor before transfer. They also consider the gift-recipient to be the owner of the object when he is not seen in possession of the object, neither is the gift-giver (Neary & Friedman, 2009).

As children acquire the concept of ownership transfer – with transfer of the rights to control and exclude – only late, it suggests that the notion of transfer is not a primitive one. In adults, unidirectional transfers of ownership without anything in return (whether it is another object or social recognition) are rare. People expect transfers to be reciprocated. Thus, the primitive component of transfers of ownership may be found in exchanges.

1.3.5.2. Exchange is based on mutual agreement and reciprocity

In order to enter legitimate transactions, children need to understand the rules that apply in exchanges. According to Faigenbaum (2005), exchanges have three characteristics: "(1) at least two individuals in mutual interaction participate; (2) at least one of the individuals is entitled to a certain item (that is, is its owner or legitimate possessor); (3) there is a voluntary transfer of such item from one individual to another". Exchanges are considered here as legitimate transactions. Faigenbaum reports that children make exchanges on the basis of an explicit contract – with mutual agreement and voluntary transfer – from 3 years of age on. At that age, they also give more complex justifications for ownership compared to their earlier "it's mine" assertions. At 2 years of age, children consider their possessions as inalienable; it is only by 3 years of age that they come to see them as alienable (Rochat et al., 2009; Rochat, 2011a). Then, children can enter the world of negotiation (Rochat & Passos-Ferreira, 2008).

Acquisition of property through exchanges is regulated by reciprocity. Reciprocity triggers early exchanges in humans (Harris, 1970; Levitt et al., 1985; Olson & Spelke, 2008; Staub & Sherk, 1970). Expectations of reciprocal and fair exchanges are also observed in animals (e.g. Brosnan & de Waal, 2003). Anthropologists described small-scale traditional societies as relying on a system of "gift". In this system, gifts confer social power and are expected to be reciprocated (Mauss, 1952/1967; Malinowski, 1932). The social aspect of gifts is what underlies exchanges among young children. In the first year, infants are already willing to offer objects to others, even if they have difficulties actually relinquishing them (Hay & Cook, 2007). 18-month-olds engage in spontaneous sharing. These offers are made to

engage the other in the interaction, rather than for strict reciprocity (Faigenbaum, 2005). The exchange creates a social bond. Exchanged goods can be tangible, but also intangible as a promise or a turn in a game. Moreover, children's taking turn in a game or adult's taking turn in a conversation are other forms of reciprocity. The underlying basis of reciprocity in transactions may be found in social reciprocity (which could also be related to infant's seeking of contingency that we discussed earlier).

1.3.5.3. Reciprocity emerges in early social interactions

Alternating interaction is suggested to be a precursor of material reciprocity of exchange. Rochat (2007) proposes that social reciprocation allows infants to become intentional and eventually to see others as intentional agents. "Social reciprocation is the mechanism that allows infants to dissociate first and third person perspectives on objects, people, and also on the self", which are all necessary components of the understanding of exchanges (see also Rochat & Passos-Ferreira, 2008).

At 2 months of age, infants display smiling as a social instrument (and not only an automatic response) and engage in reciprocal smiling in face-to-face exchanges, showing primary intersubjectivity (Stern, 1985; Trevarthen, 1979). Infants consider that these early social exchanges follow rules. 2-month-olds respond negatively if a face-to-face interaction is interrupted by the adult "freezing" (Tronick et al., 1978; see also Rochat et al., 2002; and Rochat, 2001). At this age, infants and mothers also exhibit turn-taking in sounds and gazes (Kaye, 1982). From 4 month of age on, infants are sensitive to the timing and organization of protoconversations (Rochat et al., 1999).

At 9 month of age, infants start pointing to direct another's attention on an object, or to ask for an object. They engage in joint attention with others about objects, with the emergence of secondary intersubjectivity (Tomasello, 1995; Tomasello, 1999; Trevarthen, 1979). As exchanges require mutual agreement, the development of communication is an important step. The development of these early social reciprocal exchanges leads 2-year-olds to understand the social power of objects.

We considered that exchanges are based both on reciprocity and mutual agreement. We have seen that the notion of reciprocity in exchanges of goods may emerge from social reciprocity. The notion of mutual agreement refers to the tacit or sometimes explicit rules/norms that everybody has to follow regarding the rights attached to ownership and/or

transfer. It could find its roots in joint action, based on shared intentionality, which needs the understanding of goals and intentions (e.g. Tomasello et al., 2005; Behne et al., 2005). This last normative/contractual aspect is needed to arrive at the mature concept of ownership.

1.3.6. Summary

The meaning of ownership is not apparent in the label "own". It can differ between adults and children. If ownership may be considered as a relationship between an owner and an owned object, the nature of this relationship needs to be defined. We examined five notions that specify the meaning of ownership and are potential candidates for the emergence of ownership: possession, control, attachment, exclusivity, and reciprocity.

Possession is a visible indication of ownership. First possession is considered as a justification for ownership, and avoids cost fights in animals and children. However, the fact that an object is held in an agent's hand is not a sufficient condition for asserting that the agent owns the object. On the contrary, it is not necessary to see an object in an agent's hand for believing that an absent object may be an agent's possession. We examined thus another cue indicative of ownership : control.

Control of an object is an important cue to determine an owner or to define one's own ownership. Infants start to explore the environment and the effects of their actions very early. They seek contingency between their behavior and stimuli in their environment and express positive affect when they experience it. Possession, particularly through control, also appears to be linked to the self. First "objects of possession" by infants are the effects of their own actions, such as the sound that they produced or the movement of a mobile that they kicked. The notion of causality (linked to the notion of control) is important for attribution of ownership. It would be interesting to explore causality for itself as a basic component of ownership.

People get attached to objects that are close to them. Psychological ownership gives more value – because of higher attachment – to the objects considered as owned. Around 9 month of age, infants express a particular relationship of attachment to an object having a soothing function. Attachment to caregivers may be at the basis of attachment to objects, and a potential candidate for the emergence of ownership. Time also leads to attachment. This is recognized in law, when a squatter receives legal ownership of a land for which the true owner does not act possessively and defensively. The owner of an object has to defend it against others.

This notion of exclusivity was also examined. It is important to notice that this central notion of ownership is present early in children. Owners make possession claims and defend their possessions in disputes. In animals, the resident will fight harder for his territory, which leads others to respect his possessiveness. Children also recognize people's claims of possession and of control of access to possession by others. The notion of social control has several dimensions. It is expressed in (1) control of persons seen as property (e.g. children, slaves), (2) control of others' access to an object, (3) control of others' behaviors or expectations via control of an object. We only examined the second aspect of social control. The other aspects would also need to be detailed. One would also benefit from examining the link between social power through possession and dominance. To avoid possession conflicts, rules are applied. These rules determine who are legitimate possessors and how to participate in exchanges.

From 3-4 years of age on, children recognize a transfer of ownership in the transfer of a gift given at a birthday party when asked who is the owner. At 4-5 years of age, children accept that the recipient of a birthday gift gains rights of control over the object. But it is not until 7-8 years that children accept that a giver or seller relinquishes his rights of control. It looks like unidirectional transfer of ownership is not a common situation. A more primitive notion seems to be the one of exchange. An exchange has to occur through voluntary transfers with mutual agreement. At the core of the exchange is the notion of reciprocity. It can be strict reciprocity with an exchange of two material goods or an exchange involving a social counterpart. In infants, the importance of exchange lies in the social bond that it creates. We examined the notion of social reciprocity as a primitive component of the concept of ownership.

We have seen that physical possession can be a cue to determine ownership; control and attachment are both crucial for the feeling of one's own ownership, but the notion of exclusivity needs to be added to these latter to understand ownership in a social context. To come to understand ownership transfers, the notion of reciprocity is a core concept. What is missing to these components to have a full adult mature understanding of ownership? Ownership, or property, is a contract between several persons. This contract is constitutive of rules that the different parties have to follow. The owner has a set of rights: right to use the object, right to exclude others from the use of the object, and right to transfer his property rights to someone else (Snare, 1972). The non-owners have the duty to respect these rights: they are not allowed to interfere with the owner's use of his object, they are not allowed to

use, take or transfer the object without the owner's consent, etc. The rules may be implicit or explicit and depend on the type of object or owner. The emergence of these rules may be dependent of the culture, but in any case ownership is regulated by some rules, that are defining a contract between persons with respect to objects. Young children already understand the notion of norms. At two years of age, they understand the normative implications of rules in games (Rakoczy, 2008; Rakoczy et al., 2008). At three years of age, also the normative structure of property rights is understood (Rossano et al., 2011). Rossano and colleagues tested children's enforcement of property norms when they are in presence of transgressions of property rights. They have shown that 3-year-old children understand that taking and throwing away another's piece of cloth is wrong; children protest against these transgressions, even when they are not the victims of the transgressions but are seeing them performed against a third party. It remains to be tested whether this understanding generalizes to other types of transgressions and other types of objects and owners. Moreover, the fact that young children understand and enforce property rights does not necessarily mean that they understand that property rules are made by people, i.e. that property is a convention (Kalish & Anderson, 2011). Also, the mature notion of contract may be acquired late. This notion of contract is important to allow ownership to extend in time and space. Indeed, the owner does not need to be constantly keeping control of his possessions. A contract allows regulating social interactions, and an important aspect of a contract about ownership is to regulate what happens after a transgression of property rights. Figure C1-1 summarizes the hypothetical components underlying the notion of ownership.

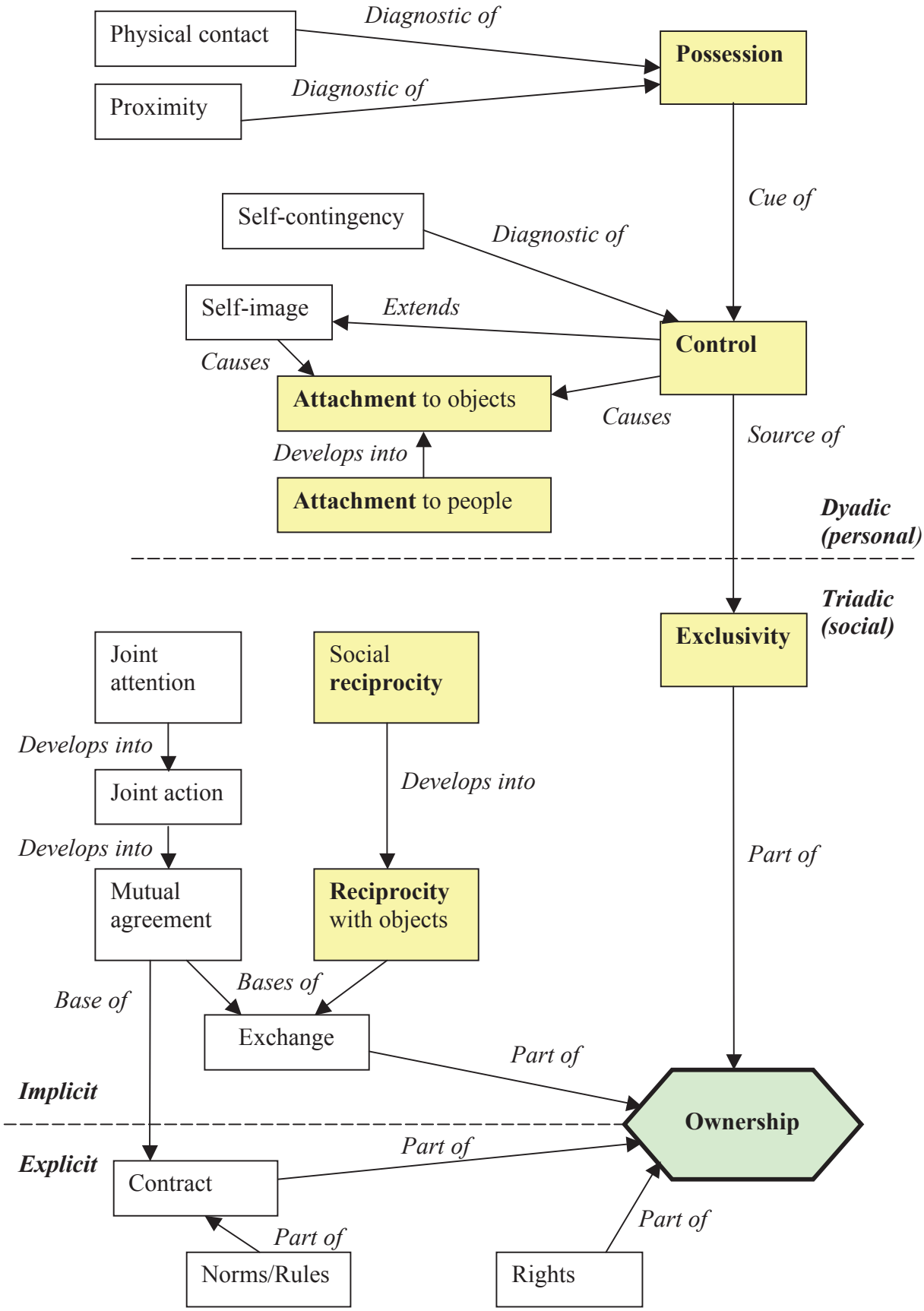


Figure C1-1. Hypothetical synopsis of the components (in yellow) of ownership (in green) and their development.

1.4. Conclusion

Interactions involving objects, and thus ownership, are present in our lives since infancy. We looked at the development of the notion of ownership. Very early infants can be seen as having a minimal sense of ownership, by preferentially latching onto soft objects. Infants seek appropriation of objects in their surroundings. We examined different basic components of the sense of ownership: possession, control, attachment, exclusivity, and reciprocity. At the end, one important aspect of ownership is its social part. Ownership can exist only if people have a contract concerning it. Ownership is normative. These norms regulate social behaviors: what one is allowed to do with regard to ownership, and what happens if ownership rules are transgressed. Ownership transgressions constitute moral transgressions. One could wonder whether the notion of attachment, one potential basic constituent of ownership, is not at the basis of the moral aspect of ownership manifested in ownership transgressions. Ownership transgressions are considered as moral transgressions because they are transgressions of rights, but also because they are harmful. In an ownership transgression, harm occurs because the owner is attached to his property. In the next section, we examine the link between the sense of ownership and the sense of morality, and discuss studies about children's evaluation and understanding of ownership transgressions.

2. The moral dimension of ownership

Claims of ownership are taken into account from a young age. However, transgressions of property rights do occur. Ownership transgressions can be seen as conventional norm transgressions (such as transgressions of game rules or of social conventions), but they are also moral transgressions, as part of transgressions of human rights. A lot of research about children's understanding of morality has been conducted through the investigation of children's moral judgments about agents involved in moral transgressions. We first introduce moral studies, and then discuss studies involving ownership transgressions.

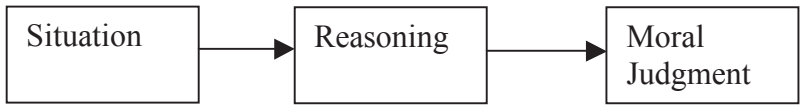
2.1. Morality

2.1.1. Basis of moral judgments: Emotion versus Reason

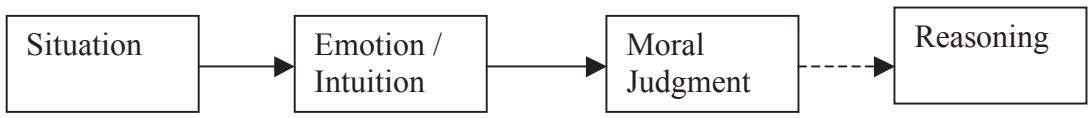
Talking about morality, we have to introduce a classical debate about the origins of our moral judgments. In this debate, two schools of thought are opposed: one arguing that morality lies in emotions and the other that it lies in reason. Hume (1776/1965) argued that morality was grounded in emotions. He considered that good acts lead to feelings of approval and bad acts to feelings of disapproval. These feelings were supposed to arise from our sympathy towards others (i.e. our sharing of others' feelings). According to Hume, without emotions, reason alone would not prevent us from performing immoral actions. In opposition to Hume, Kant (1785/1959) argued for the importance of reason in morality and developed his rationalist ethical theory. He considered that moral actions are motivated by, and moral judgments arise from practical knowledge of what one ought to do, thus morality depends on a normative principle reached through practical reasoning.

These two lines of thought debated by philosophers are also found among moral psychologists. The first psychologists studying the origins of our moral faculties were rationalists. The developmental psychologists Piaget (1932/1997) and Kohlberg (1969; 1976) considered moral judgments to be based on reasoning processes (see Figure C1-2a). They argued that the development of moral judgment is based on the development of cognitive skills. According to them, children acquire progressively knowledge of moral principles. Piaget and Kohlberg tested children's moral understanding through their ability to offer justifications of their moral judgments. However, we cannot always give a justification to a moral judgment. Haidt (2001) called this phenomenon "moral dumbfounding", and proposed

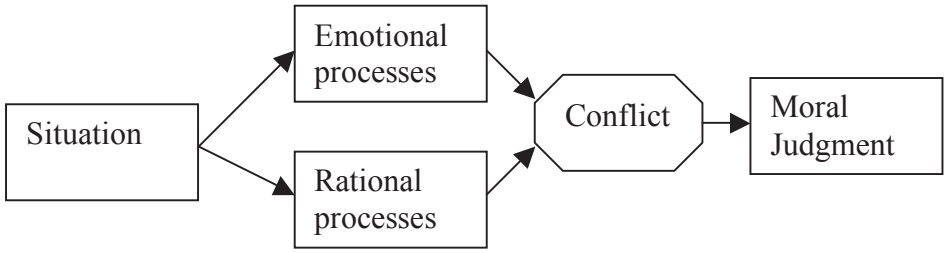
that our moral judgments are based on intuitive emotional responses. According to social intuitionists, moral judgments are intuitive, automatic, rapid and unconscious. The Social Intuitionist Model (Haidt, 2001; 2007) postulates that a moral event gives rise to emotions, which then lead us to our moral judgments of the event and/or agents involved; reasoning only occurs post-hoc to justify the judgments (see Figure C1-2b). The crucial role of emotions or reasoning in moral judgments is still debated today. However, in the last decade, a more integrative view of morality has emerged, in which both emotions and reasoning are considered to play important roles in the formation of moral judgments. The most important model including emotions and reasoning is the Dual-process Model of moral judgments (Greene et al., 2001; Greene & Haidt, 2002; Greene, 2009). Greene et al. (2001) investigated the activation of brain regions associated with emotional processes in response to judgments of moral dilemmas. The dual-process model, resulting from these studies, proposes that deontological moral judgments (concerning "norms" about how to treat another individual, e.g. it is bad to kill) are based on automatic emotional responses, whereas utilitarian or consequentialist moral judgments (concerning the "greater good", e.g. it is more acceptable to sacrifice 1 rather than 5 persons) are driven by controlled cognitive processes (see Figure C1-2c). Interestingly, these two types of processes, emotional and rational, can be in competition when there is a conflict between an emotional response (emerging from deontological aspects of the situation) and utilitarian considerations (Greene et al., 2004). To deliver a utilitarian judgment, people need to inhibit their automatic emotional response with the use of cognitive control. Another model including intuitions and controlled processes is the Affect-Backed Normative Theory of moral judgment (Nichols, 2002). In this model, moral judgments depend on norms prohibiting certain actions and on the emotions produced by those actions. Finally, the Universal Moral Grammar Model (Cushman et al., 2006; Hauser, 2006; Hauser et al., 2006; Mikhail, 2007) proposes that our moral judgments are based on core intuitive moral principles, but does not consider intuitions to be emotional. In this model, both the emotional response and conscious reasoning occur post-hoc (see Figure C1-2d).



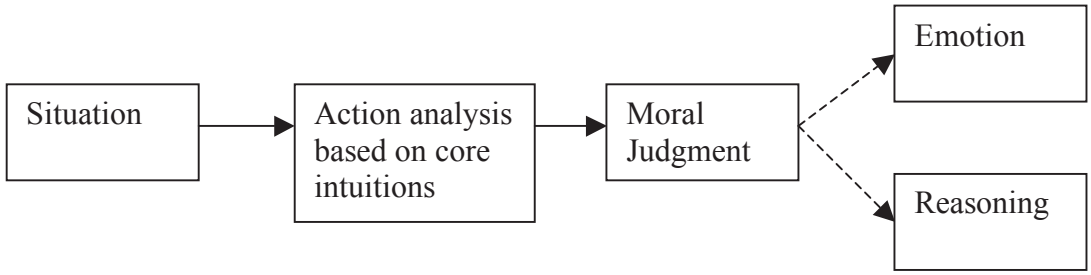
a. Rationalist model



b. Social intuitionist model



c. Dual-process model



d. Universal moral grammar model

Figure C1-2. Simplified representations of four models of moral judgment: (a) Rationalist model, (b) Social intuitionist model, (c) Dual-process model, (d) Universal moral grammar model.

2.1.2. Children's evaluations of moral transgressions

2.1.2.1. First studies in moral development found a late moral faculty

Piaget (1932/1997) is one of the pioneers in the study of moral development. He considered that morality is based on reasoning and develops through the maturation of children's cognitive functions and through children's interaction with the social world. Piaget studied morality in children using their justifications of their moral judgments. He considered that there are two stages of moral development. Until 7-8 years of age, children are in the first stage of morality (morality of constraint). In this stage, children strictly respect rules dictated by authorities such as adults. They consider theses rules as given and accept that authorities have full right to reward those respecting the rules and to punish those transgressing them. Also, at this stage, children base their moral judgment on the consequences of an action, without considering the intentions behind it. Piaget considered that it is through peer socialization rather than adult intervention that children acquire the notions of respect for others (by taking another's perspective), equality and reciprocity, which lead them to the second stage of moral understanding. During the interactions of the transitional period, children experience that rules can be decided and changed by the group. Children reach the second stage of morality (autonomous morality) around 11-12 years of age. In the second stage, children consider that moral rules are based on social agreement and are modifiable. They also consider that adults are not always fair in their punishments. Finally, they do not base their moral judgment anymore on the consequences alone but instead also consider the agent's intentions.

Following Piaget, Kohlberg (1969; 1976) also accepted a rationalist perspective in his investigation of children's moral development. He studied how children resolve hypothetical moral dilemmas through their reasoning. In his most known dilemma, Heinz is faced with the decision to steal a very expensive drug to save his wife's life. Children were asked what Heinz should do. Kohlberg proposed that children's morality develops through six stages, merged into three levels. In the first level, the pre-conventional level, children base their judgments on egoistic considerations, and consider that good acts are rewarded and bad acts are punished. In the second level, the conventional level of moral reasoning, children take into account social values and laws. In the third level, the post-conventional level, children's judgments are based on moral principles and ethics.

Piaget and Kohlberg set the basis for the study of moral development. However, recent studies showed that children have a much earlier understanding of morality than assumed by Piaget and Kohlberg. As we develop further below, Turiel (1983) showed that young children do not consider that moral rules depend on authority; on the contrary they consider moral transgressions as wrong even if an authority figure allows the transgression. Children have intuitions about what kind of acts are bad.

2.1.2.2. Moral versus conventional transgressions

The distinction between moral and conventional transgressions was introduced by Turiel (1983). Moral transgressions are defined as actions that affect the welfare of others, involve injustice or violation of rights (for e.g. hitting someone or pulling someone's hair). In contrast, conventional transgressions affect the social order, but involve no harm, injustice or violation of rights (for e.g. going to school wearing pajamas). The distinction between moral and conventional transgressions is assessed through the evaluation of their permissibility, seriousness, dependence on authority, and generalizability. Moral rules are obligatory, generalizable and independent of authority. Conventional rules are context-dependent, contingent on social rules and authority commands. Moral transgressions are considered as worse and less permissible than conventional transgressions (e.g. Turiel, 1983; Smetana, 1983). Children are able to distinguish between these two types of transgressions by 3 years of age (Smetana, 1981; Smetana et al., 1993), and do so in different cultures (Nucci et al., 1996; Yau & Smetana, 2003). Turiel and colleagues consider that it is through social interactions that children learn the difference between moral events (concerned with welfare, justice and rights) being intrinsically right or wrong, and events that are considered as right or wrong depending on a social consensus (e.g. Nucci & Turiel, 1978; Nucci, 1985).

However, children's ability to distinguish between moral and conventional transgressions in the tests of Turiel and colleagues is not sufficient to ensure that they have a true understanding of morality. Indeed, the presence of a victim of harm in moral transgressions but not in conventional transgressions might be sufficient to allow the distinction between both types of events. Moreover, the victim of a moral transgression is usually presented as crying. Thus, in these studies, moral and conventional transgressions differ by the presence of a negative emotional display, indicating the presence of harm. Based on this assessment, it is important to control that children's distinction between moral and

conventional transgressions does not only reflect the presence or absence of harm, and of negative emotional cues.

2.1.2.3. Perceived emotions and the evaluations of harm

It is important to know whether the presence of harm is underlying the distinction between moral and conventional rules. Tisak & Turiel (1984) therefore studied moral and prudential rules, whose transgressions both involve harm. A moral transgression involves harm to another. In contrast, in a prudential transgression, a character harms himself out of his own carelessness. For example, he runs in the rain, falls and cuts his knee. The authors found that children (from 6 years of age on) distinguish between the two types of rules and consider the transgressions of moral rules as worse than those of prudential ones. This shows that they not only consider the presence of harm in their evaluations, but also take into account the presence of a harmful agent (harming someone else on purpose).

Another question is whether children's evaluations of moral transgressions are not only based on the presence of a negative emotion. Leslie et al. (2006) investigated children's evaluations in three situations: moral transgression (Catherine pulls Sally's hair, which makes Sally cry), conventional transgression (Johnny goes to school wearing his pajamas) and "cry baby" scenario (Tammy eats her own cookie, which makes James cry). In both the moral and "cry baby" stories, a character's emotional distress is preceded by another's action. However, 4-year-old children (and autistic children) distinguished between these two displays of distress. They considered the action preceding crying more positively in the "cry baby" condition than in the moral condition, which suggests that they do not base their evaluations only on emotional cues but do take into account whether the emotion is justified, i.e. following an action that could harm another. Moreover, Weisberg & Leslie (2009) have shown that young children recognize that moral transgressions involve harm, even if it is not expressed by an emotion. Indeed, they found that 4-year-old children distinguish between moral and conventional transgressions even in the absence of an emotional outcome following the moral transgression.

2.1.2.4. Early evaluations of physical harm

The scenarios presenting moral transgressions often involve the presence of physical harm (e.g. hitting someone). The previously discussed studies showed an understanding of

moral transgressions from 4 years of age on, when children were asked to give an explicit moral evaluation of the situations (e.g. "Was that a bad thing to do?"). Importantly, this understanding was shown not to rely on the perception of superficial distress cues. With implicit measures, recent studies (also matching the presence of harm and/or distress between the compared situations) showed that transgressions implying physical harm are evaluated very early in infancy. They tested infants' social preferences for harmful and harmless agents. Buon et al. (in revision) investigated 10-month-olds preferences towards agents pushing down or comforting a girl. More infants chose the teddy bear presented by an agent who comforted a girl (and pushed down a rucksack) instead of the teddy bear presented by an agent who pushed down a girl (and lifted up a rucksack). In this experiment the amount of positive and negative cues was the same in both conditions. So, the infants could not base their evaluation on a simple association between the agent and the situation with more cues of positive or of negative valence. However, in this study, the emotional consequences (expressed by the girl) were different in each condition: positive in the comforting condition and negative in the pushing down condition.

Buon et al. (2008) presented to 10- and 30-month-olds situations with the same emotional outcome (a crying character). In one situation, the victim fell down after being hit by another character (intentionally harmful agent), who had a causal role in the victim's suffering and acted on purpose. In the other situation, the "victim" (crying character) fell by himself and another character (coincidentally present agent) had no causal role in the former's suffering. The results showed that infants prefer to take the teddy bear presented by the coincidentally present agent rather than the intentionally harmful agent. Thus, very early, infants are able to evaluate harmful situations with equivalent emotional displays.

2.1.2.5. Summary

First studies about children's moral development (Piaget, 1932/1997; Kohlberg, 1969; 1976) found a late moral faculty, around 11-12 years. More recent studies found that children can explicitly distinguish transgressions of moral and conventional rules, evaluating the former as worse, already at 3 or 4 years of age, even when the presence of harm or distress is controlled for. Recent studies about infants' social evaluations of moral transgressions provide evidence for a very early capacity (from 10 months of age) to evaluate transgressions implying physical harm. Many studies of moral transgressions involved physical harm, however some studies did consider other transgressions (e.g. theft) that involve ownership.

2.2. Ownership transgressions

Many studies involving transgressions of ownership have been discussed in the perspective of moral development. Here, we discuss them in the framework of the development of the concept of ownership.

2.2.1. Variability in investigations of ownership transgressions

When ownership transgressions occur during children's interactions, they give rise to a variety of reactions. When children are victims of ownership transgressions, such as stealing, they defend themselves by protesting, justifying their claims of ownership, attempting to recover the stolen object, or attacking the offender (e.g. Ross, 1996; Hay et al., 2011). They also tattle on the transgressor (Ross & den Bak-Lammers, 1998 ; Ingram & Bering, 2010), which consists in reporting the transgression to a third-party, usually an adult, with the intention to make the transgressor punished. In chimpanzees, stealing also leads to punishment. Chimpanzees retaliate against thieves, conspecifics stealing food from them. The angrier they get at the thief, the stronger they react (Jensen et al., 2007).

However, in dyadic interactions, as for chimpanzees, the response of children can be due to an emotional reaction or self-interest and not to a real understanding of the normative structure of ownership that has been transgressed. A more direct test of ownership understanding includes intervention on behalf of a third-party to protect his rights. Several studies have shown that children do evaluate third-party interactions involving ownership transgressions such as alteration or destruction of another's property, illegitimate acquisition of property, no respect of owner's right to possess his object (no restitution). In Table C1-2, we arrange those studies to interpret them in terms of ownership transgressions, organizing them by type of transgression. We consider children's evaluations of the following transgressions of property rights:

- No respect of owner's property:
    - losing another's property (it is accidental, but it is a lack of attention)
    - (intentionally) throwing away another's property
    - altering another's property
    - (intentionally) destroying another's property

- No respect of owner's use:
    - preventing owner from using his property
- No respect of owner's exclusivity:
    - using another's property without permission (without asking, or with disagreement of the owner)
- No respect of rules of transfer:
    - illegitimate acquisition (theft)
    - no restitution in the case of a non-definitive transfer.

Children exhibit explicit evaluations of property transgressors, and also implicit behaviors towards transgressors and victims of transgressions as indicators of their social and moral evaluations. This appears in the variety of methodology used by different authors. We include in Table C1-2, the type of presentation of the transgressions (verbal stories or live interactions), and the type of measure (e.g. explicit badness rating, assignment of property rights, prosocial/antisocial behavior). We can also notice the variety of participant's ages in different studies, going from 3 months to adulthood (only two studies tested children and adults), with many studies centered around 3 to 5 years. In Table C1-2, for each transgression, studies are ordered by age of mature evaluation[C1-1] of the transgression, from higher to lower.

[C1-1] Mature evaluation corresponds to correct attribution of property rights or to distinction in social or moral evaluation between a transgression and a non-transgression of property rights.

Type of transgression	Type of presentation of the transgression (stimuli)	Type of measure	Ages tested (in years) Minimum age of mature evaluation	References
No respect of another's property				
Losing another's property	Verbal story (apparently no pictures)	Explicit badness rating	4; 6; 8; 10; 15; adults 10 years (from 4 to 10 years, losing any property (own or another's) is as bad)	Hook, 1993
Throwing away another's property	Verbal story + pictures (on cards) (conflict: non-owner proposes action, owner objects)	Assignment of property rights (who should decide) (+ Explicit attribution of ownership)	4-5; 7-8; adults 7-8 years (For many 4-5-year-olds, discarding any property (own or another's) is not allowed)	Kim & Kalish, 2009 (exp 1)
	Live interaction between puppet, experimenter and child. The puppet is the transgressor, either against child or against experimenter.	Protest	2; 3 3 years (At 2 years, protest only when transgression against the child)	Rossano et al., 2011 (taking away followed by throwing away, but analyzed separately)
Altering another's property	Verbal story + pictures (on cards or computer) (conflict: non-owner proposes action, owner objects)	Assignment of property rights (who should decide / is it acceptable to take the action) (+ Explicit attribution of ownership)	4-5; 7-8; adults 7-8 years (For many 4-5-year-olds, altering any property (own or another's) is not allowed)	Kim & Kalish, 2009
Destroying another's property	Verbal story (apparently no pictures)	Explicit badness rating	4; 6; 8; 10; 15; adults 10 years (and older) (from 4 to 10 years, destroying any property is as bad)	Hook, 1993 (destroying + throwing away)

Destroying another's property	Verbal story + pictures	Explicit judgment of badness	4-6 4-6 years	Weisberg & Leslie, 2009 (theft, destruction & physical harm analyzed together because no difference)
	Live interaction between two puppets and child. One puppet is the transgressor.	Protest, tattling against transgressor, and prosocial behavior towards victim	3 3 years	Vaish et al., 2011
	Live interaction between two experimenters	Antisocial behavior towards transgressor (no help)	3 3 years	Vaish et al., 2010 (theft & destruction analyzed together)
	Live interaction between two experimenters	Prosocial behavior towards victim	1.5; 2 18 months	Vaish et al., 2009 (theft & destruction analyzed together because no difference)
No respect of owner's use - *Not directly tested as a transgression*				
Preventing owner from using his property	Verbal story + pictures (on cards or computer) (conflict: owner proposes action, non-owner objects)	Assignment of property rights (who should decide / is it acceptable to take the action) (+ Explicit attribution of ownership)	4-5; 7-8; adults 7-8 years	Kim & Kalish, 2009
No respect of owner's exclusivity - *Not directly tested as a transgression*				
Using another's property without permission (without asking, or with disagreement of the owner)	Verbal story + pictures (on cards or computer) (conflict: non-owner proposes action (altering, discarding…), owner objects)	Assignment of property rights (who should decide) (+ Explicit attribution of ownership)	4-5; 7-8; adults 7-8 years	Kim & Kalish, 2009

Using another's property without permission	Verbal story + pictures (on cards) (conflict: non-owner proposes lending, owner objects)	Assignment of property rights (who should decide) (+ Explicit attribution of ownership)	4-5; 7-8; adults 4-5 years (when ownership was not transferred)	Kim & Kalish, 2009 (exp 1)
	Verbal story enacted on foam board stage with small replicas (conflict: non-owner wants to use object, owner objects)	Assignment of property rights (who should use the object/ should the non-owner stop using the object) (+ Explicit attribution of ownership)	3; 4; 5; 6; 7; adults 3 years	(Neary, 2011, experiments 1, 2, 3)
No respect of rules of transfer				
Illegitimate acquisition (theft) & other transgression *(theft not analyzed alone, but either with other type of property transgression (destruction), or with other moral transgression (physical harm))*	Verbal story + pictures	Explicit judgment of badness	4-6 4-6 years	Weisberg & Leslie, 2009 (theft, destruction & physical harm analyzed together because no difference)
	Live interaction between two experimenters	Antisocial behavior towards transgressor (no help)	3 3 years	Vaish et al., 2010 (theft & destruction analyzed together)
	Live interaction between two experimenters	Prosocial behavior towards victim	1.5; 2 18 months	Vaish et al., 2009 (theft & destruction analyzed together because no difference)

Illegitimate acquisition (theft)	Verbal story + pictures	Explicit judgment of wrongness of act, rule utility, authority contingency, rule contingency, rule relativity/ generalizability, importance	6-7; 8-9; 10-11 6-7 years (younger age tested), but theft less wrong than physical harm. (At 8-9 years, theft is as wrong as physical harm)	Tisak & Turiel, 1984[C1-2] (theft tested with physical harm and compared to prudential transgression)
	Verbal story + cartoons (on computer)	Explicit assignment of property rights	5-6; 7-8; 11-12 5-6 years	Cram & Ng, 1989
	Verbal story + dolls and small toys as props	Explicit assignment of property rights (+ ownership)	2; 3; 4; 5 5 years (At 4 years only when presented with interactions between children; At 2 and 3 years, first possessor bias)	Blake & Harris, 2009
	Pictures (with transgressions presented verbally in test question)	Explicit judgment of seriousness, rule contingency, rule relativity, deserved punishment	3; 4 4 years (At 3 years, not universally wrong)	Smetana, 1981[C1-2] (theft tested with other transgressions)
	Live interaction between puppet, experimenter and child. The puppet is the transgressor.	Protest	2; 3 3 years (At 2 years protest when transgression against the child)	Rossano et al., 2011 (taking away[C1-3] followed by throwing away, but analyzed separately)
No restitution (after non-definitive transfer)	Verbal story (apparently no pictures)	Explicit badness rating	4; 6; 8; 10; 15; adults 8 years (and older) (from 4 to 8 years, no restitution after definitive transfer is as bad)	Hook, 1993

[C1-2] Tisak & Turiel (1984) and Smetana (1981) are two examples of studies contrasting moral transgressions (including theft) and other types of transgressions (conventional, prudential). There are a lot of similar studies, inspired by these two.

[C1-3] In Rossano et al. (2011), the action of « taking away » the object cannot be fully considered as « theft » because the puppet was ignorant of the fact that the object was owned and not abandoned, thus he was ignorant that taking away the object was a transgression.

No restitution	Live puppet interaction	Social preference (looking time at 3 months; choice of actor at 5 months)	3 months; 5 months	Hamlin & Wynn, 2011 (no restitution tested as no cooperation)
			3 months	

Table C1-2. Description of studies involving ownership transgressions, organized by the type of transgression involved, and then for each transgression, ordered by age of mature evaluation.

In Table C1-2, we see that ownership transgressions were studied with two different types of presentation of the transgressions:

- Verbal story
- Live interaction (live interaction between experimenters, and potentially child and puppet / live interaction between puppets, and potentially child)

The transgressions were studied with four different types of measures:

- Two explicit measures:
  - Explicit verbal evaluation of badness (explicit badness rating / explicit judgment of wrongness/seriousness)
  - Explicit verbal attribution of ownership or property rights (assignment of ownership rights / explicit attribution of ownership)
- Two more implicit measures:
  - Behaviors[C1-4] against transgression (protest / tattling)
  - Implicit social evaluation and prosocial/antisocial behaviors (social preference / prosocial behavior towards victim / antisocial behavior towards transgressor)

We distinguish two types of evaluation in the studies of ownership transgressions:

- Social/Moral evaluation
- Ownership/Property rights attribution

[C1-4] Behaviors against transgression (protest and tattling) have an explicit component, as most of them are verbal utterances. However, some of the protests are only physical actions to prevent the transgression. Moreover, these behaviors are not elicited by the experimenter (contrary to explicit evaluations elicited by verbal questions), but are spontaneous, and thus can be considered as more implicit; the motivation to act is implicit. Conversely, we can notice that even implicit social evaluations have an explicit component, for example, when infants are explicitly asked to choose between two agents and take one them.

Table C1-3 summarizes at what ages a mature understanding of ownership transgressions was found depending on the type of evaluation (social/moral evaluation or ownership/property rights attribution), the type of measure (explicit, of behaviors, or implicit), and the type of stimuli presentation (verbal story or live interaction).

		Verbal story	Live interaction	*Mean age* *Range*
Social/Moral evaluation	Explicit verbal evaluation of badness	Hook (10; 10; 8); Smetana (4); Tisak & Turiel (6-7); Weisberg & Leslie (4-6)		7.25 [4; 10]
	Implicit (non-verbal) social evaluation and prosocial/antisocial behaviors		Vaish-09 (1.5); Vaish-10 (3); Vaish-11 (3); Hamlin & Wynn (0.25)	1.9 [0.25; 3]
Ownership/ Property rights attribution	Explicit verbal attribution of ownership or property rights	Cram & Ng (5-6); Blake & Harris (5); Kim & Kalish (7-8; 7-8; 7-8; 7-8; 4-5); Neary (3)		6 [3; 8]
	Behaviors (verbal + non-verbal) against transgression (protest, tattling)[C1-5]		Vaish-11 (3); Rossano (3)	3 [3; 3]

Table C1-3. Studies (and ages of mature evaluation for each tested transgression, in years) organized by type of evaluation (social/moral evaluation or ownership/property rights attribution), type of measure (explicit, behaviors, implicit), and type of stimuli presentation (verbal story, live interaction). Mean age (in years), and range, of mature evaluation of ownership transgressions for each type of evaluation and each type of measure and type of stimuli presentation.

[C1-5] The studies of children's protests show a normative understanding of ownership. Moreover, some of the protests include "possessive protests" (i.e. "child intervenes against the puppet's act making use of possessive pronouns or naming the owner of the object", Rossano et al., 2011).

2.2.2. Discussion of explicit and implicit methodologies

From Table C1-2, we notice that for a given transgression, different studies found different ages at which children understand and evaluate the transgression. It seems to depend on the method used in each study. In verbal studies, the age of mature evaluation is higher. For destruction, the age of mature evaluation is of 4 to 10 years when tested with verbal material (including explicit measures), but only 18 months to 3 years when tested with live interactions (and implicit measures). Similar age differences are also found for theft depending on the methodology: mature evaluation at 4 to 7 years with explicit measures, and at 18 months to 3 years with more implicit measures. The fact that children evaluate a transgression explicitly at an older age than they evaluate it implicitly is true for each type of transgression. This effect of method on age of mature evaluation of a transgression is found both for measures (explicit / implicit) and for stimuli (verbal story / live interaction) as both are correlated, as we can notice it in Table C1-3. When the situations were presented as verbal stories, the evaluations were explicit. When the situations were presented as dynamic interactions, the evaluations were more implicit. In Table C1-3, we see that the effect of method on age of mature understanding is present when considering all types of transgressions together. Furthermore, this effect is present when understanding of transgressions was assessed both through social/moral evaluation, and through ownership/property rights attribution. However, a completely implicit measure of ownership attribution is missing.

As far as the comparison between social/moral evaluation and ownership/property rights attribution is concerned, we observe a mature evaluation at similar ages for explicit verbal evaluations. The age range of mature evaluation is huge, and there is an important overlap between the ages found with tests of badness evaluation and those revealed by testing attribution of ownership and property rights[C1-6]. Apparently, it seems that children do not recognize that something bad happened (and that the responsible agent is bad) before being able to determine what rights have been transgressed. However, explicit evaluation of property rights was not measured simultaneously to explicit evaluation of badness with the same stimuli (in a same study). The results with implicit measures cannot directly be

[C1-6] We can notice that the variability in age of mature evaluation for explicit measures could be due to differences in questions; some seem to be simpler than others. Moreover, this variability reflects the variability in ages tested in different studies, with the age of mature evaluation being the younger age tested in several studies.

compared, as the measure of behaviors against transgression is not a completely implicit measure (see footnote C1-4 above).

2.2.3. Discussion of tested transgressions

From Table C1-2, we can describe separately the analyses of each transgression. We notice that some transgressions were more studied than others, and some of them were not even directly tested. For example theft was studied with different experimental designs, whereas the disrespect of owner's use of his property was only indirectly tested.

Concerning the absence of respect for an owner's property, loss of property was only studied verbally and seems to be evaluated late, at 10 years of age (Hook, 1993). Discard of another's property is also evaluated late (at 7-8 years of age) in terms of assignment of property rights (Kim & Kalish, 2009). However, children recognize it as a transgression earlier (since 3 years of age) as shown by children's protests, at least when the transgression is presented in a live interaction involving the child (Rossano et al., 2011). Alteration of property was only studied verbally and seems to be evaluated only from 7-8 years of age (Kim & Kalish, 2009). Destruction of another's property was studied through a variety of methods. Using verbal stories and assessing children's evaluation through explicit judgments of badness, destruction of another's property was considered as worse than destruction of one's own property from 10 years of age on (Hook, 1993). At 4 years, children already consider that destroying some property is bad (see also Weisberg & Leslie, 2009). Presenting the transgression in the context of a live interaction between persons or/and puppets and testing children's evaluation more implicitly revealed an earlier judgment of the transgression. At 3 years, children protest against the transgressor and tattle on him (Vaish et al., 2011); they also show antisocial behavior towards the transgressor by withdrawing help from him (Vaish et al., 2010), and they show prosocial behavior towards the victim of the transgression (Vaish et al., 2009; 2011). This latter behavior is even exhibited by 18-month-olds. We can notice that destruction was rarely studied alone. Moreover, the studies evaluating destruction were mostly concerned with children's understanding of moral transgressions, with the exception of Hook's study (1993) presenting the transgression in terms of property rights, but which nevertheless tested children's moral judgments of badness. Destruction may indeed involve more concern about harm than about property rights. It is a rather violent action that elicits empathy. Even if the destruction of somebody else's property is evaluated as worse than the destruction of a non-owned object (see Vaish et al., 2009, 2011), destruction may be

considered negatively in itself, independently of the type of property destroyed and on the relationship between the destroyed object and a person. Indeed, Hook (1993) has shown that children evaluate negatively the destruction of a character's own object (although it is not a transgression as far as property rights are concerned). However, this may apply only to intentional destruction as Vaish et al. (2010) have shown that accidental destruction is not evaluated more negatively compared to a neutral behavior. In any case, destruction does not need to involve an owner to be judged negatively. Contrary to theft, destruction is not directly related to ownership. It involves ownership only in the case of destruction of another's property. Without the notion of ownership, theft cannot occur, but destruction can.

Concerning the non-respect of an owner's use of his property or of an owner's exclusivity, only two studies were found to address these questions, using a verbal and explicit methodology. The results of these studies suggest an early evaluation (at 3 years) of conflicts about use of an object (Neary, 2011), but a late evaluation (at 7-8 years) of conflicts involving other actions, such as altering or discarding (Kim & Kalish, 2009).

As far as transgressions of the rules of transfer are concerned, theft was only studied verbally or together with other transgressions. There was no study of implicit evaluation of theft in itself. The results showed that children explicitly evaluate theft as a transgression from around 5 years of age in terms of property rights (Blake & Harris, 2009), and 4 years of age in terms of badness (Smetana, 1981; see also Weisberg & Leslie, 2009). Through implicit evaluation, theft was only studied with other moral transgressions. Children evaluate it as a transgression at 3 years (Rossano et al., 2011; see also Vaish et al., 2010). It remains to be investigated whether the study of theft alone would also be implicitly evaluated as a transgression at 3 years, or even earlier. Vaish et al. (2009) found an evaluation of theft by 18-month-olds but theft was analyzed together with destruction in this study.

Concerning the study of absence of restitution after a non-definitive transfer, Hook (1993) found a mature evaluation only at 8 years of age through explicit badness rating. There seems to be a bias (maybe partly due to the first possessor bias) to consider the absence of restitution of an object after the request of the first possessor as bad independently from the type of transfer, even after gift-giving. In Blake & Harris (2009), when gift-giving is presented with strong cues indicating the nature of the transfer (wrapped gift at a birthday party), 5-year-old children already consider that the recipient does not need to return the object to the first possessor. However, in this study, children were asked hypothetically what the second possessor needs to do, they were not presented with an actual request of the first possessor and a refusal of the second possessor to respond to the request. In any case,

legitimate transfers of property are not well understood before 5 years of age (see also Kim & Kalish, 2009). Restitution per se was not directly studied at a very young age. We can notice that Hamlin & Wynn (2011), studying evaluations of helpful and hindering characters, presented to infants a situation where an object was either returned or not by a second possessor to its first possessor. However, there were additional cues in this study that may allow evaluating the situation without considerations for ownership, but rather in terms of cooperation. Indeed, the first possessor turned himself several times towards the second possessor as to promote social interaction. He could potentially be considered as asking his object back, but he did not express a typical gesture of begging. It remains to be confirmed that very young children do evaluate absence of restitution as a transgression in terms of property rights. These two last types of transgressions (theft and absence of restitution) need to be studied in more detail. We address these issues in our experimental studies.

2.2.4. Summary

Ownership transgressions, in a developmental context, have been studied through a variety of techniques and have focused on two different aspects of ownership. The evaluations of ownership transgressions have been studied through explicit moral judgments and more implicitly through social preference measures. Ownership/property rights attributions have been studied through explicit questionnaires, and more implicitly, through the observation of behavior responses (protest, tattling). Explicit tests were performed with verbal stories as stimuli, and implicit tests with live interactions as stimuli. Typically, implicit tests yield results showing some understanding of ownership transgressions at a younger age than explicit tests. No study has directly compared explicit and implicit measures or the understanding of rights and moral evaluation. Several types of transgressions have been studied, but some of them have not yet been tested implicitly (e.g. theft without violence, refusal to return an object to the owner without other possible interpretations of the behavior).

2.3. Conclusion

Morality is a vast domain. It is composed of people's behaviors and judgments. People's moral judgments were often studied through their judgments of moral transgressions. Moral transgressions, contrary to conventional (or social) ones involve harm, injustice or/and transgression of rights (Turiel, 1983). Transgression of rights includes

transgression of property rights, and thus the notion of ownership can be linked to the notion of morality. More precisely, ownership transgressions are part of morality, as well as their evaluation.

Most research about moral transgressions studied the evaluation of physical harm. Even when psychological harm in ownership transgressions was considered (e.g. theft), it was most often analyzed together with physical harm (e.g. Smetana, 1981 ; Vaish et al., 2009 ; Vaish et al., 2010 ; Weisberg & Leslie, 2009). Moreover, some studied transgressions (e.g. destruction) do not correspond necessarily to ownership transgressions (as opposed to violent behaviors). Thus, ownership transgressions need to be investigated in more details, such as theft by itself, and absence of restitution after a non-definitive transfer. We have seen that understanding of ownership transgressions seems to be present at a younger age when assessed through implicit measures rather than explicit ones. Age differences between acquisition of implicit and explicit knowledge have been reported in another cognitive domain, theory of mind (see Baillargeon et al., 2010, for a review). It could be interesting to study the development of the concepts of ownership and theory of mind in parallel. Concerning ownership transgressions and explicit measures, children may not perform moral evaluation before being able to correctly reason about property rights. However, explicit moral evaluation remains to be measured simultaneously to explicit evaluation of property rights with a common type of stimuli. To conclude, the majority of studies testing ownership transgressions were verbal studies. Further studies should explore children's evaluations of dynamic interactions between third parties involving ownership transgressions.

PART 2 – EXPERIMENTAL STUDIES

1. Aim

Our aim in this experimental section is to investigate children's understanding and evaluation of property transfers. We studied two types of transgressions of property rights: theft and absence of restitution of an object to its owner. We tested both children's moral evaluation of agents involved in property transfers and their attribution of property rights to second possessors after illegitimate and legitimate transfers. We used a non-verbal presentation of the stimuli, and used both explicit and implicit measures. Based on prior work, the ages of children tested in our experiments ranged from 5 months to 5 years, and adults (as a control population) were also tested in some of the studies.

2. Issues addressed

As seen at the end of Chapter 1, two types of property transgressions were not deeply investigated with non-verbal methods in previous studies. Theft alone was only studied verbally (Blake & Harris, 2009). When studied with implicit measures, theft was tested or analyzed together with other transgressions (Rossano et al., 2011; Vaish et al, 2009; 2010; Weisberg & Leslie, 2009). There was no study of implicit evaluation of theft in itself. Theft was compared to various situations: social transgressions, gift-reception, taking of character's own object, taking of a non-owned object. We compared theft to gift-giving and gift-reception, thus also assessing the question of children's understanding of property transfers.

Another type of property transgression received even less interest in previous studies. The absence of restitution of the object to its owner after a non-definitive transfer was only studied as such by one study using verbal material (Hook, 1993). With an implicit measure, this situation was only presented with cues leading to other interpretations of the interaction, such as hinder (Hamlin & Wynn, 2011) or absence of cooperation. We investigated children's expectations of restitution after a transfer by assessing their evaluations of character's returning or not an object to its first possessor.

3. Methodology

To test young children, the presentation of dynamic interactions seems more appropriate than the presentation of verbal stories. Indeed, as we have seen in Chapter 1, when asked to evaluate dynamic interactions, children seem to show an earlier understanding of the

situations, than when they are presented with verbal stories. Surprisingly, no study addressing ownership and property rights attributions presented dynamic interactions to children; these studies used verbal stories as stimuli. Here, we used dynamic interactions as our stimuli. To limit the logistics of the investigation and to be able to better control the movements presented in various situations, we used non-verbal animated cartoons (for 3- and 5-year-olds and adults) or puppet movies (for 5-, 18-, and 24-month-olds) instead of live interactions.

We presented to the participants two movies showing an interaction between two characters. In one of the movies an illegitimate action was performed, and in the other movie a legitimate action was shown. In the studies investigating the understanding of theft, a thief was compared to a legitimate recipient or to a giver. In the studies investigating restitution, a character keeping a previously acquired object was compared to a character returning the object to the owner. We also tested the role of emotions on children's evaluations, by adding emotional cues in the presented situations.

As seen in Chapter 1, when using dynamic stimuli, researchers measured only implicit responses of children. None of the studies using non-verbal stimuli assessed children's explicit understanding of ownership transgressions. Here, we used both explicit measures (with children and adults) and implicit measures (with toddlers and infants) with similar stimuli, comparing the same contrasts. Moreover, explicit moral evaluation of badness, and explicit attribution of property rights were never studied in conjunction. Here, we used these two kinds of explicit measures on the same participants. More precisely, the older participants (3- and 5-year-olds, and adults) were asked questions about the illegitimate and legitimate agents, addressing both their moral quality and their property rights. The younger participants (5-, 18-, and 24-month-olds) were asked to choose between both agents and/or their looking time to each agent was measured.

4. Presentation of our experimental studies

In all our studies, children and adults evaluated third-party interactions. In the studies described in Chapter 2 and Chapter 3, the situations were presented through non-verbal animated cartoons, and participants' social and moral judgments as well as their assignments of property rights were measured. In the studies examined in Chapter 5, the situations were presented through movies representing puppet interactions, and participant's implicit social preferences were measured.

Chapter 2 presents three studies of 3- and 5-year-old children's and adults' understanding and evaluation of illegitimate and legitimate property transfers. In Study 1a, an illegitimate and a legitimate mode of acquisition were compared: theft and gift-reception. In Study 1b, two initiations of transfer were compared: theft and gift-giving. Study 2 assessed the role of emotion in 3-year-olds' understanding and evaluation of property transfers. Adults were also tested as a control. Transfers of property were followed by a negative emotional reaction of the first possessor. Theft was compared to legitimate reception. The same questions than in Study 1 were asked.

Chapter 3 investigates 3- and 5-year-old children's and adults' understanding and evaluation of restitution in three studies. In Study 3, we asked whether 3-year-old children (compared to adults) evaluate differently a character returning an object to its first possessor compared to a character keeping the object. Study 4 addressed this same question (with the same ages) in the presence of a negative emotion displayed by the first possessor following the restitution or absence of restitution of the object to him. In Study 5, we tested 5-year-old children's understanding and evaluation of restitution with and without emotional cues.

Chapter 4 analyzes further adult's and 3- and 5-year-old children's understanding of legitimate property transfers based on participant's responses to questions about second possessor's property rights in Studies 1 to 5. The notions of definitive and non-definitive transfers of property are discussed.

Finally, Chapter 5 explores the evaluation by younger children of different modes of acquisition of property and of different behaviors concerning restitution of property. Study 6 investigated 2-year-olds' implicit social evaluation of theft and legitimate reception. In Study 7, we asked whether 2-year-olds do evaluate differently a thief and a legitimate recipient in the presence of emotional cues. Study 8 looked at 18-month-olds' and 2-year-olds' implicit social evaluation of restitution behaviors. Finally, in Study 9, we tested 5-month-olds' implicit social evaluation of a character returning an object to its first possessor compared to a character keeping the object, when the first possessor seemed to ask for his object back (or for interaction) following an "accidental" transfer of property. This study aimed at replicating the study by Hamlin & Wynn (2011) presenting these same interactions.

CHAPTER 2: Understanding and evaluation of property transfers

1. Study 1: Development of understanding and social/moral evaluation of illegitimate and legitimate property transfers

1.1. Introduction

Several approaches have been undertaken to assess children's understanding of third-party interactions involving ownership issues. When the determination of ownership was assessed by the examination of rights – as the right to keep the object, leave with it, or take it home – accorded by children to characters involved in different types of property transfers, it was found that children do not have a mature understanding of property rights before 5 years of age (e.g. Blake & Harris, 2009; see also Kim & Kalish, 2009). Failing to answer a property right or ownership definition question may mean that the concept of ownership is not acquired, or, alternatively, that children have problems answering these kinds of questions. As we have seen in Chapter 1, the majority of studies on property rights show an emergence of the understanding of those rights at 5 years, principally on the basis of tests using verbal stories. Other studies tested children's evaluations of badness of ownership transgressions (e.g. Hook, 1993; Tisak & Turiel, 1984; Weisberg & Leslie, 2009). They found similar ages of mature understanding of the transgressions than studies testing property rights attributions. These studies also used verbal stories as stimuli, thus relying heavily on children's linguistic resources. We have seen that verbal tests seem to underestimate the age of acquisition of an ownership concept.

There are indications that younger children make evaluations of ownership transgressions. Recent studies using stimuli that present dynamic interactions between characters involved in property issues, and implicit measures of social evaluation, showed that children seem to evaluate ownership transgressions before 5 years. However, as seen in Chapter 1, almost none of these studies investigated ownership transgressions such as theft without involving destruction or aggression. Vaish et al. (2009; 2010) had young children evaluate or react to acts of stealing, but the studies were run and analyzed together with acts of destruction. Rossano et al. (2011) tested stealing, but it was followed by an act of throwing away. This remark also applies to the studies measuring evaluations of badness. All the studies using dynamic stimuli measured implicit evaluations. Explicit evaluations were not studied with this type of stimuli (but only with verbal stories). Moreover, moral evaluations of ownership transgressions, and attributions of property rights were never assessed

simultaneously. Here, we test with non-verbal stimuli simultaneously social/moral evaluation and understanding of property rights in a situation that has been under-studied: theft (without violence).

The present study is aimed at constructing a situation testing selectively the understanding and evaluation of theft as an ownership transgression. We compared this illegitimate property transfer to a legitimate property transfer (gift-giving), in two contrasts. We considered gift-giving both through the evaluation of the recipient and of the actor of the transfer. We used non-verbal animated cartoons instead of verbal narration to avoid potential comprehension problems and/or semantic biases that may arise through associations with particular words ('stealing' may be negatively valued even if children don't really understand what it means). We tested both social/moral evaluation of the agents, and understanding of property rights on the same population of participants. We tested adults, 5-year-old and 3-year-old children. Adults were tested to validate our stimuli and paradigm. 5-year-olds were expected to behave like adults, i.e. both succeed in evaluating a thief negatively and in responding to property questions. 3-year-olds are known to be able to make social/moral evaluations of harmful/hindering agents, but they may not fully grasp the implications of property rights. If evaluation of ownership transgressions precedes explicit mastery of property rights, one may expect to find that 3-year-olds are able to evaluate illegitimate property transfer before they are able to reliably answer questions about property rights. If, alternatively, the explicit understanding of property rights drives the evaluation of transgressions, one should find a correlation between these two measures, or even, the former emerging before the latter. In Study 1a, we compared theft (as an illegitimate mode of acquisition) to gift-reception (as a legitimate mode of acquisition). The direction of transfer, and the character having the object at the end were matched in this contrast. In Study 1b, we compared theft (as an illegitimate action) to gift-giving (as a legitimate action). In this contrast, we matched the fact that the actor/initiator of the transfer was evaluated.

1.2. Study 1a: Three- and five-year-olds' evaluations of a *thief* and a *gift-recipient*

This study evaluated the understanding of two modes of acquisition of an object: illegitimate (theft) versus legitimate (gift-reception). Children and adults were presented with two non-verbal movie cartoons depicting the transfer of a ball between two characters. One movie represented an agent *stealing* a ball from another character. In the other movie, the agent was *receiving* a ball from the other character.

1.2.1. Method

Participants

Twenty-eight 3-year-olds (15 girls; mean age: 45 months, 6 days; range: 36 months, 14 days to 52 months, 6 days), twenty 5-year-olds (12 girls; mean age: 69 months, 25 days; range: 65 months, 27 days to 75 months, 0 days) and twelve adults (8 females) were tested. One additional child (5-year-old) was tested but excluded due to technical failure. Participants were French speakers. Adults were recruited from a mailing list of people wishing to participate to experiments in our laboratory; majority of them were students. Children were tested in their preschool. Participants were assigned randomly to one of the four experimental groups allowing counterbalancing of the order of presentation of conditions (theft first or gift-reception first) and of the characters associated to a condition (agent 1 in theft condition or agent 2 in theft condition).

Materials and setting

The participants sat in front of a laptop, with the experimenter on their side. The two cartoon movies were presented on the laptop. They were designed with the software Flash Professional Version 8.0 allowing a very precise control of the physical parameters and thus of the matching between both scenarios. Two characters were present in each movie. At whole, three different characters were seen: a protagonist (the same in both cartoons) and two agents (one in each cartoon). The protagonist (Mr. Red) was the character first possessing the object. The agents (Mr. Green or Mr. Blue) were the characters acquiring the object either by theft or by gift-reception, so they also corresponded to the second possessors. These two characters were those to be evaluated by the participants. The cartoon characters were

elongated rounded shapes with face and arms. They were designed not to have any cultural or social characteristics, but were presented as males: Mr. Red, Mr. Green, and Mr. Blue. The sequence of events in each condition (see Figure C2-1) is described bellow, with the differences between both conditions in bold.

In the theft condition:

1. The protagonist (1st possessor) arrives with a ball, and the agent (2nd possessor) arrives with empty hands.
2. The protagonist plays with the ball, and **then keeps it under his arm**.
3. **The agent steals the ball from the protagonist's hands.**
4. The agent plays with the ball.
5. **The protagonist reaches his arms out to receive the ball back.**
6. The agent leaves with the ball.
7. The protagonist leaves without the ball.

In the gift-reception condition:

1. The protagonist (1st possessor) arrives with a ball, and the agent (2nd possessor) arrives with empty hands.
2. The protagonist plays with the ball.
3. **The protagonist gives the ball to the agent.**
4. The agent plays with the ball.
5. **The agent tries to return the ball to the protagonist, who refuses to take the ball back by moving backward.**
6. The agent leaves with the ball.
7. The protagonist leaves without the ball.

See Appendix AC2-1 for more detailed descriptions of the stimuli.

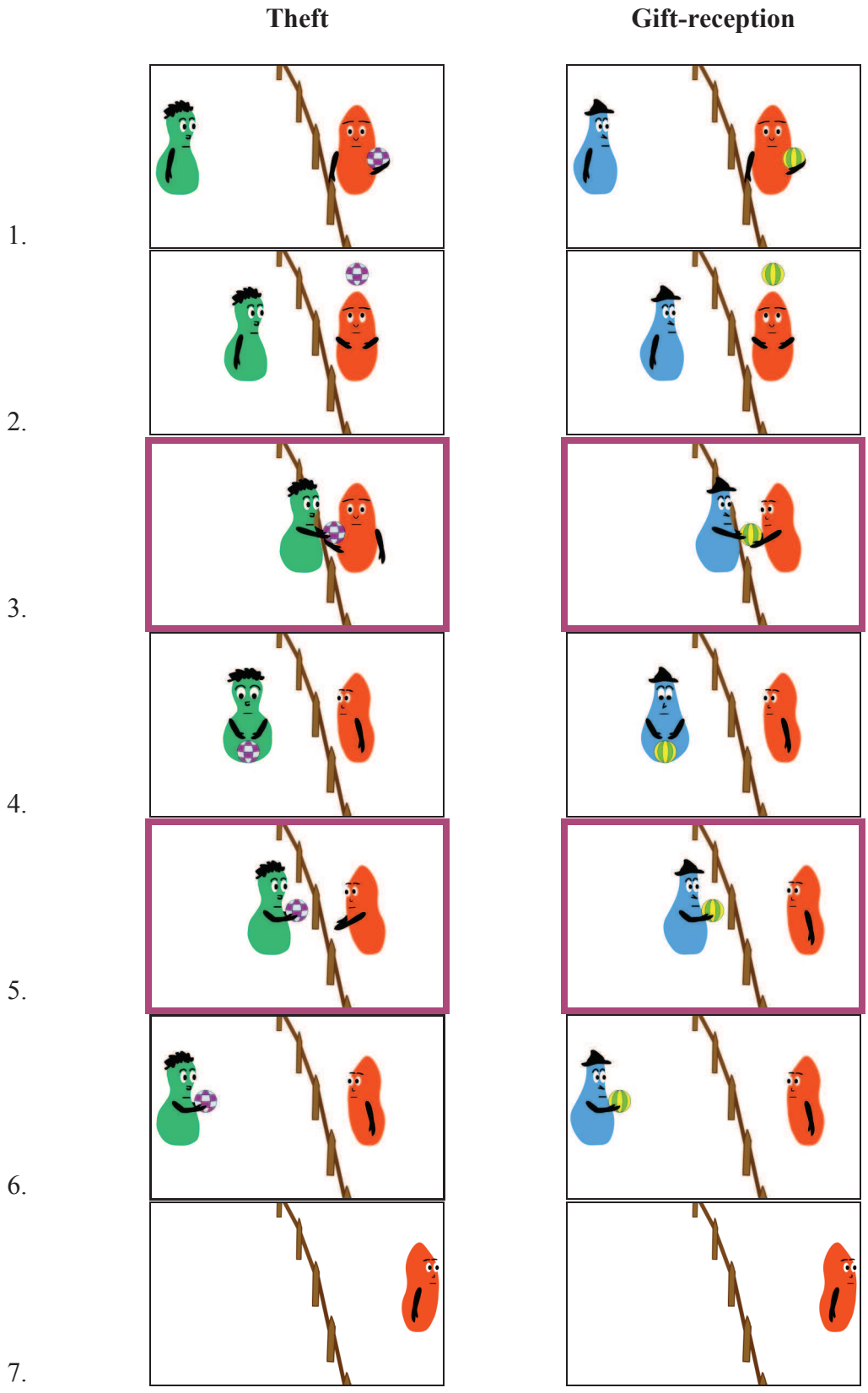


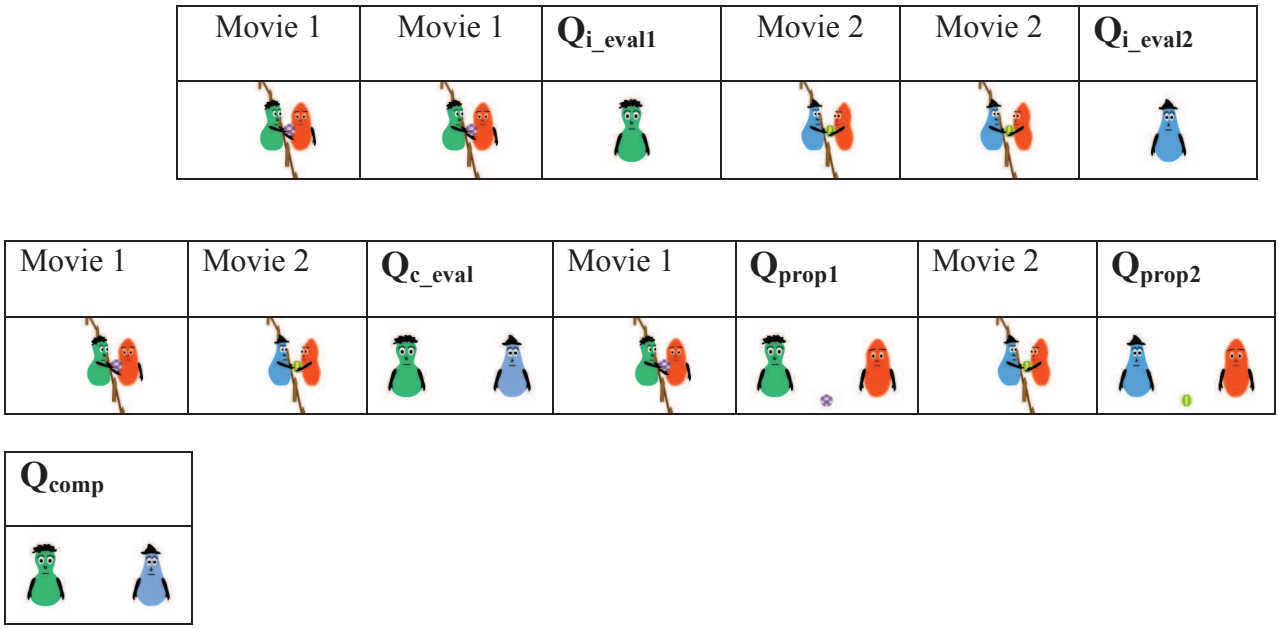
Figure C2-1. Images extracted from each of the cartoons in Study 1a. Outlined in purple, the steps being different between both conditions.

Considering the agent, the movie representing theft was exactly the same compared to the movie representing gift-reception, i.e. both agents were executing exactly the same movements at the same time in their respective movie throughout the movie. Considering the protagonist, the main difference lay in his orientation during the transfer. From the perspective of the child, the protagonist was full-face in the theft condition (not looking at the agent who was in profile), and in profile in the gift-reception condition (facing the agent). The overall amount of time the protagonist was in each of these various orientations was matched as much as possible between both movies. The different movements of the protagonist were also matched over-all.

Procedure

The study was performed in French, as all studies in this dissertation. Figure C2-2 presents the procedure and measures. The experimenter presented and named pictures of the three characters (Mr. Green and Mr. Blue, and Mr. Red) on the screen before playing the movie cartoons. Each cartoon was presented twice, after what, the main agent (Mr. Green or Mr. Blue) appeared alone on the screen and the participant was asked four questions about him: “Do you like him?”, “Is he a good guy?”, “Is he a bad guy?”, and “Would you like to play with him?”. This questionnaire allowed familiarizing the children with the questioning procedure. The answers were not considered as a measure and not analyzed. Then both cartoons were presented once again one just after the other. At the end, both agents (Mr. Green and Mr. Blue) appeared on the screen, one on each side. The participant was asked to answer a comparative questionnaire. Adults were asked the same questions than before in a comparative way: “Which one do you like?”, “Which one is the good guy?”, “Which one is the bad guy?”, “Whom would you like to play with?”. Children were asked to point towards the characters: “Show me the one you like”, “Show me the good guy”, “Show me the bad guy”, “Show me the one with whom you would like to play”. The answers to these questions correspond to our main measure, which represents participant’s social and moral preferences. Each movie was presented again individually one last time and the participants were asked two questions about the second possessor’s rights (for each condition): “[The second possessor] was he allowed to play with the ball?”, “[The second possessor] was he allowed to leave with the ball?”. A third question about property rights was asked in this study, but the results are only analyzed in Chapter 4. Finally, we also assessed participant’s understanding

of the situations. They were asked two comprehension questions in a comparative way: “To whom Mr. Red gave the ball?”, “Which one stole the ball from Mr. Red?”.



Q_{i_eval} (training): - Do you like him? - Is he a good guy? - Is he a bad guy? - Would you like to play with him?

Q_{c_eval} (social and moral evaluation)	Q_{prop} (property rights attribution)	Q_{comp} (comprehension)
- Show me the one you like (adults: Which one do you like?) - Show me the good guy - Show me the bad guy - Show me the one with whom you would like to play	- [The 2nd possessor] was he allowed to play with the ball? - [The 2nd possessor] was he allowed to leave with the ball?	- To whom Mr. Red gave the ball? - Which one stole the ball from Mr. Red?

Figure C2-2. Procedure and measures in Study 1a.

(See Appendix AC2-2 for the original version of the questions asked in French)

1.2.2. Results

Social/moral evaluation

Participants were instructed to make a choice between both characters for each question, even if their preference was not so strong. This explains why few subjects (and particularly very few adults) answered "both" or "none" to the questions. If it was the case, the question was asked again to elicit a choice, and the second answer was considered. Still some participants did not want to make a choice. An evaluation index was computed from the answers to the comparative questionnaire. Each answer was scored 1 if in favor of the gift-recipient or in disfavor of the thief, -1 if in favor of the thief or in disfavor of the gift-recipient, 0 if other ("both", "none") or absent. The four answers were averaged into an index between –1 and 1 for each subject. A positive index corresponds to a preference for the legitimate recipient (gift-recipient) over the illegitimate one (thief). Figure C2-3 shows the mean evaluation index as a function of Age.

As preliminary analyses revealed no effects of gender, we did not include gender in further analyses. A 3-way analysis of variance (ANOVA) of Order (theft first or gift-reception first) x Agent (Mr. Green or Mr. Blue as the thief) x Age revealed a main effect of Age ($F(2,48)=7.79$, $p=.001$). The analysis revealed no interactions, and no main effects for Order or Agent. We observe an effect of Age between 3- and 5-year-olds ($F(1,40)=5.09$, $p<.05$), but not between 5-year-olds and adults ($F(1,24)=2.70$, $p=.11$). There is a developmental shift in the evaluation of ownership transgressions between 3 and 5 years of age. When separating younger and older 3-year-olds, we observe a trend towards a difference in their evaluation ($F(1,20)=2.96$, $p=.10$), although both groups are at chance when comparing their individual evaluation score against zero (younger 3-year-olds: $F(1,10)=1.57$, older 3-year-olds: $F(1,10)=1.39$). Comparing the evaluation index to a chance score of 0 for each age group revealed that 3-year-olds' selection of the gift-recipient and the thief did not differ from chance ($F(1,24)=0$). Five-year-olds ($F(1,16)=7.36$, $p=.015<.05$) and adults ($F(1,8)=40$, $p<.001$) selected more the gift-recipient as opposed to the thief than would be expected by chance. The evaluation index of adults is very high[C2-1].

[C2-1] This ceiling effect might be due to the fact that participants were forced to make a choice between both characters. It would be interesting to have also a measure of participants' evaluations on a scale.

Figure C2-3. Social/moral evaluation of characters involved in property transfers as thief or gift-recipient (Mr. Green and Mr. Blue) by 3- and 5-year-old children and adults, in Study 1a. Answers were scored 1 if in favor of gift-recipient, -1 if in favor of thief, 0 if other or absent for each question. The figure shows the means of participants (and standard errors). * p<.05 *** p<.001.

Comprehension

The lack of social and moral evaluation of 3-year-olds could be due to a lack of understanding of the situations and not to a real absence of evaluation of gift-reception and theft. Each answer to the comprehension questions was scored 1 if correct, -1 if incorrect, 0 if other ("both", "none") or absent. The two answers were averaged into an index between –1 and 1 for each subject. 3-year-olds were at chance in their answers to the comprehension questions (who received and who stole the ball) ($F(1,24)=0.17$); only two 3-year-olds answered correctly to both comprehension questions. But their answers could be due to a lack of comprehension of the questions and not of the depicted situations. Five-year-olds answered above chance to the comprehension questions ($F(1,16)=6.54$, $p<.05$), and all adults responded

correctly. We separated 5-year-olds in two groups according to their answers to the comprehension questions. These two groups responded differently ($t(18)=2.27$, $p<.05$). 5-year-old children who answered wrongly to the comprehension questions had an evaluation index similar to the one of the 3-year-olds ($t(34)=0.11$, $p=.92$), they were at chance ($F(1,4)=0.32$). Those 5-year-olds who answered correctly to the comprehension questions had an evaluation index similar to the one of the adults ($t(22)=0.65$, $p=.52$)), they distinguished very well between the legitimate and the illegitimate recipients ($F(1,8)=20.99$, $p<.01$).

Property rights attribution

The results concerning the attributions of property rights can help us determining whether children make the distinction between both presented situations. We analyzed the answers to each property rights question for each acquisition mode separately. The first question (right to play with the ball) deals with the second possessor's right of use of the object. The second question (right to leave with the ball) is about the second possessor's right to keep the object. Answers were scored 1 if "yes", -1 if "no", 0 if other or absent for each question. We analyzed separately the results for the three populations (3-year-olds, 5-year-olds, and adults) with a multivariate General Linear Model for repeated measures with Condition (i.e. Acquisition mode) as within-subject factor, and Order and Agent as between-subjects factors, for two measures corresponding to the two questions. Generally, we observed a development in the attribution of property rights: 3-year-olds made no distinction between the conditions ($F(2,23)=1.65$, $p>.1$), whereas 5-year-olds ($F(2,15)=6.11$, $p<.05$) and adults ($F(2,7)=249.16$, $p<.001$) distinguished between the two conditions. When analyzing the results for each question (see Figure C2-4), we found that 3-year-olds made no distinction between the conditions for both questions (play: $F(1,24)=3.45$, $p<.1$; leave: $F(1,24)=0.57$, $p>.1$). 5-year-olds distinguished the illegitimate and legitimate recipients in their attribution of the right to use the object (play: $F(1,16)=12.38$, $p<.01$), but not the right to keep the object (leave: ($F(1,16)=1.05$, $p>.1$). Adults distinguished between the two recipients in both property rights questions (play: $F(1,8)=40.5$, $p<.001$; leave: $F(1,8)=529$, $p<.001$). See Appendix AC2-3 for more detailed analyses.

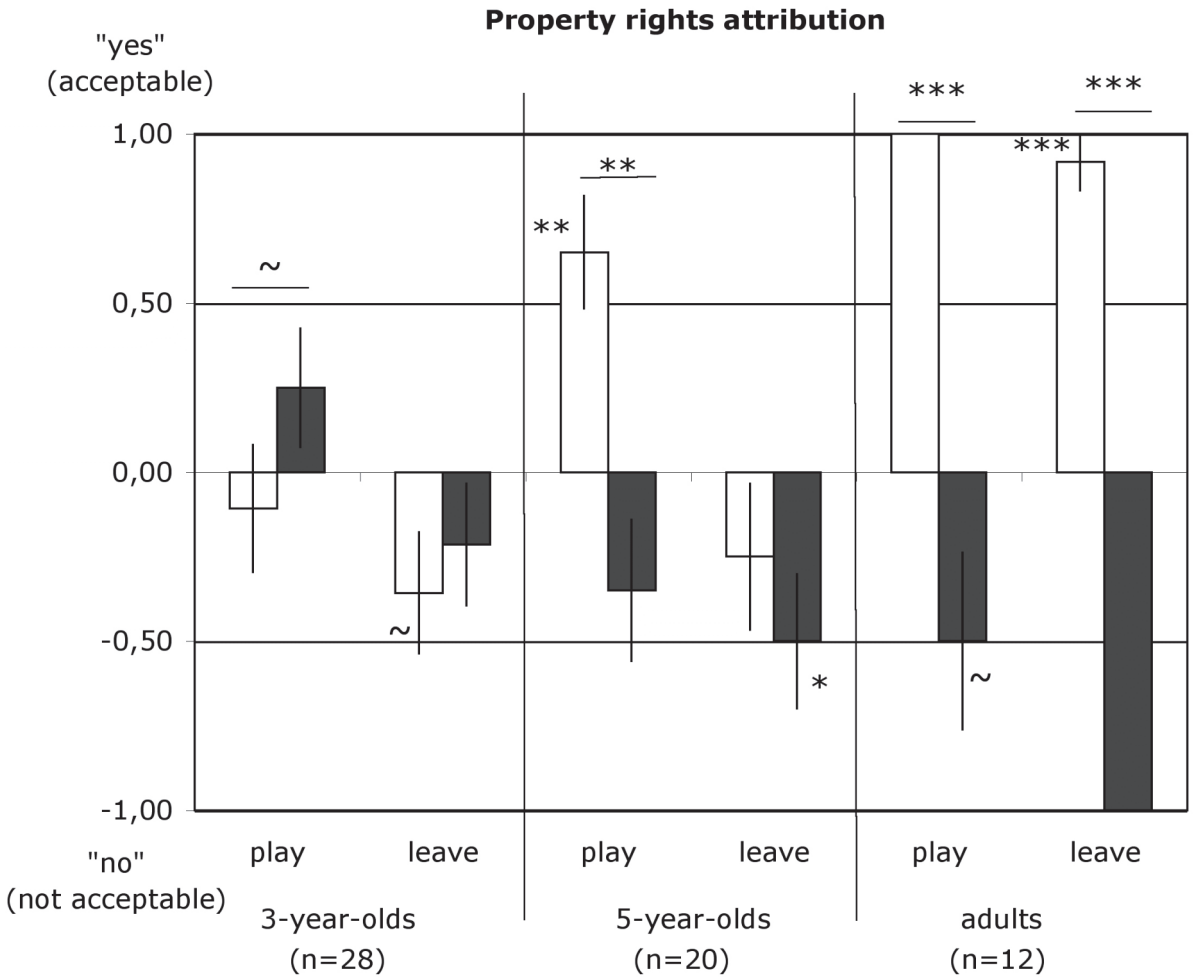


Figure C2-4. Attribution of property rights to second possessors (Mr. Green and Mr. Blue) by 3- and 5-year-old children and adults, in Study 1a.

Rights attributed to the illegitimate recipient (in black) and to the legitimate recipient (in white). Answers were scored 1 if "yes", -1 if "no", 0 if other or absent for each question. The figure shows the means of participants (and standard errors). ~ p<.1 * p<.05 ** p<.01 *** p<.001.

Overall, Study 1a showed that 3-year-olds did not take into account the mode of acquisition to evaluate the recipient of an object: they had no preference between the legitimate recipient and the illegitimate one. They did not show understanding of property transfers in their attribution of property rights either. 5-year-olds and adults considered the mode of acquisition in their social and moral evaluation and they preferred the legitimate recipient as opposed to the illegitimate one. They also distinguished between the second possessors by attributing different rights to them.

1.2.3. Discussion

Our results show a development between 3 and 5 years of age in children's ability to distinguish between different modes of acquisition of an object, particularly between an illegitimate and a legitimate acquisition, and to use this distinction in their social and moral evaluations. 3-year-olds had no preference between the illegitimate and the legitimate recipients. They performed at chance, making no distinction between the two types of transfer. 5-year-olds and adults preferred the gift-recipient as opposed to the thief. They took into account the acquisition mode in their social and moral evaluation of the characters acquiring an object. We need to be careful when interpreting the results of 3-year-olds. Their lack of evaluation of the agents could be due to a lack of identification of the situations presented. Indeed, they were not able to correctly identify who was the gift-recipient and who was the thief when explicitly asked (even if this lack of identification could also be due to the difficulty of comprehension of the questions). Furthermore, 5-year-olds who answered wrongly to the comprehension questions also failed to make a distinction between the two agents in their social and moral evaluations. But overall, contrary to 3-year-olds, 5-year-olds showed an understanding of property rights. They attributed different rights to the second possessors depending on the legitimacy of their acquisition of the ball. As adults, 5-year-olds considered that only a legitimate recipient had the right to play with the object. A character acquiring an object illegitimately was not allowed to keep the object. So, 5-year-olds showed distinction between the situations in their property rights attributions, and also in their social and moral evaluations. 3-year-olds made no distinction at all between illegitimate and legitimate recipients. Children seem not to differentiate agents in their evaluations before they are able to correctly attribute property rights.

Importantly, the majority of 5-year-olds made a distinction between the two situations, and to make this distinction, they only relied on the actions of the animated characters. Because there were no verbal materials during the presentation of the video clips, they could not rely on verbal cues regarding the valence of the actions or the intentions of the agents. In addition, the emotional expressions of the agents were matched. In particular the victim of the moral transgression showed no distress. 5-year-olds did not base their judgments on the outcomes of the actions, as they were matched in both situations, but on the intentionality of the transfer. In our study, the principal cue to detect the intention of transfer is the body orientation of the first possessor: he is turned away from the agent (in profile with respect to the agent) in the theft condition, and towards the agent (facing him) in the gift-reception

condition. The second cue indicating intentionality concerns the initiator of the act of transfer. In the theft condition, it is the agent who initiates the transfer by approaching the first possessor; while this latter is not showing any sign of will to interact with him. In the gift-reception condition, the first possessor initiates the transfer by reaching his arms out with the ball in direction of the agent. These cues may not be sufficient for the younger children to understand the type of transfer being performed. But 5-year-olds seem able to use these subtle cues to distinguish both situations (without verbal material) and to evaluate the actions.

To control that the characters are not only distinguished based on the fact that only one of the agents is an actor, i.e. initiating the transfer, whereas the other is more passive, in the next study, we test a contrast in which both agents are active. In Study 1b, we compare the negative action of theft to the positive action of giving. Moreover, the action of theft is made clearer. In Study 1a, after the theft, Mr. Red comes as close as he can to the agent, but it is not clear that he wants his ball back. One could consider that he was not stolen but that he let the agent take his ball as he is not clearly claiming it back. At the end, Mr. Red reaches his arms out when the thief approaches, but does not react more when the thief eventually leaves with the ball. So it stays unclear whether he really wanted the ball back. Hook (1993) showed that children from 4 to 8 years of age evaluate negatively a character refusing to return an object to the first possessor requiring it independently of the type of transfer (gift-reception, loan, finding, theft). In our study, if the intention of retrieving the ball would be clearer, maybe even 3-year-olds would consider the thief negatively. This is the second point investigated in Study 1b. In the theft condition of Study 1b, Mr. Red reacts immediately after the theft by reaching his arms out towards the thief with a sound expressing begging for the ball. We test the effect of a non-emotional (or at least not explicitly emotional) reaction from the first possessor: claim for his object back.

1.3. Study 1b: Three- and five-year-olds' evaluations of a *thief* and a *giver*

This study aimed at comparing characters based on their active social behavior in a situation of property transfer: illegitimate (theft) versus legitimate (giving). Children and adults were presented with two non-verbal movie cartoons depicting the transfer of a ball between two characters (illegitimate transfer action vs. legitimate transfer action). One movie represented an agent *stealing* a ball from another character. In the other movie, the agent was *giving* a ball to the other character.

1.3.1. Method

Participants

Twenty 3-year-olds (8 girls; mean age: 43 months, 29 days; range: 37 months, 23 days to 50 months, 27 days), twelve 5-year-olds (4 girls; mean age: 67 months, 19 days; range: 63 months, 21 days to 72 months, 15 days) and twelve adults (8 females) were tested. Participants were French speakers. Adults were recruited from a mailing list of people wishing to participate to experiments in our laboratory; majority of them were students. Children were tested in their preschool. Participants were assigned randomly to one of the four experimental groups allowing counterbalancing of the order of presentation of conditions (theft first or giving first) and of the characters associated to a condition (agent 1 in theft condition or agent 2 in theft condition).

Materials and setting

The disposition of the participants during testing and the material used to design the cartoons were the same as in Study 1a. The same three characters as in Study 1a were seen: a protagonist (the same in both cartoons: Mr. Red) and two agents (one in each cartoon: Mr. Green and Mr. Blue). Only the movie cartoons differed from those presented in Study 1a. The sequence of events in each condition (see Figure C2-5) is described bellow.

In the theft condition:

1. The protagonist (1st possessor) arrives with a ball, and the agent (2nd possessor) arrives with empty hands.
2. The protagonist plays with the ball, and then keeps it under his arm.
3. The agent steals the ball from the protagonist's hands.
4. The protagonist begs for the ball back.
5. The agent plays with the ball.
6. The agent leaves with the ball.
7. The protagonist leaves without the ball.

In the giving condition:

1. The protagonist (2nd possessor) arrives with empty hands, and the agent (1st possessor) arrives with a ball.
2. The agent plays with the ball.
3. The protagonist begs for the ball.
3. The agent gives the ball to the protagonist.
4. The protagonist plays with the ball.
5. The agent tries to return the ball to the protagonist, who refuses to take the ball back.
6. The agent leaves without the ball.
7. The protagonist leaves with the ball.

See Appendix AC2-1 for more detailed descriptions of the stimuli.

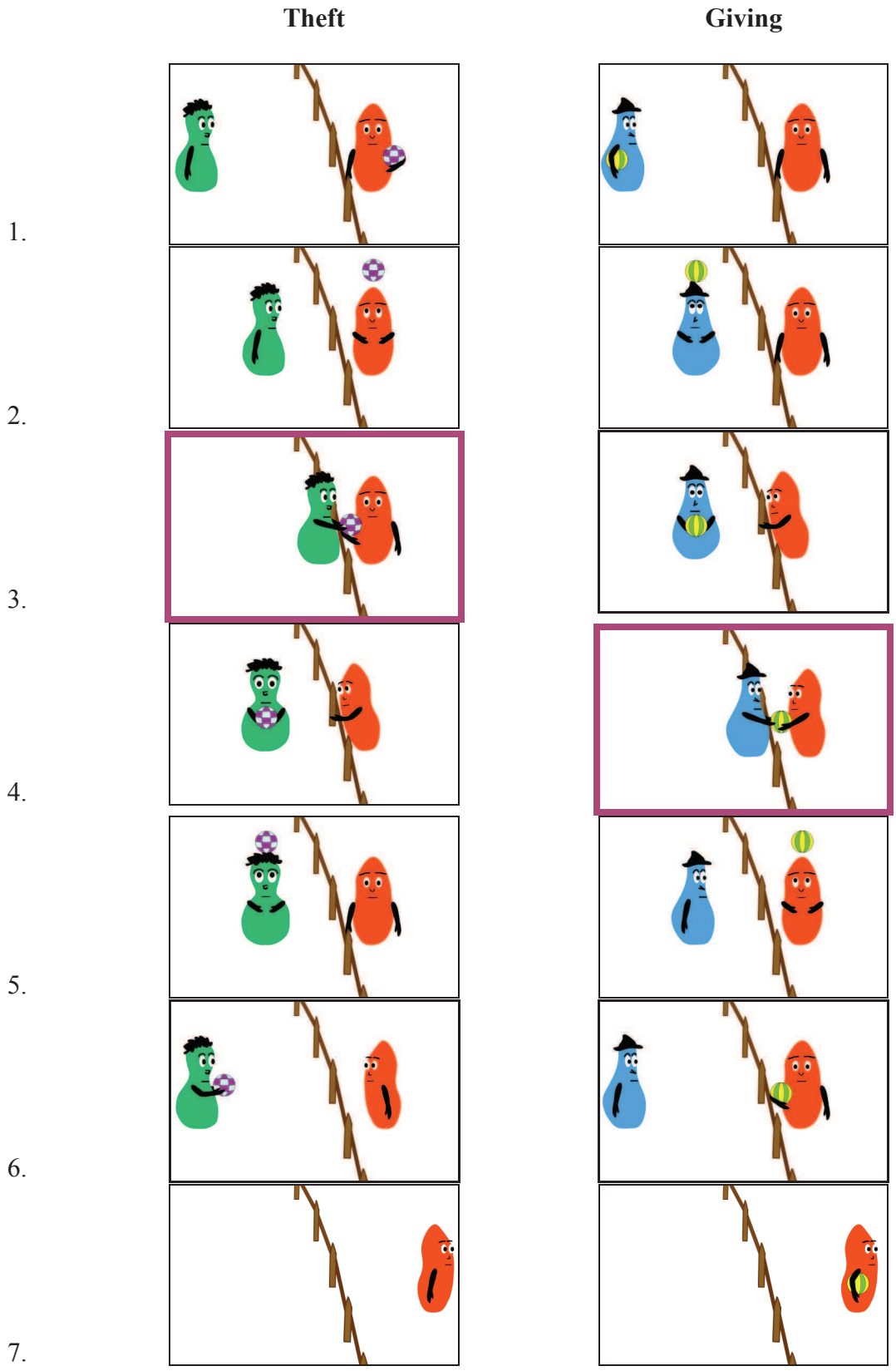


Figure C2-5. Images extracted from each of the cartoons in Study 1b. Outlined in purple, the tested contrast (theft vs. giving).

Considering the agent, the movie representing theft was exactly the reversal in time compared to the movie representing giving, i.e. both agents were executing exactly the same movements but in inverse order. Considering the protagonist, his orientation was reversed in time when comparing both movies, but the main difference lay in his orientation during the transfer. From the perspective of the child, the protagonist was full-face in the theft condition (not looking at the agent who was in profile), and in profile in the giving condition (facing the agent). The overall amount of time the protagonist was in each of these various orientations was matched as much as possible between both movies. The different movements of the protagonist were also matched overall.

Procedure

The procedure was the same as in Study 1a. The experimenter presented and named pictures of the three characters on the screen before playing the movies, and asking the questions (see Table C2-1). As in Study 1a, participants' social and moral preferences were measured and analyzed. Here, in the case of gift-giving, when assessing second possessor's property rights, the questions concern the rights of the protagonist and not of the agent (contrary to Study 1a), as the protagonist is the second possessor of the ball. Finally, participant's comprehension of the situations was assessed through the questions: "Which one gave the ball to Mr. Red?", "Which one stole the ball from Mr. Red?".

Q_{i_eval} (training): - Do you like him? - Is he a good guy? - Is he a bad guy? - Would you like to play with him?

Q_{c_eval} (social and moral evaluation)	Q_{prop} (property rights attribution)	Q_{comp} (comprehension)
- Show me the one you like (adults: Which one do you like?) - Show me the good guy - Show me the bad guy - Show me the one with whom you would like to play	- [The 2nd possessor] was he allowed to play with the ball? - [The 2nd possessor] was he allowed to leave with the ball?	- Which one gave the ball to Mr. Red? - Which one stole the ball from Mr. Red?

Table C2-1. Measures in Study 1b.

(See Appendix AC2-2 for the original version of the questions asked in French)

1.3.2. Results

Social/moral evaluation

As in Study1a, subjects were instructed to make a choice between both characters for each question, even if their preference was not so strong. An evaluation index was computed from the answers to the comparative questionnaire. Each answer was scored 1 if in favor of the giver or in disfavor of the thief, -1 if in favor of the thief or in disfavor of the giver, 0 if other ("both", "none") or absent. The four answers were averaged into an index between –1 and 1 for each subject. A positive index corresponds to a preference for the legitimate agent (giver) over the illegitimate one (thief). Figure C2-6 shows the mean evaluation index as a function of Age.

As preliminary analyses revealed no effects of gender, we did not include gender in further analyses. A 3-way analysis of variance (ANOVA) of Order (theft first or giving first) x Agent (Mr. Blue or Mr. Green as the thief) x Age revealed a main effect of Age ($F(2,32)=17.22$, $p<.001$). The analysis revealed no interactions, and no main effects for Order or Agent. We observe an effect of Age between 3- and 5-year-olds ($F(1,24)=8.61$, $p<.01$). There is a developmental shift in the evaluation of ownership transgressions between 3 and 5 years of age. Comparing the evaluation index to a chance score of 0 for each age group revealed that 3-year-olds' selection of the giver and the thief did not differ from chance ($F(1,16)=0.39$, $p=.54$). Five-year-olds ($F(1,8)=7.84$, $p<.05$) selected more the giver as opposed to the thief than would be expected by chance. All adults selected the giver over the thief.

When comparing the results of Study 1a and Study 1b, a 3-way ANOVA of Order x Agent x Study revealed no main effect of Study for any of the three age groups (*3-year-olds*: $F(1,40)=0.19$, $p=.67$; *5-year-olds*: $F(1,24)=0.21$, $p=.65$; *adults*: $F(1,16)=1.6$, $p=.22$)).

Figure C2-6. Social/moral evaluation of characters involved in property transfers as thief or giver (Mr. Green and Mr. Blue) by 3- and 5-year-old children and adults, in Study 1b.

Answers were scored 1 if in favor of giver, -1 if in favor of thief, 0 if other or absent for each question. The figure shows the means of participants (and standard errors). * $p<.05$

Comprehension

The lack of social and moral evaluation of 3-year-olds could be due to a lack of understanding of the situations and not to a real absence of evaluation of legitimate and illegitimate actions. 3-year-olds answered above chance to the comprehension questions ($F(1,16)=7.2$, $p=.016<.05$), but 5-year-olds answered only marginally above chance to these questions ($F(1,8)=4.5$, $p=.067$). The understanding of the situations cannot be fully assessed through the answers to the comprehension questions. Only adults all responded correctly.

Property rights attribution

The analyses of the answers to the property rights questions of the three populations (3-year-olds, 5-year-olds, and adults) were performed with a multivariate General Linear Model for repeated measures with Condition (i.e. Acquisition mode) as within-subject factor, and Order and Agent as between-subjects factors, for two measures corresponding to the two questions. The results revealed a development in the attribution of property rights (see Figure C2-7). In general, 3-year-olds made no distinction between the conditions ($F(2,7)=1.22$, $p>.1$), whereas 5-year-olds ($F(2,5)=13.54$, $p=.01$) and adults ($F(2,7)=22.31$, $p=.001$) distinguished between the two conditions. When analyzing the results for each question, we found that 3-year-olds made no distinction between the conditions for both questions (play: $F(1,8)=2$, $p>.1$; leave: $F(1,8)=0.17$, $p>.1$). 5-year-olds and adults distinguished between the two recipients in both property rights questions (5-year-olds: play: $F(1,6)=30$, $p<.01$; leave: $F(1,6)=14.4$, $p<.01$; adults: play: $F(1,8)=50$, $p<.001$; leave: $F(1,8)=27$, $p=.001$). See Appendix AC2-3 for more detailed analyses.

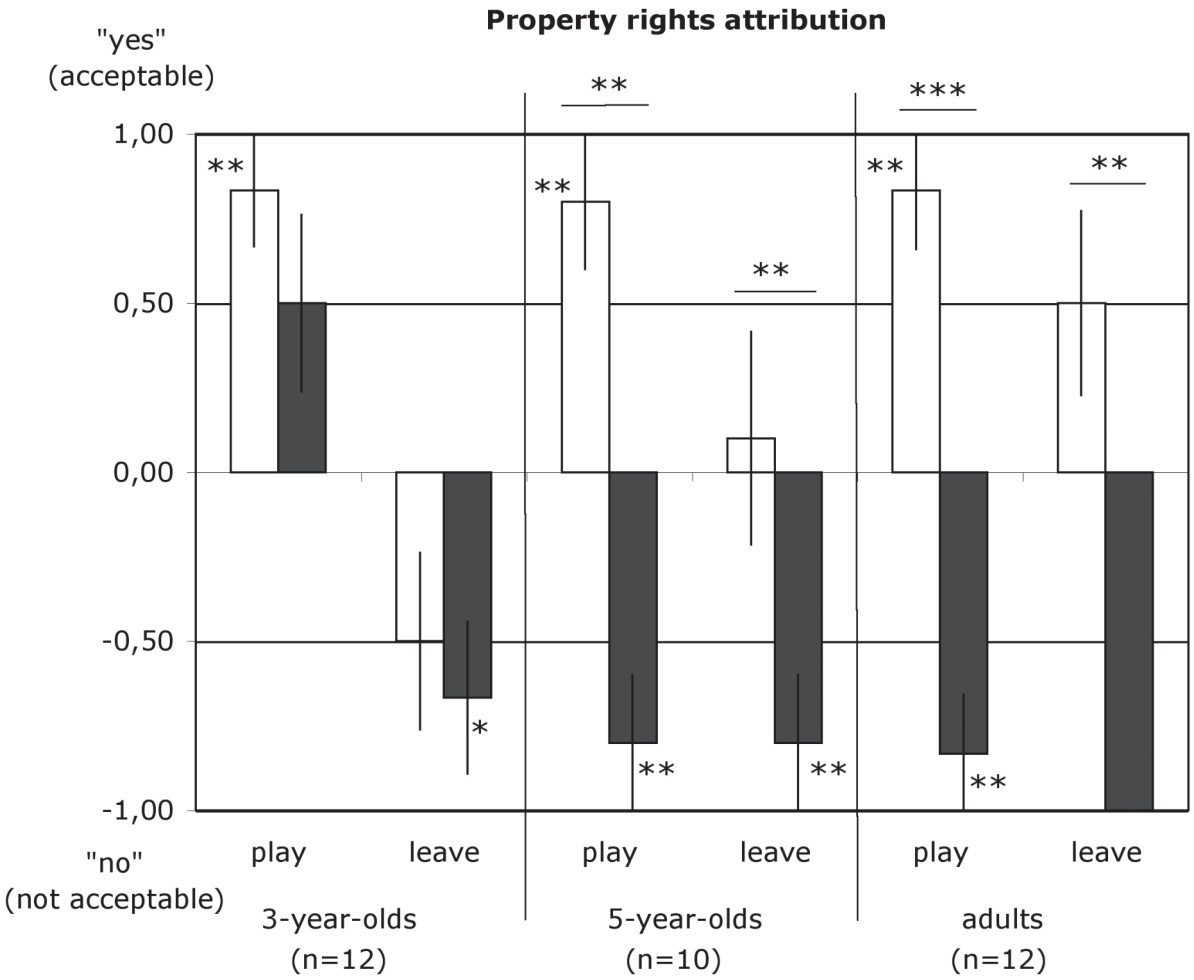


Figure C2-7. Attribution of property rights to second possessors (Mr. Green or Mr. Blue, and Mr. Red) by 3- and 5-year-old children and adults, in Study 1b.

Rights attributed to the illegitimate recipient (in black) and to the legitimate recipient (in white). Answers were scored 1 if "yes", -1 if "no", 0 if other or absent for each question. The figure shows the means of participants (and standard errors). * p<.05 ** p<.01 *** p<.001.

Overall, Study 1b showed (as Study 1a) that 3-year-olds had no preference between the illegitimate agent and the legitimate one. They did not show distinction between the two types of property transfers in their attribution of property rights either, even if they seem to show some understanding of the situations. 5-year-olds and adults considered the valence of the agent's action in their social and moral evaluation and they preferred the legitimate agent as opposed to the illegitimate one. They also distinguished between the second possessors by attributing different rights to them.

1.3.3. Discussion

This study aimed at comparing an illegitimate agent taking an object from another character and additionally refusing to give it back after the begging of the first possessor, and a legitimate agent giving an object to another character. As for Study 1a, our results of Study 1b show a development between 3 and 5 years of age in children's social and moral evaluations of illegitimate and legitimate characters involved in situations of object transfers. 3-year-olds had no preference between the thief and the giver. They performed at chance, making no distinction between the two types of transfer. 5-year-olds and adults preferred the giver as opposed to the thief. They based their judgments on the valence of the social act, evaluating the legitimate agent more positively than the illegitimate one when questioned about their social and moral preferences. These results confirm that 5-year-olds' distinction in Study 1a is not based on a difference of quantity of action, but on a real evaluation of the behaviors.

Contrary to Study 1a, here 3-year-olds responded above chance to the comprehension questions. In particular, they clearly identified the thief, possibly thanks to the immediate reaction of the victim after theft. But, this label was given as a forced choice, and children may not consider the stealing agent as having the characteristics to be evaluated as a real thief and judged badly for his actions. As 5-year-olds responded only marginally above chance to the comprehension questions, caution is still needed in assessment of children's understanding of the situations. Contrary to Study 1a, here 3-year-olds did not answer completely at chance to the property rights questions; the giver was allowed to play, and the thief was not allowed to leave with the object. However, they still made no distinction in their property rights attributions between the two compared situations. As in Study 1a, 5-year-olds (as adults) made a distinction between the illegitimate and legitimate recipients also in their attributions of property rights. A legitimate recipient had the right to play with an object, whereas an illegitimate recipient had not. Only a character acquiring an object illegitimately was not allowed to keep the object (leave with it). So, as in Study 1a, 5-year-olds distinguished the situations in their property rights attributions, and also in their social and moral evaluations. 3-year-olds made no distinction at all between illegitimate and legitimate recipients. Children seem not to make different social and moral evaluations of characters involved in property transfers before they are able to correctly attribute property rights. However, we can notice that the addition of a request after theft helped all participants in their attribution of property rights. Some other cues may also be helpful.

As in Study 1a, 5-year-olds made a distinction between the illegitimate and the legitimate agents, and to make this distinction, they did not rely on verbal cues of the valence of the actions, nor did they rely on explicit emotional reactions of the protagonist. Children could not rely on distress cues as no distress was expressed in any situation. In particular the victim of the moral transgression showed no distress, but only a request. A lot of studies about children's evaluations of illegitimate (or antisocial) and legitimate (or prosocial) actions present characters expressing emotions as the consequences of the other character's actions (e.g. Leslie et al., 2006; see also Blake and Harris, 2009), even if these emotions are sometimes subtle (e.g. "happy" jumping ball in Hamlin et al., 2007). In our study, 5-year-olds could not base their judgments on the emotional consequences of the actions.

In Study 1b, the protagonist was asking for his ball back right after the theft. Thus, the thief is performing two negative actions: the theft and the refusal to give an object back after the request by its owner. The refusal to give back is considered negatively from 4-5 years of age on. Hook (1993) found that children from 4 to 15 years of age and adults considered a character who refused to return an object to the prior possessor as being very bad. In Hook's study however it was made clear by narration that the first possessor asked for the object back and that the second possessor refused to give it. This explicit verbal focus on the refusal to give the object back may have helped the children in their evaluations. In our theft scenario, the claim of the first possessor was less obvious. Then the fact that the second possessor left may not have been considered as a refusal to restitute the object (even if he was compared to a character giving the ball after the begging of the protagonist). The reaction of Mr. Red may still have helped the younger children to recognize that there was an illegitimate transfer of property, even if it did not emerge in their social and moral evaluations. Indeed, 3-year-olds recognized correctly the thief in the comprehension questions, and participants at all ages took into account the refusal to return the object when answering to the property rights questions. Thus reaction of the first possessor after theft seems important to understand the situation. Blake & Harris (2009) found an amplification of correct responses to questions about property rights in the case of an emotional reaction of the first possessor following the transfer. In our study, the theft was entirely non violent, and the victim did not express any emotion. This kind of theft may not be characteristic enough of an illegitimate or antisocial action to trigger negative evaluation of the agent by very young children. Alternatively, young children may simply not consider ownership in their social and moral evaluations. This is consistent with previous studies by Smetana (1981), who showed that 3-year-olds do not consider theft as bad in the absence of rule. Only 4-year-olds do evaluate theft negatively

even in the absence of rule, whereas both 3- and 4-year-olds consider physical harm negatively.

1.4. General Discussion

Our two studies showed a developmental change between 3 and 5 years of age in children's ability to distinguish between illegitimate and legitimate property transfers. Study 1a showed that 5-year-old children (as adults) made the distinction between an agent acquiring an object in an illegitimate fashion (theft) and in a legitimate one (gift-reception). This distinction was honored both in their social/moral evaluation of the agent (with a preference for the legitimate recipient) and in their answers to explicit questions about property rights. In contrast, 3-year-olds made no such distinction. Study 1b showed similar results: 5-year-olds (as adults) also distinguished an illegitimate actor (thief) from a legitimate one (giver), both from the viewpoint of social/moral evaluation (preferring the giver) and property rights, whereas 3-year-olds did not. In a previous study about moral evaluation of property transgressions (Hook, 1993), it is not before 8 years of age that children distinguished between different modes of acquisition, notably between theft and gift-reception, considering all second possessors as bad if they refused to restitute an object to the first possessor. We have therefore shown that children are able to differently evaluate theft from gift-reception (Study 1a) and theft from giving (Study 1b) already at 5 years of age.

The distinctions made by 5-year-olds between the illegitimate character (thief) and the legitimate one (gift-recipient or giver) cannot be explained by a low level factor or a bias. In both studies, the quantity and quality of movements were controlled and matched between both compared situations. In Study 1a, the end result of the transfer is the same in both situations, which controls for a bias towards a preference for the character having an object at the end, and potentially considered as rich or lucky. Indeed, some experiments have shown that children prefer "lucky" characters than unlucky ones (Olson et al., 2006; 2008). In Study 1b, we matched the level of activity of the illegitimate and legitimate characters, both being the initiator of the transfer of property. This shows that our results cannot be due to a difference in level of activity. In addition, we did not use any verbal cueing in our studies, potentially indicating the valence of the actions. Therefore 5-year-olds could only distinguish between illegitimate and legitimate behaviors on the basis of the agent's behaviors, not because of a label given to him. In Blake & Harris' studies (2009), children were presented with verbal stories of gift-reception and theft. Thus, they could have relied on the negative

valence of the word “steal” to side with the first possessor, without the need of additional cues about the distress of the stolen character. In addition, their understanding of the situations was enhanced when the victim of theft reacted negatively and the recipient of a gift reacted positively. In our studies, children could not rely on explicit emotional reactions of the protagonist. In particular, they could not rely on distress cues showed by the victim of the moral transgression (theft), as such cues were not present. Thus, our effect cannot be due to the perception of distinct emotional consequences.

We suggest that 5-year-olds’ distinction between the illegitimate and legitimate characters is due to the negative evaluation of the character performing a property right transgression. The distinction could however also be based on a positive evaluation of the legitimate character. Indeed, in Study 1b, the negative illegitimate behavior was compared to a positive legitimate one. In this situation we cannot disentangle the effect of the negative action from the effect of the positive one. Two arguments can however be advanced in favor of our interpretation. First, it has been claimed that, generally, children are more sensitive to negative than to positive acts. Such children’s negativity bias has been found across many studies (see Vaish et al., 2008 for a review). This suggests that they should be more sensitive to a theft than to a gift. Second, in Study 1a, we compared an active negative illegitimate behavior (stealing) to a neutral (rather than positive) legitimate behavior (receiving), and found an effect not different in magnitude to that of Study 1a. It would still be interesting to perform a direct comparison of a giver and a gift-recipient to investigate the potential effect of the legitimate behaviors in the evaluations, but the absence of difference in the results between our two studies validates our claim that it is the negative evaluation of theft that leads the comparative evaluation of both agents in each of the contrasts.

One motivation of our work was to determine if there is dissociation between children’s ability to evaluate ownership transgressions and their ability to correctly attribute property rights. The owner of an object has the right of use of his object and nobody else can interfere with this use. He also has the right of exclusivity of use of his possession. This means that the owner has the right to allow someone else to use his object or to exclude someone from the use of his object. Finally, the owner can transfer his ownership rights to someone else (Snare, 1972). Previous research showed that children lack a mature understanding of property rights until 5 years of age (Blake & Harris, 2009; Kim & Kalish, 2009). As in previous studies, we investigated the right of the second possessor to leave with the object, and found consistent results. Only from 5 years of age on, children attributed different rights to illegitimate and legitimate recipients. In addition, we also investigated the second possessor’s right of use of

the object, which was not studied previously. Similarly, 5-year-olds but not 3-year-olds made a distinction between the recipients according to their mode of acquisition, allowing only the legitimate recipient and not the illegitimate one to use the object. 5-year-olds may consider the rights of the owner (or first possessor) of an object in their evaluation of characters interacting with him and potentially interfering with those rights. Alternatively, the evaluation of property transfers may not rely on considerations of property rights but be processed by an independent system that may be operational at a younger age. We investigated whether young children exhibit a property sense through their evaluations of property transgressions before they explicitly reason about property rights and are able to answer questions concerning those rights. However, we found no dissociation between these two measures. Our results suggest that the two are "correlated"[C2-2]. At 3 years of age, children do not have a mature understanding of property rights, and they are not evaluating property transgressions either. At 5 years of age, children are able to correctly answer questions about property rights, and they are also able to judge transgressions of property rights. This shows that 5-year-olds reliably track and evaluate property transfers in third parties. As discussed earlier, since our movies did not include any verbal materials regarding property transgressions, the valence of the behaviors had to be inferred from the actions of the characters. To determine the valence of the actions, children had to identify the intentions of the different characters, but could not rely on explicit emotional consequences. Our results extend previous findings about the understanding of property transfers at 5 years of age to children's social and moral evaluations of second possessors involved in those transfers. Further studies could investigate whether children's evaluations are based on their understanding of property rights, or present independently. In any case, the evaluative system seems not to be operational at a younger age, but only at the same age when children understand property rights.

In our studies, 3-year-olds did not evaluate differently illegitimate and legitimate property transfers. This is consistent with their lack of understanding of property rights. Does it mean that there is no sense of ownership present in very young children? Other studies suggest apparent evaluation regarding ownership in young children. Vaish et al. (2009) have shown that 18- and 25-month-olds show more empathy and sympathy for a character whose property has been stolen or destroyed, compared to a character to whom nothing bad happened. It seems thus that very young children do encode ownership transgressions, and

[C2-2] We consider that there is a "correlation" in the sense that at a given age children are able to correctly answer to either none of our measures or to both of them. See Appendix AC2-4 for statistical analysis of correlations between our two measures.

show concern for the victims of such transgressions. At 3 years of age, children intervene in third parties interactions when there is a property right transgression (Rossano et al., 2011; Vaish et al., 2011). They protest against the act of a puppet stealing, throwing out, or destroying a piece of property from the experimenter or another puppet. 3-year-old children also withdraw their help more from an individual who stole or destroyed the property of someone else than from a neutral individual who made no transgression (Vaish et al., 2010). All these studies however did not directly measure children's judgment about a transgressor. We don't know whether children's ability to detect a transgression would lead to a negative moral evaluation of the transgressor. Moreover, the actions presented in these various studies included not only theft but also destruction of property, which is more violent and thus may involve another system, based on harm and not on ownership. Other researchers directly measured infant's evaluations of characters in interactions involving a piece of property. Hamlin & Wynn (2011) have shown that infants as young as 5 month of age show preference for a character returning a ball to the first possessor of the ball compared to a character keeping the ball. However, their results could be interpreted in terms of cooperation (i.e. as a preference for a cooperative partner compared to a non-cooperative one), or as the authors claim in terms of goal attribution and prosociality (i.e. as a preference for a helper compared to a hinderer), and not in terms of ownership. Overall, these studies did not really measure the evaluation of theft, as did our studies. These studies have shown that by 3 years of age children understand and evaluate prosocial and antisocial behaviors (see also Hamlin et al., 2007), but they did not show clear evaluation of property transfers. Most often the antisocial acts that were studied involved physical harm. Theft seems to be an act more difficult to identify as antisocial for young children. Smetana (1981) showed that both 3- and 4-year-olds consider hitting as wrong, but only 4-year-olds consider taking another's property as wrong in the absence of rule. Only when young children are involved in the events, they take property transgressions into consideration. When they participate in the interactions, 20- and 30-month-olds respond negatively to moral transgressions including hitting or taking of property (Smetana, 1984). However, our results suggest that when young children do not take part in the interactions but are only third-party observers they do not evaluate property transgressors.

There are two possible interpretations of our results showing a correlation between property rights and evaluation. The first possible interpretation is that our stimuli were not clear enough to engage the younger group in social and moral evaluation. In the absence of emotional consequences, theft may have not been clearly identified as a property right transgression. In a study by Weisberg and Leslie (2009), the presence of a victim's negative

emotion amplifies the badness of an action. The second possible interpretation of our results is that evaluations of property transgressions are made at the same time as property rights are learned. Children have an understanding of property rights at 4-5 years of age (Blake & Harris, 2009), and they also evaluate theft negatively at 4 years of age (Smetana, 1981; Weisberg & Leslie, 2009). Earlier, children may not consider ownership issues in their evaluations. Alternatively, children may encode the action of theft as being a transgression but not necessarily evaluate this action and the actor as being bad. Indeed, young children show concern for a victim of theft (Vaish et al., 2009), but do not consider theft as wrong in the absence of rule before 4 years of age (Smetana, 1981).

The next study tries to tease apart these two interpretations. We investigate whether 3-year-old children are engaged in social and moral evaluations when the stimuli are clearer with emotional cues that could confirm the presence of a transgression. We have seen that Studies 1a and 1b did not entail negative consequences expressing harm. In particular, there is no display of distress by the victim of theft. Without any emotional cue confirming the presence of harm, 3-year-olds may not engage in social and moral evaluations. In Study 2, we examine the evaluation of the mode of acquisition (illegitimate vs. legitimate) as in Study 1a, and compare it to the evaluation of the same situations but with the presence of negative emotional consequences. Importantly, the same consequences are displayed in both the illegitimate and the legitimate conditions, so that children could not rely only on the presence of crying but would have to evaluate the whole situation in each condition. If 3-year-olds make a distinction between the illegitimate and legitimate recipients in the presence of distress cues, it would mean that they have the ability to evaluate property transfers, but that they only need to be in presence of clear property transgressions to activate evaluations.

2. Study 2: The role of emotional cues in young children's evaluation of ownership transgressions

2.1. Introduction

Study 1 showed that 3-year-olds do not distinguish between illegitimate and legitimate actions in interactions involving ownership, while 5-year-olds do. In these experiments, the owner did not react to the agent's illegitimate action. Arguably, without any reaction of the owner, 3-year-olds may simply not engage in social and moral evaluation. In situations dealing with ownership transgressions, as the theft condition of Study 1, the transgression may be difficult to detect because there is no evidence of the presence of "harm". The first possessor is not protesting or expressing negative emotion. With this absence of evident negative consequences, younger children may consider that nothing bad happened, and thus not engage in social and moral evaluation of the agent. Thus, emotions may be necessary to young children to understand the situation. As negative emotional expression is often a cue of the presence of harm it could act as a trigger to social and moral evaluation of property transfers. Then, emotions could be used at early ages to tune the system processing situations involving ownership.

The role of emotion in moral judgments was largely debated. As discussed in the general introduction (Chapter 1), there are two schools of thought about moral judgments: rationalists (e.g. Kant, 1785/1959; Kohlberg, 1976; Piaget, 1932/1965) consider that moral judgments are made through a rational process, whereas intuitionists (e.g. Hume, 1776/1965; Prinz, 2006; Haidt, 2001; see also Hauser, 2006) consider that moral judgments rely on emotions. These two points of view about the necessity of emotion for moral judgment are also present in research about children's moral judgments. Some authors (Kohlberg, 1976; Piaget, 1932/1965; Turiel, 1983) consider that children's moral judgments are based on reasoning, whereas others (Blair, 1995; 1996; 1997; Hoffman, 2000) insist on the importance of emotions in moral development. The proponents of an emotional account for moral judgment consider that the judgments are based on the emotion felt by the evaluator when seeing a moral transgression. The evaluator's emotion is argued to affect his judgments. But the role of the emotion perceived in the situation (i.e. displayed by the victim of a moral transgression) stayed largely unexplored. In the large majority of studies about children's moral judgments, the victim of a moral transgression was always seen or said to be expressing a negative emotion (e.g. Smetana, 1981; 1983; Nucci, 1985; Turiel, 1983). These studies

showed that children are able to distinguish moral from conventional transgressions and the authors claimed that children are able to make true moral judgments at 3 years of age. But the distinction between moral and conventional transgressions could have relied only on the difference of emotional display (presence of a negative emotion in the moral transgression, but no distress in the conventional transgression) and not on the understanding of harm and thus on a true moral sense.

However, Leslie et al. (2006) showed that children do not rely only on the emotional display to make their judgments, because they do distinguish between justified and unjustified emotions and do not judge a non-transgression as being bad even if it is followed by a display of distress. The character displaying distress after a non-transgression is recognized as a "Cry Baby", crying for no reason. Emotion seems not to play a role in children's ability to recognize a moral transgression as they do not consider a non-transgression with the presence of emotion to be a moral transgression, but emotion may still play a role in moral judgments and particularly for the recognition of less evident types of moral transgressions, such as ownership transgressions. Vaish et al. (2009) showed that emotional expression by the victim of an ownership transgression is not necessary to elicit young children's sympathy and empathy towards the victim. However, a sympathetic reaction does not constitute a moral judgment. Children's sympathy for the victim may not lead them to blame the agent of the transgression. Vaish et al. (2010) explored children's evaluation of the actor of the transgression. They showed that children punished (by withdrawing help) an actor who intentionally harmed or intended to harm a victim. In this study, the victim was displaying sadness. So, we still do not know whether young children would consider as bad an actor harming a victim who does not display a negative emotion. In a study of Weisberg & Leslie (2009), the action of theft (analyzed together with destruction and physical harm) was judged negatively by 4-year-olds even without emotion, but the presence of emotion amplified the badness of the action. It seems that the emotion of the victim of a transgression may play a role (even if not central) in moral evaluations. In this study, it is still not the agent who was evaluated, but the situation. More importantly, the stimuli used were verbal and thus the word "steal" may have provided a verbal cue indicating the valence of the action. Also in a study using verbal material, Blake & Harris (2009) showed that the presence of congruent emotions help children to reason about ownership transfers. Blake & Harris (2009) tested two versions of their stories about legitimate and illegitimate acquisitions, varying the emotional content of the consequences of the actions. In the emotionally enhanced scenarios, gift-giving was made clearer by the display of a positive emotion by the recipient, and theft was made clearer by the

display of a negative emotion (sadness) by the first possessor. The authors found an effect of story version: children gave more correct replies to questions about property rights to both stories in the emotional version.

Do emotional cues help young children to evaluate transgressions of ownership rules where the presence of harm (or illegitimacy of the action) may be difficult to detect and the valence of the action is not suggested by the narration? Here, in Study 2, we explore whether young children's moral evaluation of an agent involved in a property transfer is modulated by the affect displayed by the first possessor during the interaction. We performed this study with 3-year-olds and adults, in a 2*2 factor design: legitimacy of the agent's behavior (within subjects): illegitimate versus legitimate conditions, and presence of the first possessor's emotion (between subjects): non-emotional versus emotional conditions. More precisely, we compared agents' mode of acquisition of an object: theft (illegitimate condition) versus legitimate reception (legitimate condition). In each condition, the transfer was immediately followed either by no reaction of the first possessor of the object (non-emotional condition) or by the same negative emotion (sadness) of the first possessor of the object (emotional condition). The non-emotional condition is a replication of Study 1a, but with slightly different stimuli to have a minimal difference when comparing it to the same contrast with emotion. Importantly, as we wanted to avoid the judgments being based only on the consequences and not on the action in itself, we equalized the outcome of both presented situations: in the emotional condition, the same emotion of sadness was displayed after both transfers (the illegitimate as well as the legitimate transfers). This leads to two different situations: the emotion of the first possessor is justified in the case of theft, but is unjustified in the case of giving. This latter case could be compared to the "Cry Baby" scenarios of Leslie et al. (2006), where a character is crying in the absence of a moral transgression. Young children may then judge a character who causes an expected and justified negative emotion as being more "bad" than a character who is only (coincidentally) present when another character unexpectedly shows a negative emotion. As the emotion displayed was the same whether the transfer was illegitimate or not, emotion alone could not act as a cue to differentiate between the illegitimate and legitimate agents. Rather, we hypothesize that negative affect acts as a trigger to moral evaluation.

2.2. Method

As in Study 1, children and adults were presented with two non-verbal movie cartoons depicting the transfer of a ball between two characters. One movie represented an agent *stealing* a ball from another character (who cried or not after the transfer). In the other movie, the agent was *receiving* the ball from the other character.

Participants

Forty 3-year-olds (20 girls; mean age: 42 months, 20 days; range: 40 months, 10 days to 45 months, 14 days), and twenty-four adults (16 females) were tested. Participants were French speakers. Adults were recruited from a mailing list of people wishing to participate to experiments in our laboratory; majority of them were students. Children were recruited from a database of parents who accepted to participate with their child in our studies; they were tested in our laboratory. Half of the participants of each age (twenty 3-year-olds (11 girls) and twelve adults (7 females)) were assigned to the non-emotional condition and half of them to the emotional condition. For each condition of emotion, participants were assigned randomly to one of the four experimental groups allowing counterbalancing of the order of presentation of conditions of legitimacy (theft first or legitimate reception first) and of the characters associated to a condition of legitimacy (agent 1 in theft condition or agent 2 in theft condition).

Materials and setting

The participants sat in front of a laptop with the experimenter on their side. Children were tested with their parent(s) behind them or on their side. The two cartoon movies were presented on the laptop. The same three characters as in Study 1, and an additional character were seen. Two characters were present in each movie. At whole, four different characters were involved in the situations: two protagonists (one in each cartoon: Mr. Yellow and Mr. Red) and two agents (one in each cartoon: Mr. Green and Mr. Blue). Mr. Yellow was always presented with Mr. Green, and Mr. Red with Mr. Blue. The protagonists were the characters first possessing the object. The agents were the characters acquiring the object either by theft or by gift-reception, so they also corresponded to the second possessors. These two characters were those to be evaluated by the participants. Compared to Study 1, Mr. Yellow was

introduced because of the emotional condition, where the crying of the same protagonist to two different actions by the agents could reduce his credibility and thus diminish the legitimacy of crying in the theft condition. The sequence of events in each condition (see Figure C2-8) is described bellow, with the differences between both conditions of legitimacy in bold, and between both conditions of emotion in italic.

In the theft condition:

1. The protagonist (1st possessor) arrives with a ball, and the agent (2nd possessor) arrives with empty hands.
2. The protagonist plays with the ball, and **then keeps it under his arm**.
3. **The agent steals the ball from the protagonist's hands.**

In the non-emotional condition:

4. The protagonist turns himself towards the agent but *stays inexpressive.*
5. The agent plays with the ball.
6. The agent stops playing, and the movie ends.

In the emotional condition:

4. The protagonist turns himself towards the agent and *starts to cry*[C2-3].
5. The agent plays with the ball.
6. The agent stops playing, and the movie ends.

In the legitimate reception condition:

1. The protagonist (1st possessor) arrives with a ball, and the agent (2nd possessor) arrives with empty hands.
2. The protagonist plays with the ball.
3. **The protagonist gives the ball to the agent.**

In the non-emotional condition:

4. The protagonist *stays inexpressive*.
5. The agent plays with the ball.
6. The agent stops playing, and the movie ends.

[C2-3] He shows a facial expression of sadness, and a verbal expression of distress.

In the emotional condition:

4. The protagonist *starts to cry*.
5. The agent plays with the ball.
6. The agent stops playing, and the movie ends.

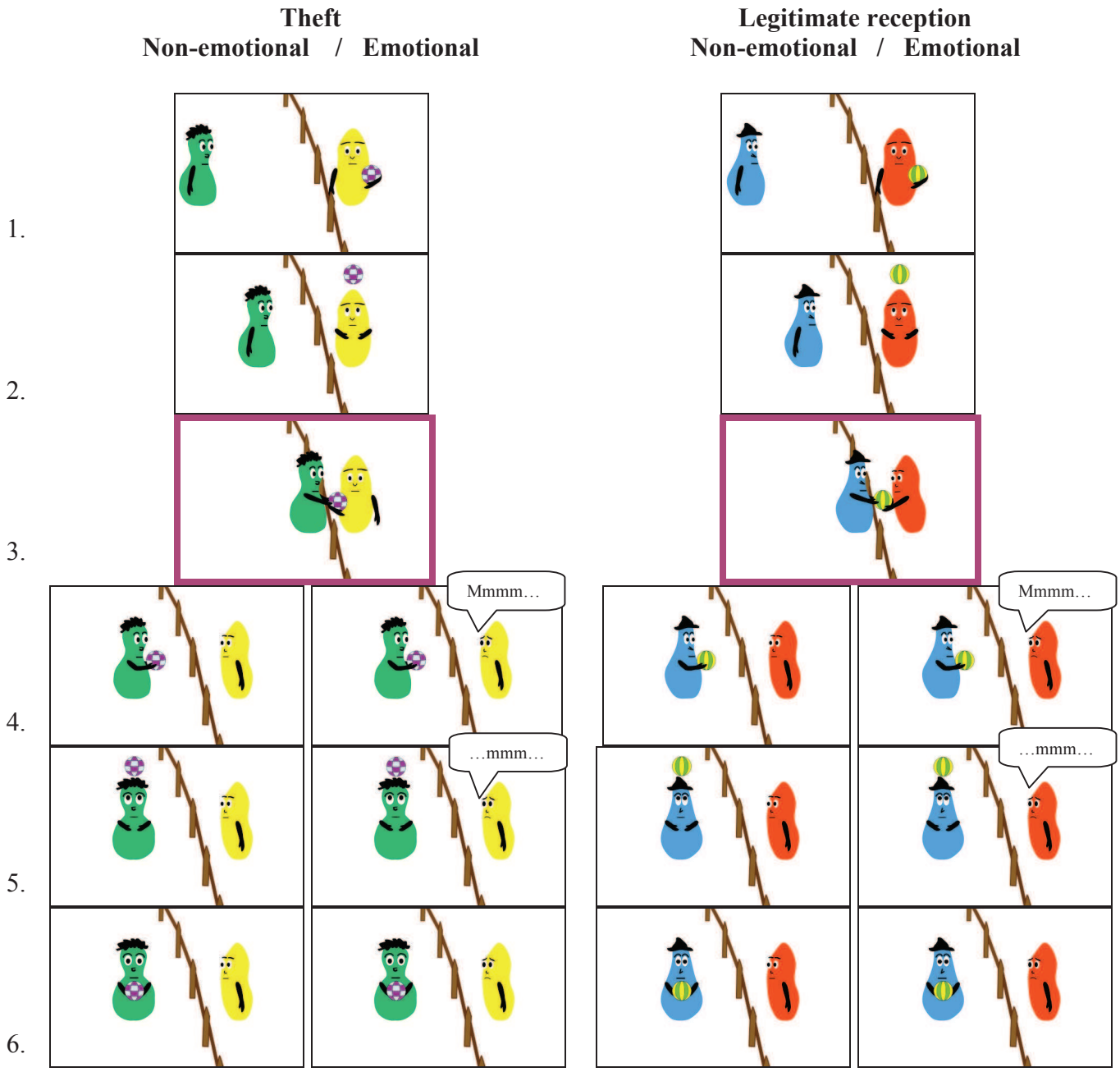


Figure C2-8. Images extracted from each of the cartoons in Study 2. Outlined in purple, the step being different between both conditions of acquisition.

As in Study 1a, movements of the characters were matched between both movies seen by a participant (either non-emotional or emotional condition). Considering the agent, the movie representing theft was exactly the same compared to the movie representing legitimate reception, i.e. both agents were executing exactly the same movements at the same time in their respective movie throughout the movie. Considering the protagonist, the main difference lay in his orientation during the transfer. From the perspective of the child, the protagonist was full-face in the theft condition (not looking at the agent who is in profile) and in profile in the legitimate reception condition (facing the agent). The overall amount of time the protagonist was in each of these various orientations was matched as much as possible between both movies. The different movements of the protagonist were also matched overall. In both the non-emotional and emotional conditions, the movies ended at the same time.

Procedure

The procedure was the same as in Study 1. The experimenter presented and named pictures of the four characters on the screen before playing the movies, and asking the questions (see Table C2-2). Participant's social and moral preferences were measured and analyzed. Participant's attributions of property rights to the second possessors were also measured. We will not discuss them here but in Chapter 4. Finally, participant's comprehension of the situations was assessed.

Q_{i_eval} (training): - Do you like him? - Is he a good guy? - Is he a bad guy? - Would you like to play with him?

Q_{c_eval} (social and moral evaluation)	Q_{comp} (comprehension)
- Show me the one you like (adults: Which one do you like?) - Show me the good guy - Show me the bad guy - Show me the one with whom you would like to play	- To whom Mr. Red gave the ball? - Which one stole the ball from Mr. Red?

+ Q_{prop} (property rights attribution) not analyzed here.

Table C2-2. Measures in Study 2.

2.3. Results

Social/moral evaluation

As in Study 1, participants were instructed to make a choice between both characters for each question, even if their preference was not so strong. An evaluation index was computed from the answers to the comparative questionnaire. Each answer was scored 1 if in favor of the legitimate recipient or in disfavor of the thief, -1 if in favor of the thief or in disfavor of the legitimate recipient, 0 if other ("both", "none") or absent. The four answers were averaged into an index between –1 and 1 for each subject. A positive index corresponds to a preference for the legitimate recipient over the illegitimate one (thief). Figure C2-9 shows the mean evaluation index as a function of Age for both the non-emotional and the emotional conditions.

As preliminary analyses revealed no effects of gender, we did not include gender in further analyses. A 4-way analysis of variance (ANOVA) of Order (theft first or legitimate reception first) x Agent (Mr. Green or Mr. Blue as the thief) x Age x Emotion revealed a main effect of Age ($F(1,48)=54.99$, $p<.001$), a main effect of Emotion ($F(1,48)=4.32$, $p<.05$), and an interaction between Age and Emotion ($F(1,48)=4.32$, $p<.05$). The interaction comes from the fact that there is no effect of emotion for adults ($F(1,16)=0$), but there is an effect of emotion for 3-year-olds ($F(1,32)=7.72$, $p<.01$). The 4-way ANOVA revealed also an effect of Order ($F(1,48)=6.04$, $p<.05$) and a marginally significant effect of Agent ($F(1,48)= 3.28$, $p=.076$).

Comparing the evaluation index to a chance score of 0 for each age group revealed that adults selected more the legitimate recipient as opposed to the thief than would be expected by chance in both conditions of Emotion (*non-emotional:* $F(1,8)=675$, $p<.001$; *emotional:* $F(1,8)=675$, $p <.001$). For 3-year-olds, the evaluation index was not different from chance in the *non-emotional condition* ($F(1,16)=2.50$, $p=.13$), but was significantly above chance in the *emotional condition* ($F(1,16)=5.72$, $p <.05$).

Comprehension

The lack of social and moral evaluation of 3-year-olds in the absence of emotion could be due to a lack of understanding of the situations and not to a real absence of evaluation of theft and gift-reception. 3-year-olds did not answer above chance to the comprehension

questions in the non-emotional condition ($F(1,16)=2.21$, $p=.16$), but they did answer above chance in the emotional condition ($F(1,16)=7.15$, $p<.02$). However, when separating 3-year-olds in two groups according to their answers to the comprehension questions in the emotional condition, these two groups did not respond differently in their social and moral evaluations ($t(16.40)=1.23$, $p<.05$). The understanding of the situations cannot be fully assessed through the answers to the comprehension questions.

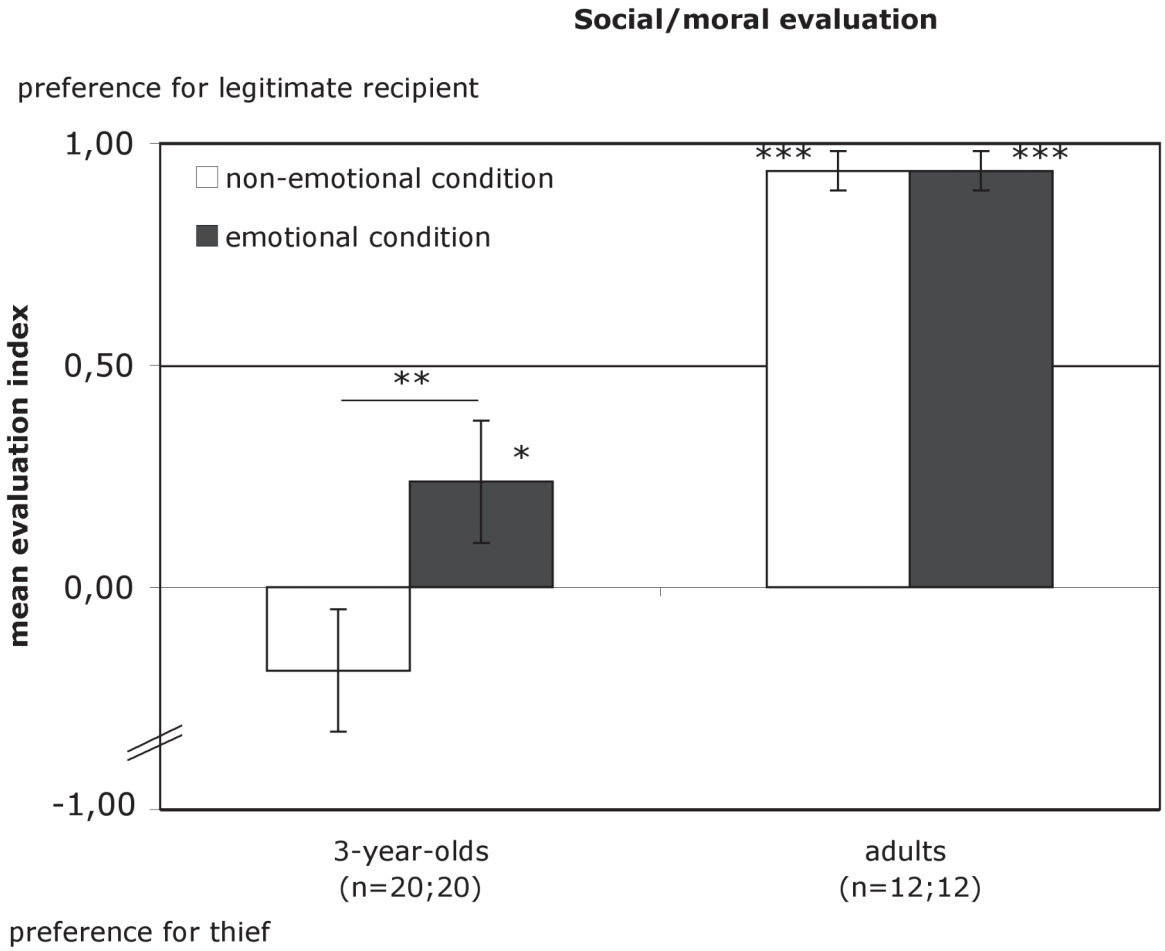


Figure C2-9. Social/moral evaluation by 3-year-olds and adults of characters involved in property transfers as thief or legitimate recipient (Mr. Green and Mr. Blue), without (in white) or with (in black) emotion displayed by the first possessor, in Study 2. Answers were scored 1 if in favor of legitimate recipient, -1 if in favor of thief, 0 if other or absent for each question. The figure shows the means of participants (and standard errors). * p<.05 ** p<.01 *** p<.001.

Overall, Study 2 showed that adults preferred the legitimate recipient as opposed to the thief in both the non-emotional and the emotional conditions, whereas 3-year-olds did so only in the emotional condition, displaying no preference in the non-emotional condition as found in Study 1a.

2.4. Discussion

The presence of emotion modulates 3-year-olds' evaluations

We have shown that in the presence of an emotional reaction of the first possessor after a transfer, even 3-year-old children evaluated agents acquiring the transferred object and showed a preference for a legitimate recipient as opposed to an illegitimate one. 3-year-olds' social and moral evaluations of agents involved in a property transfer are modulated by the affect displayed by the first possessor during the interaction:

- in the absence of any emotional display, 3-year-olds do not evaluate differently an illegitimate and a legitimate acquisition of property;

- in the presence of a negative emotion displayed by the first possessor (expressing a negative consequence to each transfer action, independently of the type of action), 3-year-olds prefer a legitimate recipient as opposed to a thief.

These results show that young children do not evaluate property transfers as adults do. They do not base their evaluation on ownership rules, but seem to consider the potential harm produced by an action, and are sensitive to its visible emotional consequences. Previous findings showed that children do not evaluate a harmful situation only on the basis of its emotional consequences. Vaish et al. (2009) presented to 18- and 25-month-old children an actor who takes and destroys objects from another person. They measured children's concern looks and subsequent prosocial behavior (sharing) towards the victim. They showed that children express more sympathy for a victim of a harmful behavior (both because of harm due to taking and destruction of the victim's property) compared to a character who was not harmed (neutral condition). In Vaish's study, children expressed sympathy and empathy for a victim who was not displaying a negative emotion. The authors suggest that children evaluate the situation trough affective perspective taking. To compare these results to our studies, we would need to measure children's help towards the victim of theft and compare it to a neutral character. It is important to compare a thief with a neutral character instead of a character giving an object in order to avoid children's behavior being driven by indirect reciprocity (Olson & Spelke, 2008). We could also analyze whether children look at the protagonist more in the illegitimate condition. In our studies, we did not assess children's concern for the victim but their evaluation of the agent of the harmful behavior. Having sympathy for a victim may not imply that one has antipathy for the harmful agent. Vaish et al. (2009) showed that the emotion of the victim is not needed to elicit sympathy for the victim. Children can

understand that a situation is harmful/painful even in the absence of emotional cues. However, we do not know whether they would blame the actor responsible of it. Vaish et al. (2010) showed that 3-year-olds help less an actor who intentionally harmed someone else compared to a neutral actor, but they help equally an actor who helped someone else compared to a neutral actor. They also help less an actor who intended but failed to harm someone else compared to a neutral actor, but they help equally an actor who performed harm accidentally compared a neutral actor. In these studies, in the case of harm, the victim showed sadness. Thus, children punished (by withdrawing help) an actor who intentionally harmed (or intended to harm) a victim who expressed suffering. However, they did not show complete antipathy for the harmful agent as they also helped him if he was the only actor needing help (after a first help to the other actor). Moreover, we do not know from these studies whether an actor harming a victim who is not expressing suffering would be considered as bad.

Leslie et al. (2006) and Weisberg & Leslie (2009) showed that what matters for children's moral evaluations of different situations is not the emotion expressed by the victim but the type of transgression: moral transgression is worse than conventional transgression, which is worse than no transgression. In a conventional transgression, there is usually no distress displayed. To investigate the role of harm in the evaluation of moral transgressions, and show that these evaluations (and the distinction between moral and conventional transgressions) do not solely rely on the presence of distress cues, Leslie et al. (2006) introduced a new type of situation: the Cry Baby scenario. In this situation there is no transgression but one character still cries. As this condition includes distress, it differs from a moral transgression only on the type of action and not on the emotional consequences of the action. Children (4-year-olds and autistic children) recognized that the actions performed in the Cry Baby situations were not bad, and thus these actions were not considered as moral transgressions despite the presence of distress. Children even judged the actions of eating one's own cookie and of taking one's turn on a swing, which represented non-transgressions, as being good ("OK"). The Cry Baby scenarios entailed the authorization of the teacher to perform the action. But, when compared to a moral transgression following authorization, children still made the distinction between both types of behavior, considering the non-transgression as good and the moral transgression as bad. In the study of Weisberg & Leslie (2009), to judge a moral transgression as bad, emotion is not needed. This could be due to the fact that the scenarios are typical harm scenarios (hitting and hair pulling), where it is evident that the victim is suffering even if she shows no emotion (and even if the experimenter says to

the child that she is not suffering). So, emotions do not bring additional cues to the presence of harm. To rule out this hypothesis, in a second study, the authors used also "property harm" scenarios (stealing a ball and destroying a painting). In this study, the authors introduced four characters that are supposed to feel pain or not, and supposed to cry or not. To control if the child understood what type of character is involved in a situation, they ask the child if the character will feel hurt and cry. At the moment of the tested transgression, the characters are not showed crying and it is not said that they feel hurt. The authors merged property harm and physical harm in their analyzes claiming that the results showed that children consider property harm to be as bad as physical harm. In both situations, children consider that the victim suffers and cries as much, even when children were told that the "victim" cannot feel pain and does not cry. Children have a bias to consider that the victim suffers, even when this suffering is not displayed (and said not to be present). What matters seems to be whether the victim would feel a negative emotion according to the child, not if she expresses it or not. Nonetheless, the transgression tended to be judged more negatively in the presence of emotion (i.e. in the case of victims that are said to cry). The results of this second study showed that what matters more for moral evaluation of a situation is harm, but that emotions also play a role (contrary to the results of study 1 of Weisberg & Leslie, 2009).

Our study showed that 3-year-olds are sensitive to the emotional consequences of an interaction, but that they consider their legitimacy. Indeed, the emotion displayed by the first possessor was the same whether the agent's behavior was negative or not. Therefore emotion alone cannot have acted as a cue to differentiate between the illegitimate and legitimate agents. Rather, our results suggest that negative affect acts as a cue to the presence of harm, amplifying an action's negative valence, and triggering social and moral evaluation.

"Harm" and "Causality" models

Moral transgressions imply the presence of harm. This harm can be of different forms: physical harm or psychological harm (e.g. harm due to loss of property). In the case of physical harm, it may be evident to detect. In the case of property interactions, the detection of harm may be less evident. Young children may then need some cues to confirm the presence of this harm. We propose that young children's evaluation of social interactions (including property interactions) is based on two mechanisms:

- a forward preliminary analysis of the valence of the actions, some actions being tagged as supposedly harmful, what can lead to sympathy towards the victim (Vaish et al., 2009)
- and a backward evaluation, from a negative emotional outcome, that confirms the presence of harm when it was expected from the preliminary analysis, which amplifies the action's negative valence, what leads to blame the agent of the harmful act.

We hypothesize that the emotional display is used to trigger social and moral evaluations by confirming the presence of a harmful act. Importantly, as already highlighted, the emotional display being the same in both compared situations, the evaluation cannot rely solely on the emotion itself, but has to take into account the intentional structure of the actions. The role of emotion is then to trigger social and moral evaluation on the basis of preliminary analysis of harm. Figure C2-10 presents a model of young children's evaluation of the situations based on harm recognition. When a questionable action is highlighted during the preliminary analysis, a subsequent emotional display is used as a cue to confirm the moral transgression. Here, in the theft condition, when the thief (B_1) takes the object from the first possessor (A_1) without permission, his action is tagged as supposedly harmful. Then, the negative emotion amplifies the badness of B_1's action (expected harm) leading to a negative evaluation of B_1, the agent responsible of the harmful act. When there is no questionable action, no negative evaluation follows. Here, in the legitimate reception condition, no harmful act is detected in the forward preliminary analysis. Thus, there is no negative action to be amplified by the negative emotion (no expected harm). The legitimate recipient (B_2) is not considered negatively. When comparing the thief with the legitimate recipient, this latter is preferred.

Our results could alternatively be interpreted only in terms of causality and not property or even harm. Figure C2-11 presents a model of young children's evaluation of the situations based on causality detection. In this view, the person performing the last action that can account for the negative emotion would be considered as responsible of it and blamed (see Cushman, 2008). In the theft condition, the character, who performed an action just before the negative outcome was the agent, so he would be considered as blameworthy. In the legitimate reception condition, the protagonist was the last character acting just before the negative outcome and the agent was not performing any action that could possibly lead to the negative emotion (his action of reception was more passive), so the protagonist should be responsible for his emotion and the agent should not be blamed for it. Even if reception would be

considered as a causal action, the causality, and thus responsibility, would be shared. However, even if 3-year-old children may have performed only a causal analysis here, at 4 years of age, children do not base their moral evaluations only on causality. Indeed, Leslie et al. (2006) and Weisberg & Leslie (2009) showed that 4-year-old children recognize unjustified crying, and do not consider the action that caused this crying as wrong. In our legitimate reception condition, crying of the first possessor could be considered as unjustified because he intended and initiated the transfer of his object. Thus a negative emotion contradicts his intentions. Even if it is improbable that children in our study would have based their judgments only on causality, our results could nevertheless be interpreted without considering young children's understanding of ownership.

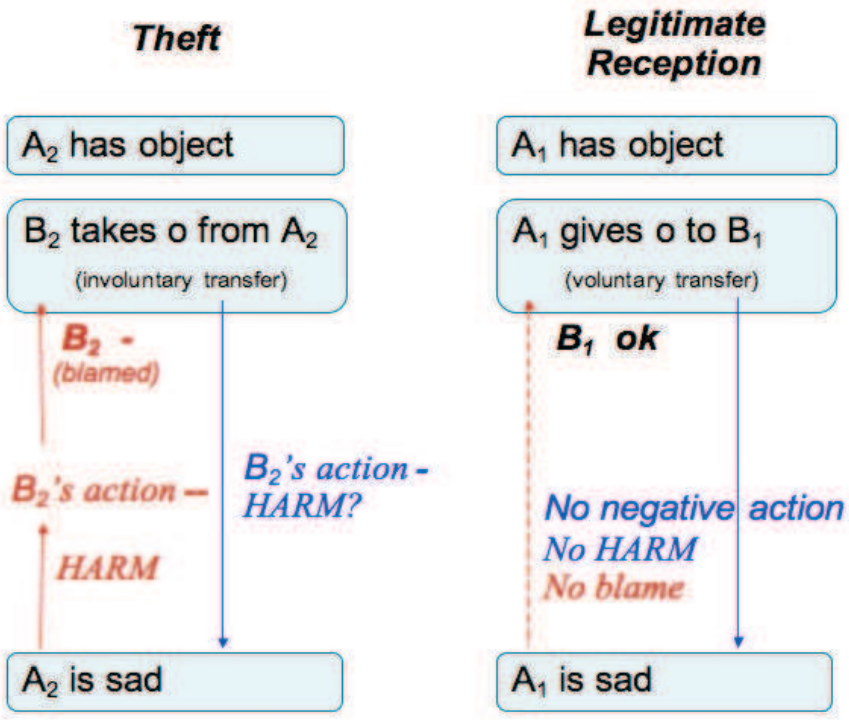


Figure C2-10. Hypothetical evaluation mechanism (of theft and legitimate reception) based on harm recognition in young children (3-year-olds), before mature understanding of property rights.

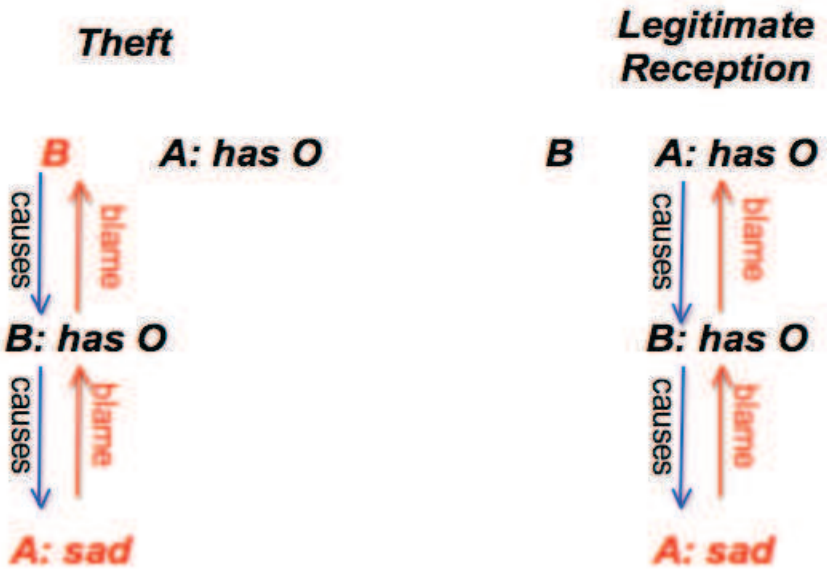


Figure C2-11. Hypothetical evaluation mechanism (of theft and legitimate reception) based on causality detection in young children (3-year-olds), before mature understanding of property rights.

3. Summary

Overall, we have found that 5-year-olds (in Study 1) evaluate property transfers similarly to adults. As adults, they have the ability to distinguish between illegitimate and legitimate transfers of property both through explicit attribution of different property rights to second possessors depending on the legitimacy of the transfer, and through a comparative evaluation of agents involved in the two types of transfer. Importantly, 5-year-olds were able to recognize a theft despite the absence of a negative emotional reaction of the first possessor to the transgression. In contrast, 3-year-olds (in Study 1) do not have a mature understanding of ownership. They are not able to answer questions about second possessor's property rights. Also they are not able to distinguish illegitimate and legitimate property transfers through their social/moral evaluations when the transfers involve no emotions. However, in the presence of distress of the first possessor after the transfer, 3-year-olds (in Study 2) do distinguish theft from legitimate reception. Young children may be using a different system than the system used by older children and adults. This system seems not to be based on ownership understanding in the sense that adults mean it, but based on the detection of harm and/or a causal analysis of the situations. A negative emotional outcome, that is justified, leads to blame the character who caused it. To make this evaluation 3-year-olds do not need to apply property rules. To investigate whether 3-year-olds can evaluate agents' behaviors according to property rules, in the next Chapter we study situations addressing the owner's right to have his possession back after a transfer.

CHAPTER 3: Evaluation of restitution behaviors in property transfers

1. Introduction

In the previous studies, we tested children's and adult's evaluations of illegitimate and legitimate property transfers. We have seen that the comparative social/moral evaluation of illegitimate and legitimate recipients of an object is correlated with the explicit understanding of property rights, which has been acquired at 5 years. There are different types of property rights: the rights concerning the immediate use of the object, and the rights concerning the keeping of the object. With a mature understanding of ownership rights, one considers that if a person acquires property through a legitimate and definitive transfer of ownership, he acquires both kinds of rights. On the contrary, in the case of an illegitimate property transfer, the second possessor has not even the right to play with the object and even less the right to keep it. But, there is also another configuration of property transfer. Indeed, one may transfer an object to someone else through loan. In this case, the recipient should have the right to use the object, but not the right to keep it.

Previous research has shown that even when attempting to present a definitive transfer of ownership, children tend to consider the transfer as temporary. Indeed, it seems particularly difficult for young children to acknowledge that the owner of an object changes after a gift. They exhibit a *first possessor bias*, considering that the first possessor of an object is its owner and that he stays the owner after the object has been transferred (Friedman & Neary, 2008; Blake & Harris, 2009). Young children have difficulty to consider that the previous owner relinquishes his rights to control the object in the case of a definitive transfer of ownership (Kim & Kalish, 2009; see also Cram & Ng, 1989). Thus, it seems that young children consider by default a legitimate transfer of property to be a loan. It has been shown that children lack a mature understanding of ownership before 5 years of age, but this claim came from young children's lack of understanding of definitive transfers of ownership (through gift-giving or selling). Children correctly respond to questions about property rights in the case of loan (Kim & Kalish, 2009), however this could be due to their first possessor bias, as claimed for their responses concerning theft (Blake & Harris, 2009). If children really consider a property transfer as a loan, they may be considering that the second possessor should return the object to the first possessor at the end of the interaction. Even if young children do not consider a property transfer as a loan (in the sense adults mean it), they may still consider that the second possessor should return the object to the first possessor because

of their first possessor bias. The results of Study 1b (Chapter 2) showed that 3-year-olds could consider that the second possessor is not allowed to leave with the object, which suggests that the second possessor may have to return the object. In the next three studies, we investigated children's and adult's evaluation of restitution. In Study 3, we explored 3-year-olds' evaluation of restitution. In Study 4, we investigated 3-year-olds's evaluation of restitution in the presence of emotional cues. Finally, in Study 5, we directly tested the role of emotion in 5-year-olds' evaluation of restitution by comparing situations with and without emotional cues.

2. Study 3: Three-year-olds' evaluation of restitution

2.1. Introduction

In Study 1, we showed that there is a correlation between understanding of property rights and evaluation of illegitimate and legitimate property transfers. Before a mature understanding of the full concept of ownership (not present at 3 years of age), are children evaluating characters acting in concordance with or against expectations raised by their first possessor bias? The first possessor bias could lead young children to prefer a character acting prosocially towards the first possessor (by returning the object to him) compared to a character acting antisocially towards him (by keeping the object). Even in the absence of a mature understanding of ownership, young children may show sensitivity to transgressions of the first possessor's rights. Here, we investigated young children's understanding of the transgression of the right to keep one's property. We measured 3-year-olds (and adult's) preferences between a character keeping a previously acquired object and a character restituting the object to its first possessor. We also verified participant's explicit considerations about second possessors' property rights.

For the situation where the second possessor keeps the object, we used the movie of Study 1a presenting a legitimate transfer. Using the same movie as in Study 1a was done to assess whether the absence of 3-year-olds' comparative evaluation of the two recipients in Study 1a could be due to attention focused on the behavior following the transfer rather than on the transfer itself. In this movie, after the transfer, the agent keeps the ball. This situation represents a transgression of property rights if the transfer is considered as a loan. We compared it to a situation where the agent restitutes the ball.

2.2. Method

This study aimed at comparing characters based on their behavior after a property transfer: no restitution of an object to the first possessor (keep condition) versus restitution of the object (return condition). Children and adults were presented with two non-verbal movie cartoons depicting a legitimate transfer of a ball between two characters and then the restitution or not of this ball by the second possessor to the first possessor. One movie represented an agent keeping a ball previously acquired from another character (the first possessor), and leaving with it. In the other movie, the agent was returning the ball to the first possessor.

Participants

Twenty 3-year-olds (10 girls; mean age: 44 months, 2 days; range: 37 months, 23 days to 50 months, 27 days), and twelve adults (6 females) were tested. One additional child was tested but excluded due to absence of response to the comparative questionnaire. Participants were French speakers. Adults were recruited from a mailing list of people wishing to participate to experiments in our laboratory; majority of them were students. 3-year-olds were recruited from a database of parents who accepted to participate with their child in our studies; they were tested in our laboratory. Participants were assigned randomly to one of the four experimental groups allowing counterbalancing of the order of presentation of conditions (keep first or return first) and of the characters associated to a condition (agent 1 in keep condition or agent 2 in keep condition).

Materials and setting

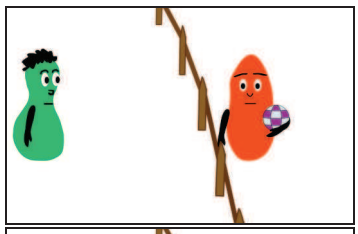
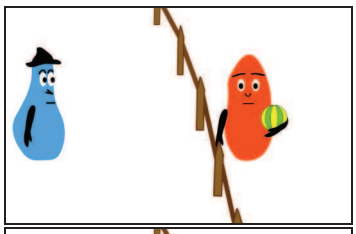
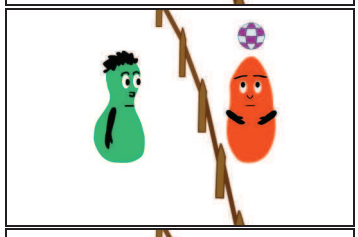
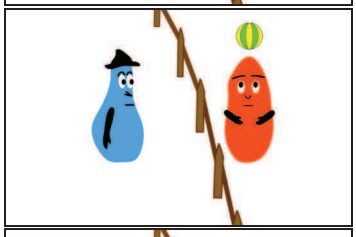
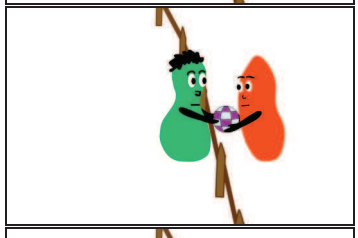
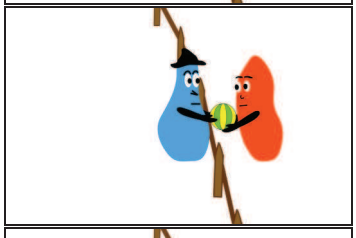
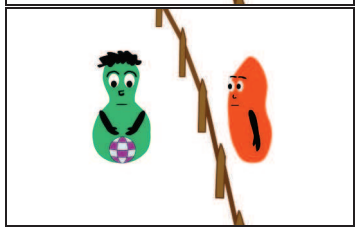
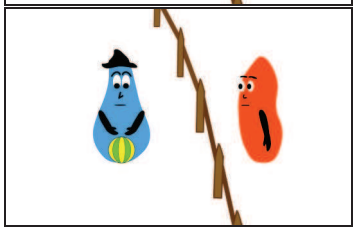
The disposition of the participants during testing and the material used to design the cartoons were the same as in the previous studies. The same three characters as in Study 1 were seen: a protagonist corresponding to the first possessor (the same in both cartoons: Mr. Red) and two agents corresponding to the second possessors (one in each cartoon: Mr. Green and Mr. Blue). The agents were the characters to be evaluated by the participants. The sequence of events in each condition (see Figure C3-1) is described bellow, with the differences between both conditions in bold.

In the keep condition (the same as the gift-reception condition of Study 1a):

1. The protagonist (1st possessor) arrives with a ball, and the agent (2nd possessor) arrives with empty hands.
2. The protagonist plays with the ball.
3. The protagonist gives the ball to the agent.
4. The agent plays with the ball.
5. The agent tries to return the ball to the protagonist, who refuses to take the ball back by moving backward.
6. **The agent does not insist and keeps the ball.**
7. **The agent leaves with the ball.**
8. **The protagonist leaves without the ball.**

In the return condition:

1. The protagonist (1st possessor) arrives with a ball, and the agent (2nd possessor) arrives with empty hands.
2. The protagonist plays with the ball.
3. The protagonist gives the ball to the agent.
4. The agent plays with the ball.
5. The agent tries to return the ball to the protagonist, who refuses to take the ball back by moving backward.
6. **The agent insists to return the ball by approaching further. The protagonist takes the ball.**
7. **The agent leaves without the ball.**
8. **The protagonist leaves with the ball.**

	Keep	**Return**
1.		
2.		
3.		
4.		

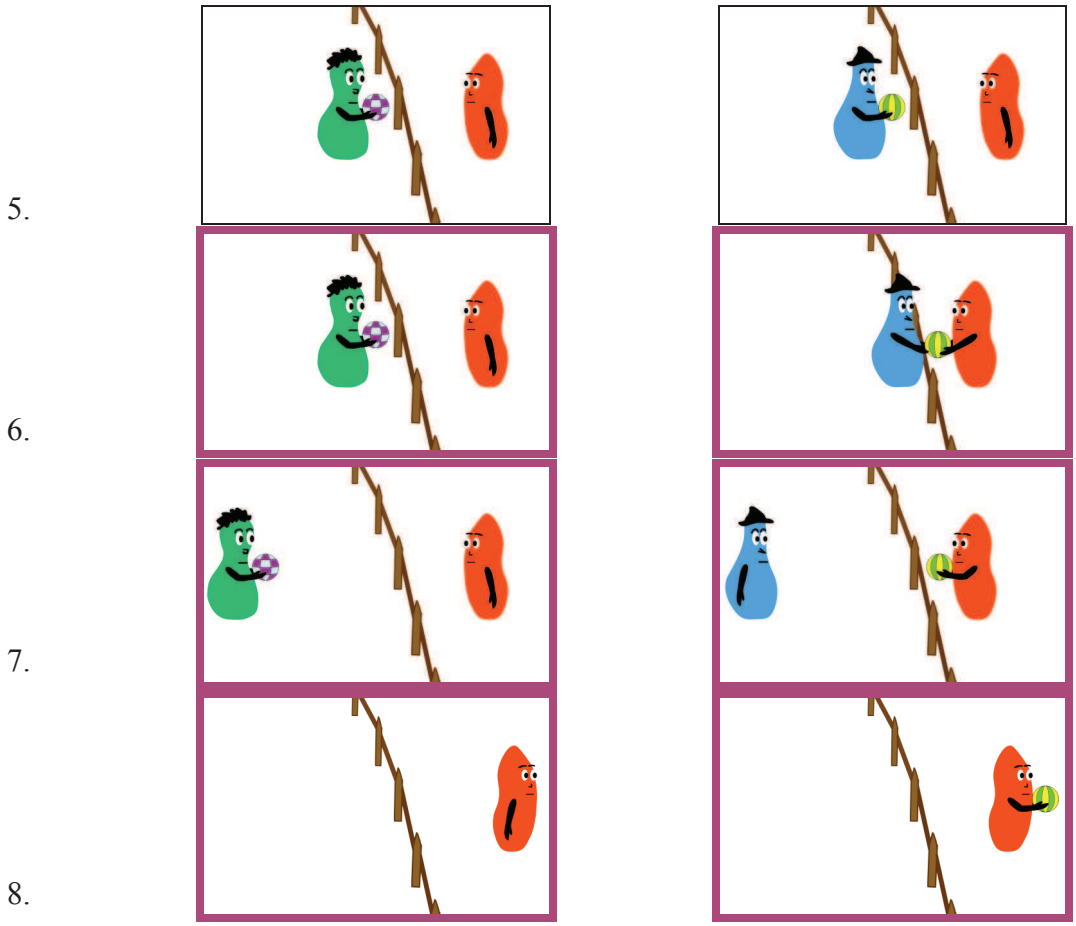
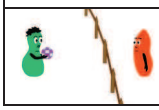
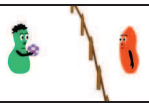
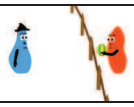
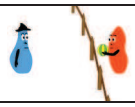


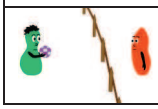
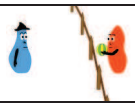
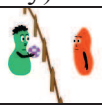
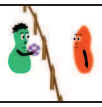
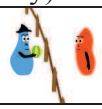
Figure C3-1. Images extracted from each of the cartoons in Study 3. Outlined in purple, the steps being different between both conditions.

The different movements of the agent and of the protagonist were matched as much as possible between both movies. The movies were exactly the same at the beginning, only the last behavior of the agent differed between both movies. Considering the agent, both movies were the same as far as the first transfer was concerned and differed only at the very end with more movement of the agent in the return condition. The amount of time the agent was present on screen and his orientation throughout the movie was exactly the same in both movies. Considering the protagonist, his movements and orientations upon the whole movie were matched as much as possible between both movies.

Procedure

The procedure was almost the same as in the previous studies. The experimenter presented and named pictures of the three characters on the screen before playing the movie cartoons, and asking the questions (see Figure C3-2). As in Studies 1 and 2, participants' social and moral preferences were measured and analyzed. Children's social and moral evaluations of restitution behaviors constitute an indirect evaluation of their consideration of property rights. We also tested children's explicit understanding of what the second possessor should do as far as returning the ball is concerned. Here, three questions about the second possessor's rights were asked. Contrary to the previous studies, these questions were not asked after a full fourth presentation of the movie. In each condition, the movie was not displayed entirely but was stopped after the second possessor has played with the ball and approached the first possessor, who then moved backwards (step 5 of the sequence of events). This was done in order to ask the two questions about the second possessor's rights to keep the ball at the present to facilitate children's understanding. The property rights questions were then: "[The second possessor] was he allowed to play with the ball?", "[The second possessor] is he allowed to leave with the ball?", "[The second possessor] does he have to give the ball back to M. Red?". In this study, we did not systematically ask the participants to answer comprehension questions about who returned and who kept the object.

Movie 1	Movie 1	Q_{i_eval1}	Movie 2	Movie 2	Q_{i_eval2}
					

Movie 1	Movie 2	Q_{c_eval}	Movie 1 (partly)	Q_{prop1}	Movie 2 (partly)	Q_{prop2}
						

Q_{i_eval} (training): - Do you like him? - Is he a good guy? - Is he a bad guy? - Would you like to play with him?

Q_{c_eval} (social and moral evaluation)	Q_{prop} (property rights attribution)
- Show me the one you like (adults: Which one do you like?) - Show me the good guy - Show me the bad guy - Show me the one with whom you would like to play	- [The 2nd possessor] was he allowed to play with the ball? - [The 2nd possessor] is he allowed to leave with the ball? - [The 2nd possessor] does he have to give the ball back to Mr. Red?

Figure C3-2. Procedure and measures in Study 3.
(see Appendix AC3-1 for the original version of the questions asked in French)

2.3. Results

Social/moral evaluation

As in Studies 1 & 2, participants were instructed to make a choice between both characters for each question, even if their preference was not so strong. An evaluation index was computed from the answers to the comparative questionnaire. Each answer was scored 1 if in favor of the reciprocator (i.e. the agent returning the ball to the first possessor) or in disfavor of the keeper (i.e. the agent not returning the ball but keeping it), -1 if in favor of the keeper or in disfavor of the reciprocator, 0 if other ("both", "none") or absent. The four answers were averaged into an index between –1 and 1 for each subject. A positive index corresponds to a preference for the reciprocator over the keeper. Figure C3-3 shows the mean evaluation index as a function of Age.

As preliminary analyses revealed no effects of gender, we did not include gender in further analyses. A 3-way analysis of variance (ANOVA) of Age x Order (keep first or return first) x Agent (Mr. Green or Mr. Blue as the keeper) revealed a main effect of Age ($F(1,24)=16.85$, $p<.001$). The analysis revealed interactions between Age and Agent ($F(1,24)=5.10$, $p<.05$) and between Order and Agent ($F(1,24)=5.29$, $p<.05$), but no main effects of Order or Agent.

Comparing the evaluation index to a chance score of 0 for each age group revealed that 3-year-olds' selection of the reciprocator and the keeper did not differ from chance ($F(1,16)=0.95$, $p=.34$). Adults selected more the reciprocator as opposed to the keeper than would be expected by chance ($F(1,8)=22.23$, $p<.01$).

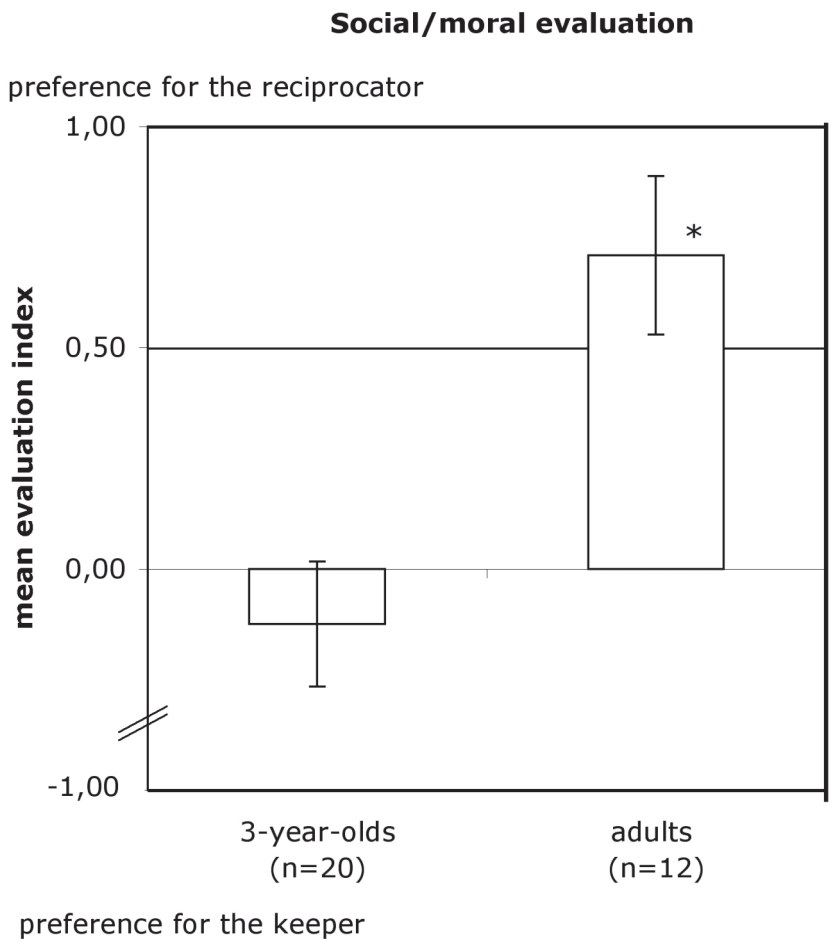


Figure C3-3. Social/moral evaluation of characters differing in their restitution behavior after a property transfer (no restitution vs. restitution) by 3-year-old children and adults, in Study 3. Answers were scored 1 if in favor of reciprocator, -1 if in favor of keeper, 0 if other or absent for each question. The figure shows the means of participants (and standard errors). * $p<.05$

Property rights attribution

We analyzed participants' attributions of property rights in particular to verify that restitution is important in considerations of property transfers (or/and to establish the presence of a first possessor bias). This was assessed through the answers to the questions about the second possessor's right to leave with the object and his obligation to give it back to the first possessor. The answers to the question about the second possessor's right to play with the ball gave us information about participants' understanding of the legitimacy of the transfer.

We performed a General Linear Model with Condition (i.e. presence or absence of restitution) as within-subject factor, and Age, Order and Agent as between-subjects factors, for three measures corresponding to the three questions. The results (see Figure C3-4) revealed no effect of Age on the general attribution of property rights ($F(3,22)= 1.65$, $p=.21$). A marginal effect of Age is present only for the question about the right to play with the ball ($F(1,24)= 4.33$, $p<.05$). The analyses revealed no effect of Condition either ($F(3,22)=1.14$, $p=.36$). There were no interactions and no effects of Order or Agent. In the rest of the analyses, we separated the results of the two populations (3-year-olds and adults), with Order and Agent as between-subjects factors in the GLM. The results revealed a trend towards a distinction of the conditions by adults in their attribution of the second possessor's right to leave with the object ($F(1,8)= 4.5$, $p=.067$). When analyzing the results for each question, we see that both 3-year-olds and adults considered the transfer as legitimate by according the right to play with the ball to the second possessor in both conditions (3-year-olds: keep: $F(1,16)=6.25$, $p<.05$; return: $F(1,16)=7.14$, $p<.02$; adults: they all answered "yes" in both conditions). As far as the two rights to keep the object (temporarily by leaving with it, or definitively by not giving it back) are concerned, participants were at chance in their attribution of the right to leave with the object, except adults in the return condition where they answered "no" significantly above chance ($F(1,8)=8$, $p<.05$). More importantly, participants answered "yes" significantly above chance to the question about the obligation to give the object back to the first possessor in all conditions (3-year-olds: keep: $F(1,16)=5.56$, $p<.05$; return: $F(1,16)=10.29$, $p<.01$; adults: keep: $F(1,8)=8$, $p<.05$; return: $F(1,8)=8$, $p<.05$) Thus, restitution of the ball to the first possessor seems to be expected by the participants.

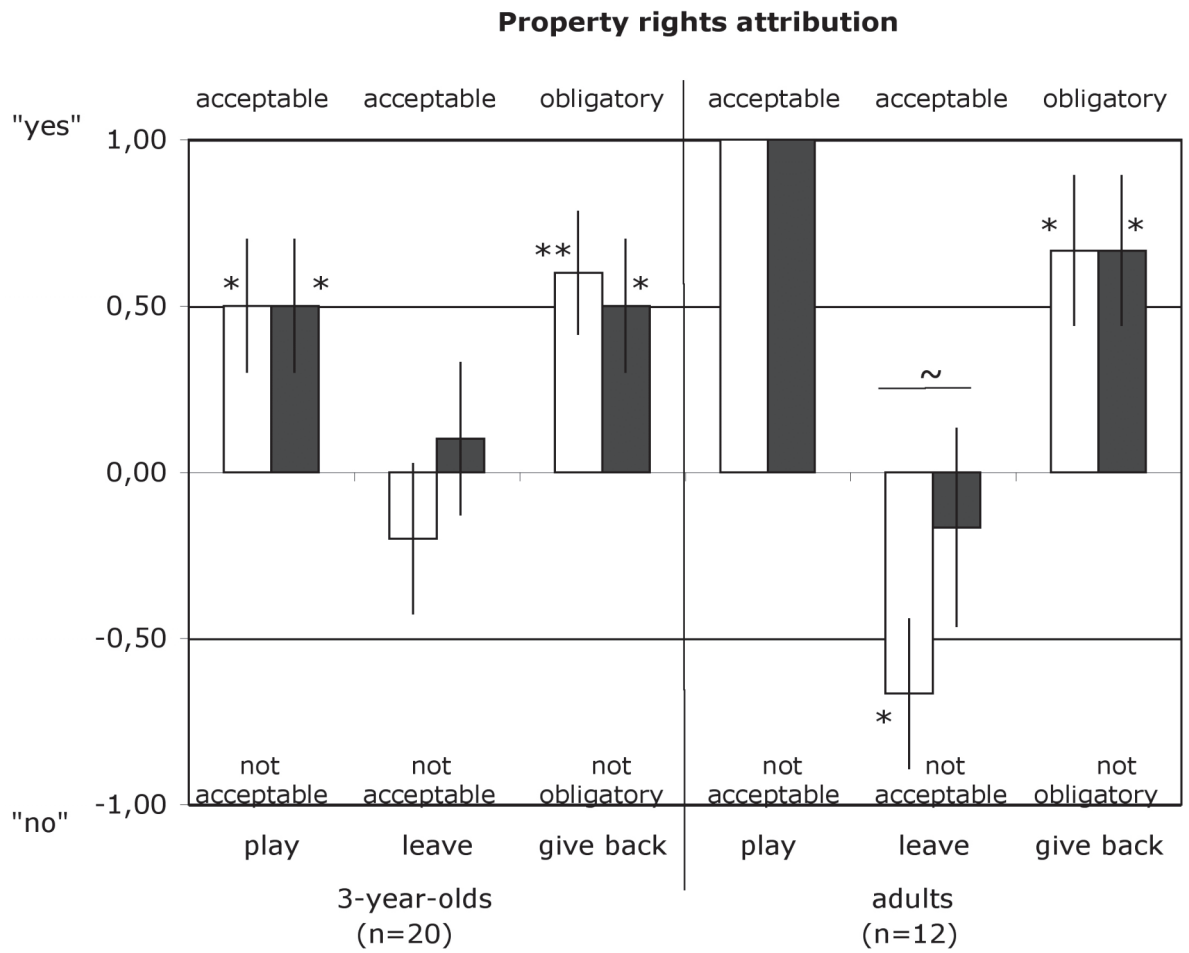


Figure C3-4. Attribution of property rights to second possessors by 3-year-old children and adults, in Study 3.

Rights attributed to the keeper (in black), and to the reciprocator (in white). Answers were scored 1 if "yes", -1 if "no", 0 if other or absent for each question. The figure shows the means of participants (and standard errors).

~ p<.1 * p<.05 ** p<.01.

Correlation between loan bias and evaluation?

We looked whether participants answering that the second possessor should return the object to the first possessor preferred the reciprocator compared to the keeper. We averaged participant's responses to the question about the second possessor's obligation to give the object back into a mean score, and looked at its correlation with the evaluation index. We did not find any correlation (*adults*: r=.35, t(10)=1.16, p=.27; *3-year-olds*: r=.23, t(18)=1.02, p=.32). For the mean score indicating the right not to leave with the object (reversed answers to the question about the right to leave with the object), we did not find a correlation with the evaluation index either (*adults*: r=.18, t(10)=0.57, p=.58; *3-year-olds*: r=.15, t(18)=0.65, p=.52).

Overall, Study 3 showed that 3-year-olds did not take into account the second possessor's restitution behavior to evaluate him: they had no preference between the agent restituting the previously acquired object and the agent keeping the object. However, in their attributions of property rights, they did claim that the second possessor of an object should return the object to the first possessor. Adults considered the restitution behavior in their social and moral evaluations and preferred the agent reciprocating as opposed to the agent keeping the object. They also considered that the second possessor should return the object in their attributions of property rights (However, these two measures were not correlated).

2.4. Discussion

The results show that young children do not distinguish between different types of behaviors occurring after an object transfer, whereas adults do. When presented with a character keeping a previously acquired object and a character returning the previously acquired object to the first possessor of the object, 3-year-olds have no preference between both characters. Adults prefer the reciprocator compared to the keeper. Concerning the attribution of property rights to the second possessors, both 3-year-olds and adults consider that the recipients are allowed to use the object, but that they have to return it to the first possessor afterwards. The authorization to play with the object shows that the transfer is considered as legitimate. The obligation to return the object shows that the transfer is considered as non-definitive. Participants seem not to take into account the unwillingness of the first possessor to take the object back (he stepped back when the agent approached to return the object). This is probably due to the fact that the first possessor finally accepts to have the object back in one of the conditions, which may lead participants to suppose that his movement away from the object was not due to a real renunciation to the object. This result shows the difficulty to present an object transfer as a gift (see Chapter 4 for a detailed analysis of the interpretations of the transfers). With a mature understanding of property rights, if an object transfer is seen as a loan, then a character restituting the object to the first possessor should be seen as acting legitimately and a character keeping the object as acting illegitimately. Adults do prefer the legitimate agent compared to the illegitimate one.

The obligation of the second possessor to restitute the object is part of the first possessor's rights of keeping his property (if he is considered as an owner). It has been shown that the first possessor of an object is considered as the owner of the object (Friedman & Neary, 2008). Thus the attribution of obligation to return the object can be seen as an

understanding of property rights, but also as a response to a first possessor bias. The first possessor bias leads children not to accept definitive transfers of ownership (e.g. Friedman & Neary, 2008; Kim & Kalish, 2009). They seem to see a transfer as a loan. When asked about who should keep an object, young children (2- and 3-year-olds) answer in favor of the first possessor, even after a gift (Blake & Harris, 2009).

We investigated whether the presence of the first possessor bias or loan bias (leading to consider that the second possessor should restitute the object to the first possessor) triggered evaluation of characters acting according or contrary to an expectation of restitution. Our results showed that despite a first possessor bias (expressed in their attribution of rights), 3-year-olds had no preference for a character returning an object to the first possessor in comparison to a character keeping the object. So the loan bias is not expressed in young children's evaluations. In contrast, adults exhibit a loan bias in their attribution of property rights, and prefer the character returning the object. However, the measure of explicit assignment of obligation to return was not correlated with the measure of social/moral evaluations. In this study, answers to the questions about property rights lead to the identification of the type of transfer being performed; they were indications of a loan bias. They did not allow assessing mature understanding of ownership as the transfer was not clear, and the same transfer was shown in both conditions. We have seen in Chapter 2 that there is a correlation between understanding of property rights and evaluation of transfers, and that 3-year-olds lack a mature understanding of ownership. The results here suggest that without this mature understanding, young children do not evaluate the restitution following a transfer either. The first possessor bias may be a precursor to the mature understanding of ownership, and also a precursor to the evaluation of ownership transgressions, but in the absence of mature understanding of ownership we found that no evaluation is made.

Our result showing that 3-year-olds did not prefer the reciprocator compared to the keeper seems inconsistent with previous findings showing that 5-month-old infants do prefer a character returning a previously dropped object to its first possessor compared to a character leaving with the object (Hamlin & Wynn, 2011). However, several elements differ between Hamlin's study and our study (in addition to the fact that Hamlin & Wynn used an implicit non-verbal measure of infant's preferences instead of a verbal measure). Firstly, in Hamlin's study, the transfer of object between the two protagonists is not made through a gift or a loan (that are intentional transfers), but through the accidental drop of the object by the first possessor. Secondly, and more importantly, in our study the first possessor did not ask for the ball back, but on the contrary he stepped back when the second possessor approached to

return the object to him, whereas in Hamlin's study the first possessor expressed his will to recover the lost ball by turning himself several times towards the character who picked the ball up. Hook (1993) showed that not returning an object to the first possessor if he asks for it is considered as bad from 4 years of age on. Begging seems important, and the non-fulfillment of a perceived request may elicit negative evaluation at a very young age. In addition, the first possessor may be perceived as frustrated after the loss of the object. In the other situation, when the second possessor returns the object to the first possessor, it could both be seen as a relief of the first possessor's frustration and as a fulfillment of his requirement, potentially leading to positive evaluation. This difference in evaluation could be only due to the difference in inferred emotions of the first possessor (frustrated vs. relieved). We could also consider the interaction between the two protagonists as social interaction or communication, where the protagonist is asking the other character to interact with him and not begging particularly to retrieve the ball. Then in one condition the second possessor breaks the communication, whereas in the other he responds to it. Thus, Hamlin's results may not have any link with ownership considerations, but with cooperation. Still, reciprocity in property transfers is a form of cooperation, and other studies about reciprocity have shown that young children do act reciprocally or consider that others should act reciprocally (e.g. Olson & Spelke, 2008).

How can we interpret the dissociation between considerations for reciprocity and evaluation of characters acting according to or against these considerations? As we already mentioned it, it is possible that evaluations of property transgressions are only present at the same time as property rights are learned. Earlier, children may not consider property issues in their evaluations. Alternatively, our stimuli may have not been clear enough to engage young children in social and moral evaluation. Even if children consider that the second possessor should return the object to the first possessor, if the absence of restitution is not contested by the first possessor, they may not engage into evaluation. Indeed, the first possessor did not react negatively to the absence of restitution, he even refused the restitution at first. In the absence of negative emotional consequences, the absence of restitution may have not been clearly identified as a property transgression. The next experiment will investigate this possibility.

3. Study 4: Three-year-olds' evaluation of restitution in the presence of emotional cues

3.1. Introduction

Three-year-old children have a first possessor bias, considering that the first person seen in possession of an object is its owner, and expect him to receive his object back after a transfer, yet they do not distinguish between a character returning an object to its first possessor and a character keeping the object in their social/moral evaluations. This suggests that they do not consider the absence of restitution as a transgression of property rights. To be evaluated, the transgression has to be clearly identified. Without any reaction (protest or negative emotion) of the owner of the object to the behavior of the agent, 3-year-olds may not engage in evaluation because no transgression was clearly detected. As for the identification and evaluation of transgression in the way of acquiring an object (see Study 2), young children may need emotional cues to consider the absence of restitution of an object to its first possessor and probable owner as a transgression of property rights. To test this hypothesis, we performed an experiment where the agent's restitution behavior (absence or presence of restitution) is followed by a negative emotion of the first possessor (either being distanced from the object or retrieving it). We compared two conditions: no restitution/keep and restitution/return. In both conditions, the final behavior of the agent (keeping or returning the previously acquired object) was followed by the same negative emotion (sadness) of the first possessor. Importantly, as we wanted to avoid the judgments being based only on the consequences and not on the action in itself, we equalized the outcome of the two presented situations: the same emotion of sadness was displayed in both situations.

As in Study 2, this leads to two different situations: the emotion of the first possessor is justified in the case of keeping, but it is unjustified in the case of returning. This latter case could be compared to the "Cry Baby" scenarios of Leslie et al. (2006), where a character is crying in the absence of a moral transgression. Young children may then judge a character who causes an expected and justified negative emotion as being more "bad" than a character who is only (coincidentally) present when another character unexpectedly shows a negative emotion. As the emotion displayed was the same whether the transfer was followed by restitution or not, emotion alone could not act as a cue to differentiate between the two agents.

3.2. Method

As Study 3, this study aimed at comparing characters on the basis of their restitution of an object to the first possessor: no restitution (keep condition) versus restitution (return condition), but with the presence of a negative emotion expressed by the first possessor after the restitution behavior of the second possessor in both conditions. Children and adults were presented with two non-verbal movie cartoons depicting a legitimate transfer of a ball between two characters, followed or not by the restitution of the ball by the second possessor to the first possessor, who cried in both situations. One movie represented an agent keeping a ball previously acquired from another character. The first possessor cried when the agent moved the ball away from him. In the other movie, the agent returned the ball to the first possessor, who cried after the restitution.

Participants

Twenty-one 3-year-olds (8 girls; mean age: 42 months, 9 days; range: 40 months, 29 days to 44 months, 20 days), and thirteen adults (9 females) were tested. Participants were French speakers. Adults were recruited from a mailing list of people wishing to participate to experiments in our laboratory; majority of them were students. 3-year-olds were recruited from a database of parents who accepted to participate with their child in our studies; they were tested in our laboratory. Participants were assigned randomly to one of the four experimental groups allowing counterbalancing of the order of presentation of conditions (keep first or return first) and of the characters associated to a condition (agent 1 in keep condition or agent 2 in keep condition).

Materials and setting

The disposition of the participants during testing and the material used to design the cartoons were the same as in the previous studies. Two characters were present in each movie. At whole, four different characters were seen (as in Study 2): two protagonists corresponding to the first possessors (one in each cartoon: Mr. Yellow and Mr. Red) and two agents corresponding to the second possessors (one in each cartoon: Mr. Green and Mr. Blue). Mr. Yellow was always presented with Mr. Green, and Mr. Red with Mr. Blue. The agents were the characters to be evaluated by the participants. Compared to Study 3, Mr. Yellow was

introduced because of the display of emotion: the crying of the same protagonist to two different actions by the agents could reduce his credibility and thus diminish the legitimacy of crying in the keep condition. Compared to Study 3, there was no sign of renunciation to the object by the first possessor before the keeping or restitution. We can thus consider here that the transfer is a loan and the absence of restitution a transgression. Another difference with Study 3 is that the characters are not leaving the scene. In particular the agent is not leaving with or without the ball. The sequence of events in each condition (see Figure C3-5) is described below, with the differences between both conditions in bold.

In the keep condition:

1. The protagonist (1st possessor) arrives with a ball, and the agent (2nd possessor) arrives with empty hands.
2. The protagonist plays with the ball.
3. The protagonist gives the ball to the agent.
4. The agent plays with the ball.
5. **The agent keeps the ball by placing it on a rock behind him.**
6. The protagonist **(without the ball)** cries[C3-1].

In the return condition:

1. The protagonist (1st possessor) arrives with a ball, and the agent (2nd possessor) arrives with empty hands.
2. The protagonist plays with the ball.
3. The protagonist gives the ball to the agent.
4. The agent plays with the ball.
5. **The agent returns the ball to the protagonist.**
6. The protagonist **(with the ball)** cries.

[C3-1] He shows a facial expression of sadness, and a verbal expression of distress.

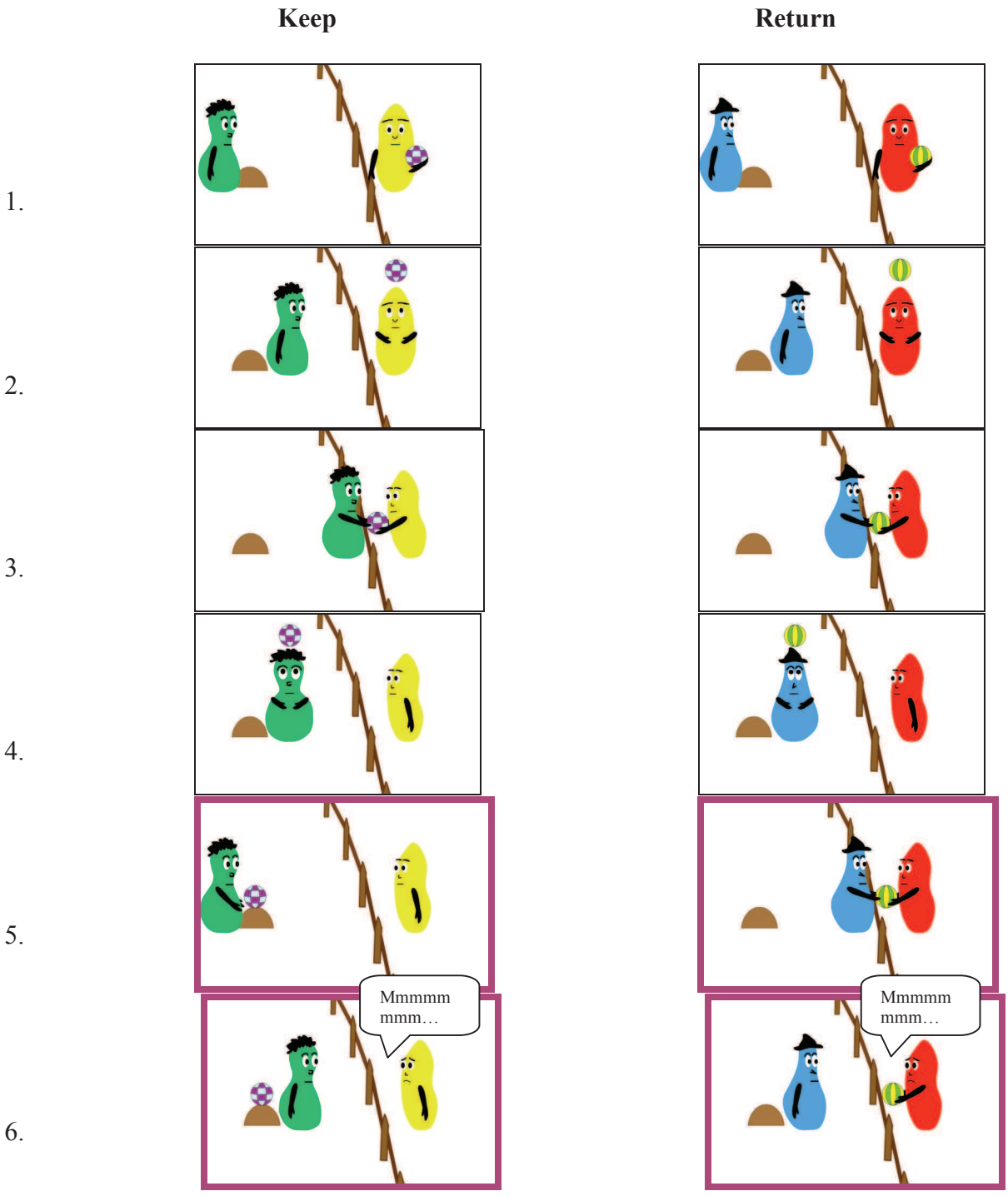


Figure C3-5. Images extracted from each of the cartoons in Study 4. Outlined in purple, the steps being different between both conditions.

The different movements of the agent and of the protagonist were matched as much as possible between both movies. The movies were exactly the same at the beginning, only the last behavior of the agent differed between both movies. Considering the agent, both movies were the same as far as the first transfer was concerned and differed only at the very end where both agents did not move in the same direction, but the amount of movement was the same. The amount of time the agent was present on screen and his orientation throughout the movie was exactly the same in both movies. Considering the protagonist, his movements and orientations upon the whole movie were matched as much as possible between both movies.

Procedure

The procedure was the same as in Study 3[C3-2]. The experimenter presented and named pictures of the four characters on the screen before playing the movies, and asking the questions (see Table C3-1). As in previous studies, participants' social and moral preferences were measured and analyzed. After another presentation of each movie individually, the participants were also asked questions about property rights of the agent (second possessor), and whether the agent did something bad, for each condition. They were also asked a question concerning the justification of the first possessor's emotion: "Did he have a reason to be sad?". Finally, they were asked comprehension questions: between the two agents, "Which one returned the ball?" and "Which one kept the ball?".

[C3-2] except that the movies were presented less times to some of the adults, and that some of the adults answered to the questions about property rights before answering the comparative questionnaire about social/moral evaluation.

Q_{i_eval} (training): - Do you like him? - Is he a good guy? - Is he a bad guy? - Would you like to play with him?

Q_{c_eval} (social and moral evaluation)	Q_{prop} (property rights attribution)
- Show me the one you like (adults: Which one do you like?) - Show me the good guy - Show me the bad guy - Show me the one with whom you would like to play	- [The 2nd possessor] was he allowed to play with the ball? - [The 2nd possessor] was he allowed to keep the ball? - [The 2nd possessor] did he have to give the ball back to [the first possessor]?
$Q_{i\_eval\_action\_emotion}$ (evaluation of action and emotion)	Q_{comp} (comprehension)
- [The 2nd possessor] did he do something bad? - [The 1st possessor] did he have a reason to be sad?	- Which one returned the ball? - Which one kept the ball?

Table C3-1. Measures in Study 4.
(see Appendix AC3-1 for the original version of the questions asked in French)

Compared to Study 3, here participants were asked about the second possessors' right to keep the object and not his right to leave with it, as the agent did not leave with the object but only kept it behind him. This question concerning the right to keep the ball corresponds in fact to the same one than the question about the second possessor's obligation to return the ball, but "reversed".

3.3. Results

Social/moral evaluation

As in the previous studies, participants were instructed to make a choice between both characters for each question, even if their preference was not so strong. An evaluation index was computed from the answers to the comparative questionnaire. As in Study 3, each answer was scored 1 if in favor of the reciprocator (i.e. the agent returning the ball to the first possessor) or in disfavor of the keeper (i.e. the agent not returning the ball but keeping it), -1 if in favor of the keeper or in disfavor of the reciprocator, 0 if other ("both", "none") or

absent. The four answers were averaged into an index between –1 and 1 for each subject. A positive index corresponds to a preference for the reciprocator over the keeper. Figure C3-6 shows the mean evaluation index as a function of Age.

As preliminary analyses revealed no effects of gender, we did not include gender in further analyses. A 3-way analysis of variance (ANOVA) of Age x Order (keep first or return first) x Agent (Mr. Green or Mr. Blue as the keeper) revealed a main effect of Age ($F(1,26)=14.89$, $p=.001$). The analysis revealed no interactions and no main effects of Order or Agent. Comparing the evaluation index to a chance score of 0 for each age group revealed that 3-year-olds' selection of the reciprocator and the keeper did not differ from chance ($F(1,17)=1.20$, $p=.29$). Adults selected more the reciprocator as opposed to the keeper than would be expected by chance ($F(1,9)=118.87$, $p<.001$). When separating younger and older 3-year-olds, we observe a difference in their evaluation ($F(1,14)=5.50$, $p<.05$). The participants from the younger group are at chance when comparing their evaluation score against zero ($F(1,7)=0.36$, $p=.57$). The participants from the older group tend to answer marginally but not significantly above chance ($F(1,7)=4.87$, $p=.063$).

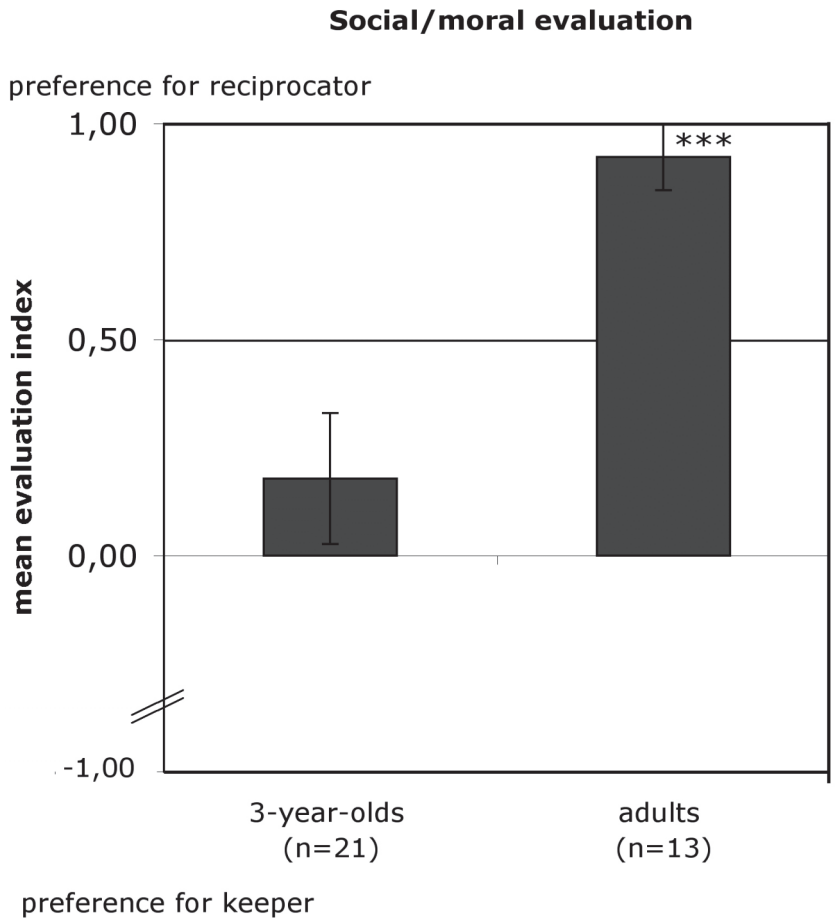


Figure C3-6. Social/moral evaluation by 3-year-olds and adults of characters differing in their restitution behavior (no restitution vs. restitution; both followed by a negative emotional response of the first possessor), in Study 4. Answers were scored 1 if in favor of reciprocator, -1 if in favor of keeper, 0 if other or absent for each question. The figure shows the means of participants (and standard errors). *** p<.001.

Comprehension

The lack of social and moral evaluation of 3-year-olds seems not to be due to a lack of understanding of the situations. 3-year-olds answered above chance to the comprehension questions ($F(1,17)=5.79$, $p<.05$). Nine 3-year-olds answered correctly to both comprehension questions[C3-3]. All adults responded correctly to these questions.

[C3-3] When separating 3-year-olds in two groups according to their answers to the comprehension questions (9 participants responded correctly, and 12 incorrectly), these two groups seem to respond differently to the comparative evaluation questionnaire but it is not significant ($t(19)=1.63$, $p=.12$); both groups answered at chance. The measures for the group responding correctly to the comprehension questions and the older group are correlated as 6 of 9 children who answered correctly to the comprehension questions were part of the older group.

Property rights attribution

We analyzed participants' attributions of property rights, in particular the second possessor's right to play with the ball, his right to keep the ball, and his obligation to give it back to the first possessor. We performed a General Linear Model with Condition (i.e. presence or absence of restitution) as within-subject factor, and Age, Order and Agent as between-subjects factors, for three measures corresponding to the three questions. The results (see Figure C3-7) revealed an effect of Condition ($F(3,24)=5.06$, $p<.01$). There was no effect of Age on the general attribution of property rights ($F(3,24)= 16.46$, $p=.12$). An effect of Age is present only for the question about the right to play with the ball ($F(1,26)= 5.29$, $p<.05$). However, the analyses revealed an interaction between Condition and Age ($F(3,24)=7.02$, $p=.001$). There was also an interaction between Condition, Age, and Agent ($F(3,24)=3.73$, $p<.05$), but no other interactions or effects of Order or Agent.

In the rest of the analyses, we separated the results of the two populations (3-year-olds and adults), with Order and Agent as between-subjects factors in the GLM. The results revealed an effect of Condition both for 3-year-olds ($F(3,15)=4.85$, $p<.02$) and adults ($F(2,8)=6.64$, $p=.02$). This distinction between the conditions is present in 3-year-olds attribution of the second possessor's obligation to return the ball ($F(1,17)=6.16$, $p<.05$), and marginally for his right to play with the ball ($F(1,17)= 4.30$, $p=.054$). Adults distinguish between both conditions in the second possessor's right to keep the ball ($F(1,9)=13.85$, $p<.01$), and his obligation to return the ball ($F(1,9)=7.23$, $p<.05$).

When analyzing the results for each question, adults considered the transfer as legitimate by according the right to play with the ball to the second possessor in both conditions (they all answered "yes" in both conditions). 3-year-olds considered that the second possessor was allowed to play with the ball only in the keep condition (*keep*: $F(1,17)=17.03$, $p=.001$; *return*: $F(1,17)=2.10$, $p=.17$).

As far as the right to keep the object is concerned, participants were at chance, except adults in the keep condition where they answered "no" significantly above chance ($F(1,9)=26.67$, $p=.001$). When the question was asked as an attribution of obligation to give the ball back to the first possessor, 3-year-olds were at chance in the keep condition ($F(1,17)=2.75$, $p=.12$), but considered that the second possessor has to return the object in the return condition ($F(1,17)=36.22$, $p<.001$). It was the reverse for adults (*keep*: $F(1,9)=26.67$, $p=.001$; *return*: $F(1,9)=0.02$, $p=.89$). Thus, participants did not show a loan bias, when the restitution or absence of restitution was followed by a negative emotion of the first possessor.

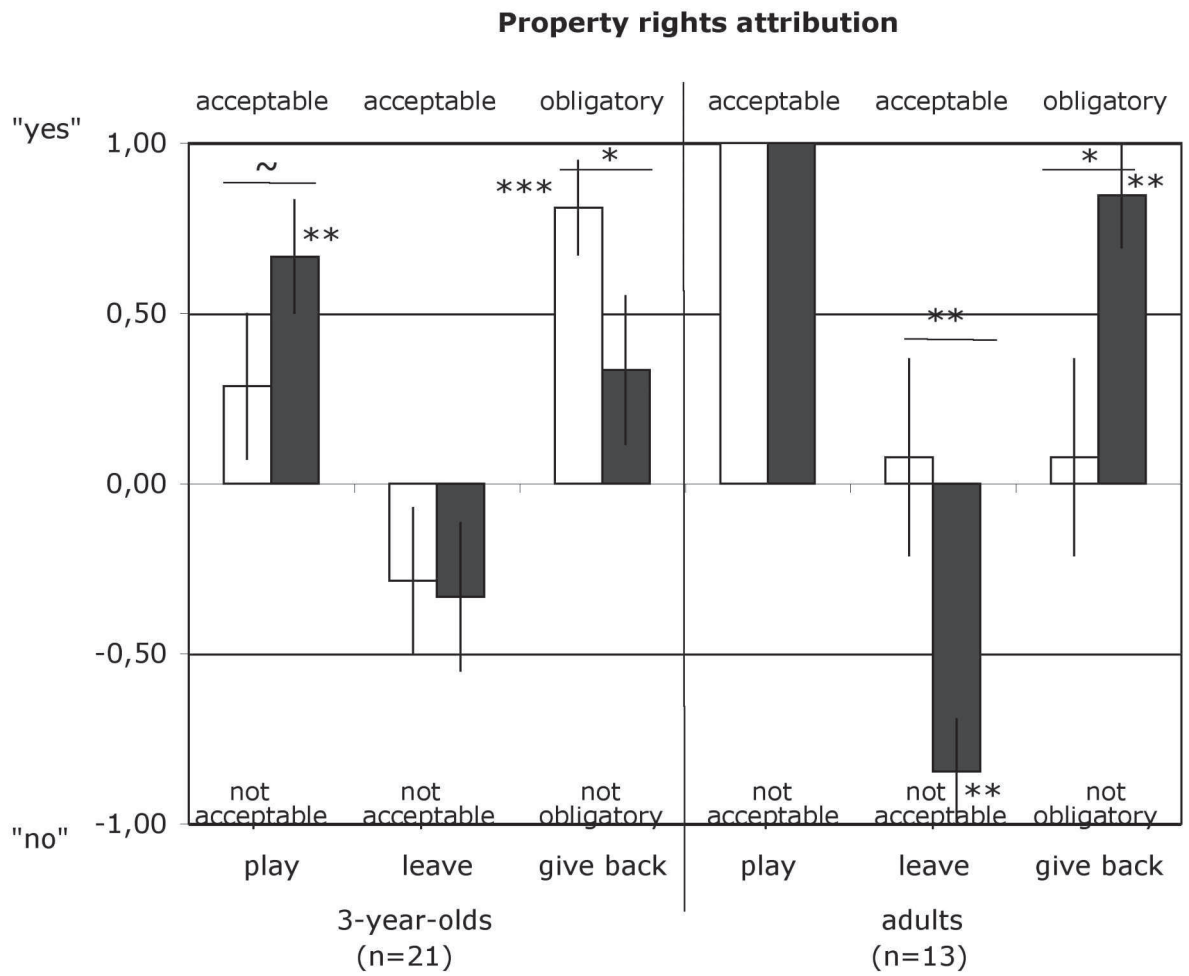


Figure C3-7. Attribution of property rights to second possessors by 3-year-olds and adults, in Study 4.

Rights attributed to the keeper (in black), and to the reciprocator (in white). Answers were scored 1 if "yes", -1 if "no", 0 if other or absent for each question. The figure shows the means of participants (and standard errors).
~ p<.1 * p<.05 ** p<.01 *** p<.001.

Evaluation of action and emotion

Adults recognized that the emotion of the first possessor was justified in the case of theft but unjustified in the case of restitution. In this latter case, adults considered that the second possessor did nothing bad ($F(1,9)=12.49$, $p<.01$) and that the first possessor had no reason to be sad ($F(1,9)=132.81$, $p<.001$). For both questions they distinguished this condition from the keep condition (*something bad:* $F(1,9)=73.67$, $p<.001$; *reason to be sad:* $F(1,9)=580.61$, $p<.001$), for which all adults considered that the second possessor did something bad and that the first possessor had a reason to be sad. 3-year-olds made no

distinction between both conditions (*something bad:* F(1,17)=0.95, p>.1; *reason to be sad:* F(1,17)=0.007, p>.1). In the keep condition, they answered at chance to the questions though marginally considering that the second possessor did not do something bad (F(1,17)=3.88, p=.065) and the first possessor had a reason to be sad (F(1,17)=3.19, p=.092). In the return condition, they considered that the second possessor did not do something bad (F(1,17)=7.57, p<.02). Since they were at chance to the question "did [the first possessor] have a reason to be sad", but marginally considering that he did have a reason (F(1,17)=3.15, p=.094), it is not clear that they could identify an unjustified emotion. This result could also be due to a difficulty in understanding the question.

Comparison between Study 3 and Study 4

When comparing the results of Study 3 and Study 4 on the measure of social/moral evaluation, a 4-way ANOVA of Age x Study x Order x Agent revealed a main effect of Age (F(1,50)=31.69, p<.001) and a marginal effect of Study (F(1,50)=3.31, p=.075). No interaction between Age and Study was found. A 3-way ANOVA of Study x Order x Agent revealed no main effect of Study for any of the two age groups (*3-year-olds*: F(1,33)=2.14, p=.15; *adults*: F(1,17)=1.98, p=.18)).

We also compared the results of Study 3 and Study 4 for the measure of property rights attribution concerning the obligation of the second possessor to give the object back to the first possessor. We performed a GLM with Condition as within subject factor, and Study, Order, and Agent as between subjects factors. The results revealed no effect of Study for any of the two age groups (*3-year-olds*: F(1,33)=0.96, p=.94; *adults*: F(1,17)=0.36, p=.56). There was an interaction between Study and Condition for adults (F(1,17)=6.91, p<.02), but not for 3-year-olds (F(1,33)=2.25, p=.14).

Overall, Study 4 showed that 3-year-olds did not take into account the second possessor's restitution behavior to evaluate him: they had no preference between the agent restituting the previously acquired object and the agent keeping the object. It seems that the agent keeping the object was not considered negatively despite the display of a negative emotion by the first possessor when the agent moved the object away from him. Adults considered the restitution behavior in their social and moral evaluations and preferred the agent reciprocating as opposed to the agent keeping the object. They preferred the agent restituting the object even if the first possessor displayed a negative emotion when receiving

the object back, because this emotion was unjustified. 3-year-olds and adults did not show a loan bias here, but attributed to the second possessors different property rights concerning the keeping of the object. Comparing Study 3 and Study 4, the results on social/moral evaluation are similar. Concerning property rights, in adults, we see that the presence of emotion had an effect on attribution of property rights to the agent who returned the object.

3.4. Discussion

Concerning social/moral evaluation, the results are similar to those obtained in Study 3 (where there were no emotional cues). The presence of a negative emotion following the second possessor's action of restitution or keeping does not influence participants' evaluations. 3-year-olds have no preference between a character returning a previously acquired object to its first possessor and a character keeping the previously acquired object. Adults prefer the reciprocator compared to the keeper. Adults are sensitive to the legitimacy of the emotion. In the condition where the agent moves the object away from the protagonist, the negative emotion of the protagonist is perceived as justified, whereas in the condition where the agent returns the object to the protagonist the negative emotion of the protagonist is perceived as unjustified. The negative emotion in the return condition is not considered as a cue indicating that the transfer was a gift, but as a weird reaction of the protagonist.

Importantly, the emotion displayed was the same in both conditions, to prevent the participants from basing their judgment on the emotional consequences alone, but forcing them to consider the presence of a transgression to form their evaluations. Despite the negative emotional consequence, 3-year-olds did not evaluate the second possessor's act of keeping the object (apparently belonging to the first possessor) as a property transgression. We have seen in Study 2 (Chapter 2) that emotional cues help 3-year-olds to evaluate different modes of acquisition (distinguishing between illegitimate and legitimate property transfers). A negative emotion following an illegitimate transfer helps young children to identify the transgression. Here, we observe that emotional cues do not seem to help young children to evaluate the absence of restitution after a legitimate transfer as a transgression, despite the presentation of the transfer as a loan (rather than a gift). It remains to be tested whether restitution behaviors (with or without the presence of emotional cues) can be distinguished through social/moral evaluation by 3-year-olds when those behaviors are following an illegitimate acquisition. However, our results of Study 1a showed that a character leaving with the object that was acquired by theft was not considered as worse than

a character leaving after gift-reception. This suggests that some cues may be necessary for young children to consider the absence of restitution as a transgression even when it follows an illegitimate transfer of property. It would be interesting to investigate what cues could help young children to evaluate this behavior as bad. Would begging of the first possessor help? According to Hook (1993), not returning an object to a first possessor who asks for it is considered as bad by 4-year-olds (the youngest age tested). Hamlin & Wynn (2011) have shown that 5-month-olds prefer a character returning a ball to its first possessor compared to a character keeping the ball when the first possessor expresses willingness to have it back. Our results did not confirm these findings. In Study 1b, we found that young children did not consider a thief who left with the ball requested by the first possessor as being worse than a character who gave the ball to the second possessor after his request. However, the act of begging in our situation was less evident than in the studies performed by Hook (1993) and Hamlin & Wynn (2011). Moreover, in Hamlin's study, an implicit emotion (frustration) may have contributed to elicit infant's evaluations (see discussion of Study 3). Thus begging seems to be an important cue when clearly presented, and it may be amplified by the presence of a negative emotion. It would be interesting to test whether young children would be able to evaluate the absence of restitution of an object to its first possessor as a property transgression when presented with both cues: the first possessor clearly asking for the object back, and being sad after the absence of restitution. This situation could be compared to a situation where the second possessor returns the object after the begging of the first possessor, who is then sad (which should be considered as unjustified). Also this former situation could be compared to a situation presenting a character that did not possess the object before displaying the same action of begging and the same negative emotion after to absence of restitution.

Considering ownership, if the second possessor keeps the object definitively, then he is acting against property rules, which leads adults to blame him, but not 3-year-olds. How can we interpret the absence of 3-year-olds' evaluation of restitution even in the presence of emotional cues? This result can be included in our model of young children's evaluations based on harm detection instead of understanding of ownership (presented in Chapter 2). In the case of a legitimate transfer, the first possessor is deprived of the ball voluntarily, which could potentially legitimate the subsequent acts of the second possessor. Then the fact that the second possessor keeps the object may not be considered as harmful. There would be no negative action detected in the forward analysis to be amplified during the backward analysis

triggered by the negative emotional output. So, there would be no negative evaluation. In the case of return, there would be no negative evaluation either. So, when comparing both agents, there would be no preference (See Figure C3-8). The results of 3-year-olds could also be interpreted in terms of causality evaluation triggered by the negative emotion. In that case, only a backward evaluation would be performed, where both agents would be considered as causally responsible for the negative emotion (without considering whether the emotion is justified or not). Thus both agents would be blamed equally and no preference would emerge. If going at the beginning of the causal chain, then the protagonist would be blamed in both cases (See Figure C3-9). Considering this interpretation of a causal evaluation, our results do not allow us to validate our model of young children's evaluations based on harm detection. Also, 3-year-olds may simply not engage in social and moral evaluation of restitution behaviors following a legitimate transfer of property, even in the presence of emotional cues. However, this hypothesis seems unlikely considering that Hamlin & Wynn (2011) have shown that already at 5 months of age infants do evaluate characters based on their restitution or absence of restitution of an object to its first possessor.

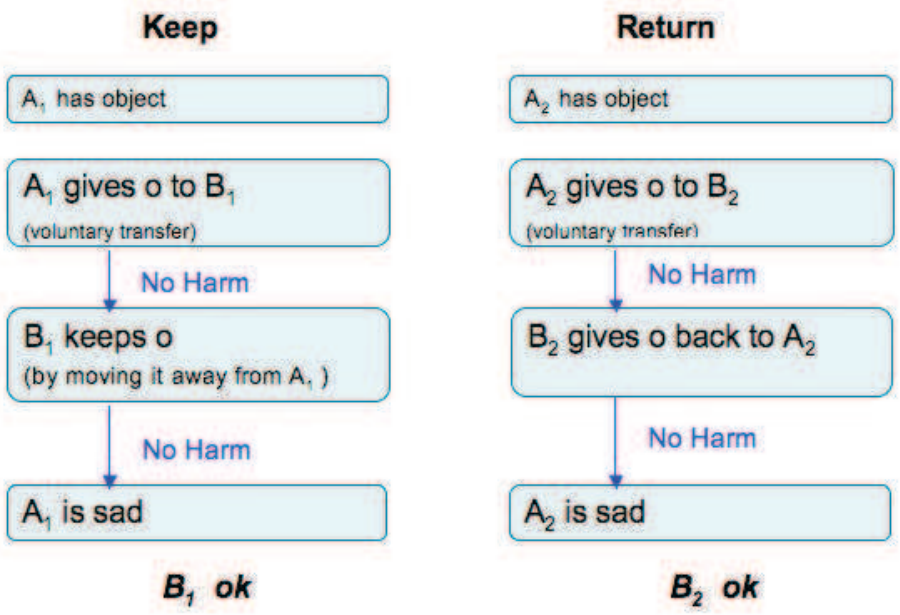


Figure C3-8. Hypothetical evaluation mechanism (of no-restitution and restitution of object to first possessor) based on harm recognition in young children (3-year-olds), before mature understanding of property rights.

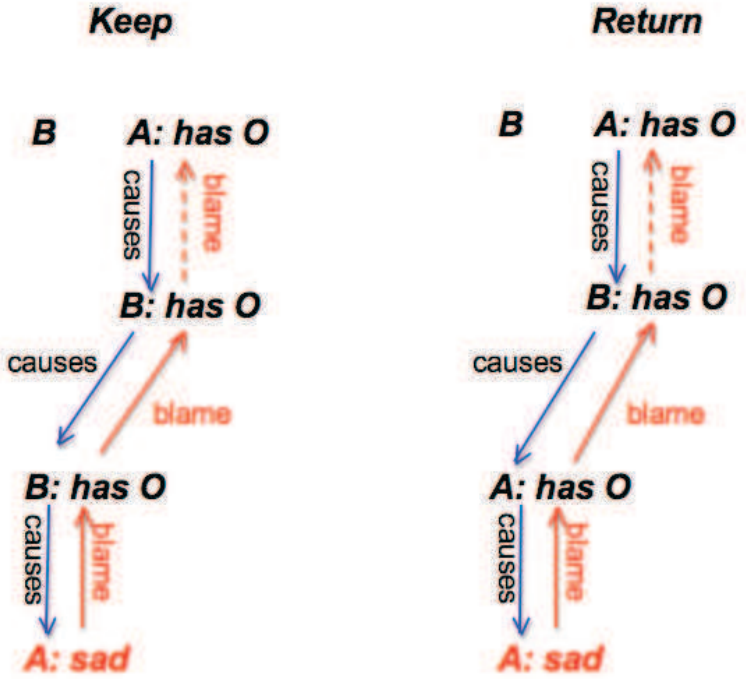


Figure C3-9. Hypothetical evaluation mechanism (of no-restitution and restitution of object to first possessor) based on causality detection in young children (3-year-olds), before mature understanding of property rights.

In Studies 3 and 4, our results suggest that children do not evaluate restitution behaviors before acquiring a mature understanding of property rights. In the next study, we investigate whether 5-year-olds, who have been seen to have a mature understanding of property rights (see Study 1; Blake & Harris, 2009), are able to evaluate second possessors on the basis of their restitution or not of an object to its first possessor. We did not find any effect of emotion in the evaluation of restitution in 3-year-olds (lacking comparative social/moral evaluation in both the non-emotional (Study 3) and emotional (Study 4) conditions) and adults (being close to ceiling already in the non-emotional condition (Study 3)). However, emotion could play a role in 5-year-olds evaluations, if they are not at ceiling. To test the role of emotion in children's evaluations of restitution behaviors we performed an experiment where we varied (in minimal pairs) the presence of restitution (within subjects): no restitution vs. restitution, and the presence of the first possessor's emotion (between subjects): no emotion vs. emotion.

4. Study 5: The role of emotional cues in five-year-olds' evaluation of restitution

4.1. Introduction

We have seen in Study 1 (Chapter 2) that 5-year-olds have a mature understanding of property rights and that they are able to comparatively evaluate illegitimate and legitimate transfers. Here, we investigate whether 5-year-olds are also already sensitive to the presence or absence of restitution following a transfer that seems to be a loan, and whether their evaluations of restitution behaviors is modulated by the presence of emotional cues.

As Studies 3 & 4, this study aimed at comparing characters on the basis of their restitution of an object to the first possessor: no restitution (keep condition) versus restitution (return condition). We investigated whether 5-year-olds' social/moral evaluation of an agent restituting or not an object to its first possessor (probable owner) is modulated by the affect displayed by the first possessor during the interaction. As Study 2, we performed this study in a 2*2 factor design: presence of restitution (within subjects): no restitution (keep condition) vs. restitution (return condition), and presence of the first possessor's emotion (between subjects): non-emotional condition vs. emotional condition (minimally adding emotions to the non-emotional condition).

In each interaction, the last action of the second possessor (restitution or keeping of the previously acquired object) was immediately followed by either (between subjects) no reaction of the first possessor of the object (non-emotional condition) or the same negative emotion (sadness) displayed by the first possessor (emotional condition). The non-emotional condition and the emotional one only differ by the presence of emotion in the latter case. The stimuli of the emotional condition are the same than those used in Study 4; the stimuli of the non-emotional condition are minimally different (only removing the emotion), thus they are not exactly the same as those used in Study 3. Importantly, as we wanted to avoid the judgments being based only on the consequences and not on the action in itself, we equalized the outcome of the two presented situations: in the emotional condition, the same emotion of sadness was displayed in both situations. As the emotion displayed was the same whether the transfer was followed by restitution or not, emotion alone could not act as a cue to differentiate between the two agents.

4.2. Method

Children and adults were presented with two non-verbal movie cartoons depicting a legitimate transfer of a ball between two characters, followed or not by the restitution of the ball by the second possessor to the first possessor, who either cried in both situations or did not react in both situations.

Participants

Forty 5-year-olds (21 girls; mean age: 70 months, 18 days; range: 63 months, 25 days to 77 months, 20 days) were tested. Participants were French speakers. They were recruited either at their preschool and tested there, or from a database of parents who accepted to participate with their child in our studies and tested in our laboratory. Half of the participants were assigned to the non-emotional condition and half of them to the emotional condition. For each condition, participants were assigned randomly to one of the four experimental groups allowing counterbalancing of the order of presentation of conditions of restitution (keep first or return first) and of the characters associated to a condition of restitution (agent 1 in keep condition or agent 2 in keep condition).

Materials and setting

The disposition of the participants during testing and the material used to design the cartoons were the same as in the previous studies. Two characters were presented in each movie. At whole, four different characters were seen (as in Study 2): two protagonists corresponding to the first possessors (one in each cartoon: Mr. Yellow and Mr. Red) and two agents corresponding to the second possessors (one in each cartoon: Mr. Green and Mr. Blue). Mr. Yellow was always presented with Mr. Green, and Mr. Red with Mr. Blue. The agents were the characters to be evaluated by the participants. As in Study 4, Mr. Yellow was introduced because of the display of emotion in one of the conditions: the crying of the same protagonist to two different actions by the agents could reduce his credibility and thus diminish the legitimacy of crying in the keep condition. The sequence of events in each condition (see Figure C3-10) is described bellow, with the differences between both conditions of restitution in bold, and between both conditions of emotion in italic.

In the keep condition:

1. The protagonist (1st possessor) arrives with a ball, and the agent (2nd possessor) arrives with empty hands.
2. The protagonist plays with the ball.
3. The protagonist gives the ball to the agent.
4. The agent plays with the ball.
5. **The agent keeps the ball by placing it on a rock behind him.**

In the non-emotional condition:

6. The protagonist (without the ball) *stays inexpressive.*

In the emotional condition (same as Study 4):

6. The protagonist (without the ball) *cries*[C3-4].

In the return condition:

1. The protagonist (1st possessor) arrives with a ball, and the agent (2nd possessor) arrives with empty hands.
2. The protagonist plays with the ball.
3. The protagonist gives the ball to the agent.
4. The agent plays with the ball.
5. **The agent returns the ball to the protagonist.**

In the non-emotional condition:

6. The protagonist (with the ball) *stays inexpressive.*

In the emotional condition (same as Study 4):

6. The protagonist (with the ball) *cries.*

[C3-4] He shows a facial expression of sadness, and a verbal expression of distress.

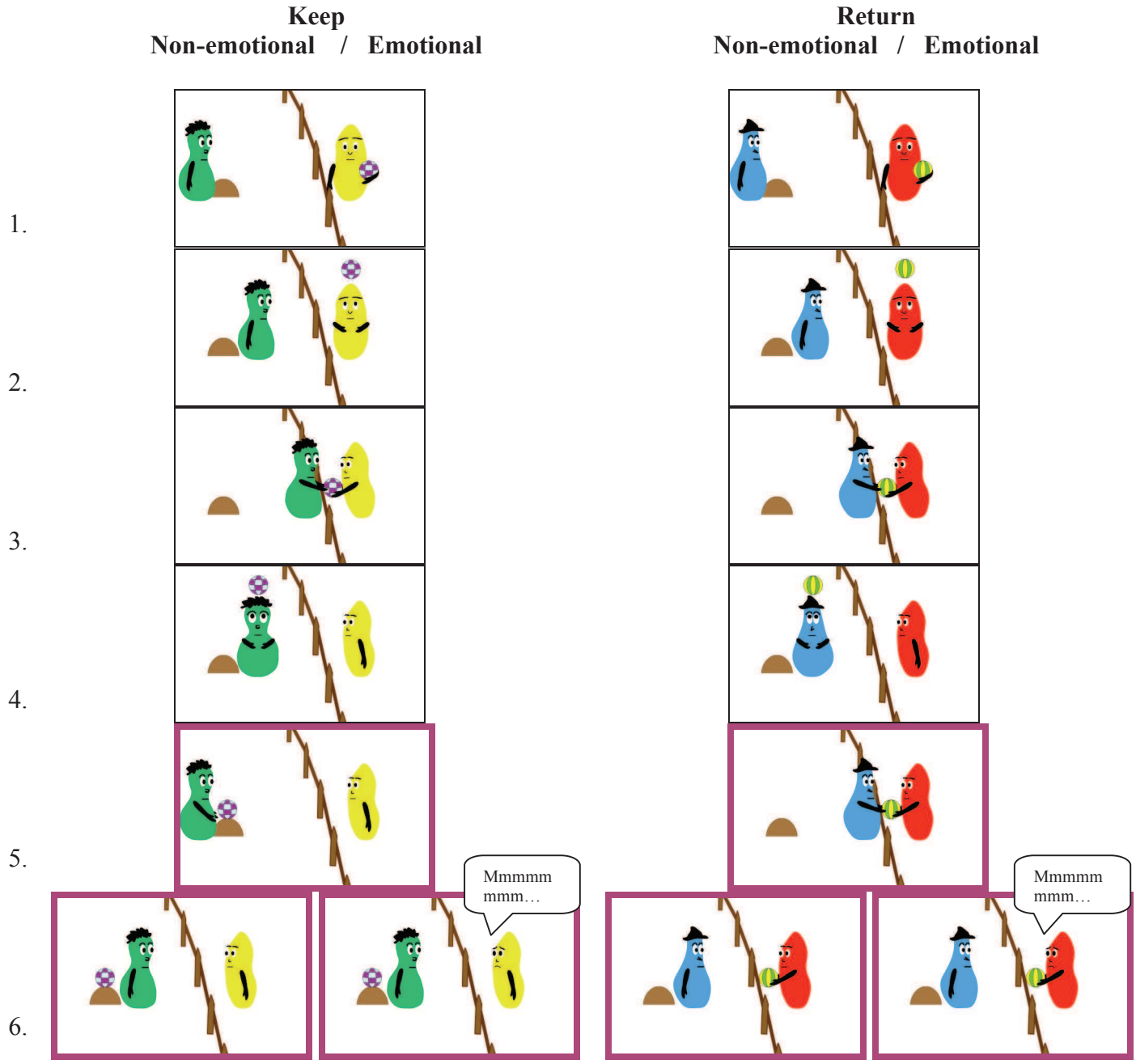


Figure C3-10. Images extracted from each of the cartoons in Study 5. Outlined in purple, the steps being different between both conditions of restitution.

The different movements of the agent and of the protagonist were matched as much as possible between both movies. The movies were exactly the same at the beginning, only the last behavior of the agent differed between both movies. Considering the agent, both movies were the same as far as the first transfer was concerned and differed only at the very end

where both agents did not move in the same direction, but the amount of movement was the same. The amount of time the agent was present on screen and his orientation throughout the movie was exactly the same in both movies. Considering the protagonist, his movements and orientations upon the whole movie were matched as much as possible between both movies.

Procedure

The procedure was the same as in Study 4. The experimenter presented and named the four characters on the screen before playing the movies, and asking the questions (see Table C3-2). As in previous studies, participants' social and moral preferences were measured and analyzed. Here, the same three questions as in Study 4 about the second possessor's rights were asked: "[The second possessor] was he allowed to play with the ball?", "[The second possessor] was he allowed to keep the ball?", "[The second possessor] did he have to give the ball back to [the first possessor]?". As the second possessor is not leaving with the ball in this study (as in Study 4) but only moving the ball away from the first possessor in one of the conditions, there was no question about the right to leave with the ball, but this question was replaced by the attribution of the right to keep the ball, which constitutes another formulation of the question about the obligation to give the ball back. Participants were also asked for each movie: "[The second possessor] did he do something good or something bad?". In the emotional condition, participants were also asked a question concerning the justification of the first possessor's emotion: "Did he have a reason to be sad?". Finally, 5-year-olds' comprehension of the situations was assessed through the questions: "Which one returned the ball?" and "Which one kept the ball?".

Q_{i_eval} (training): - Do you like him? - Is he a good guy? - Is he a bad guy? - Would you like to play with him?

Q_{c_eval} (social and moral evaluation)	Q_{prop} (property rights attribution)
- Which one do you like? - Which one is the good guy? - Which one is the bad guy? - Whom would you like to play with?	- [The 2nd possessor] was he allowed to play with the ball? - [The 2nd possessor] was he allowed to keep the ball? - [The 2nd possessor] did he have to give the ball back to [the first possessor]?
$Q_{i\_eval\_action\_emotion}$ (evaluation of action and emotion)	Q_{comp} (comprehension)
- [The 2nd possessor] did he do something good or something bad? + in the emotional condition only: - [The 1st possessor] did he have a reason to be sad?	- Which one returned the ball? - Which one kept the ball?

Table C3-2. Measures in Study 5.
(see Appendix AC3-1 for the original version of the questions asked in French)

4.3. Results

Social/moral evaluation

As in the previous studies, participants were instructed to make a choice between both characters for each question, even if their preference was not so strong. An evaluation index was computed from the answers to the comparative questionnaire. As in Studies 3 & 4, each answer was scored 1 if in favor of the reciprocator (i.e. the agent returning the ball to the first possessor) or in disfavor of the keeper (i.e. the agent not returning the ball but keeping it), -1 if in favor of the keeper or in disfavor of the reciprocator, 0 if other ("both", "none") or absent. The four answers were averaged into an index between –1 and 1 for each subject. A positive index corresponds to a preference for the reciprocator over the keeper. Figure C3-11 shows the mean evaluation index for the non-emotional and the emotional conditions.

As preliminary analyses revealed no effects of gender, we did not include gender in further analyses. A 3-way analysis of variance (ANOVA) of Emotion x Order (keep first or return first) x Agent (Mr. Green or Mr. Blue as the keeper) revealed no main effect of

Emotion (F(1,32)=0.53, p=.47). The analysis revealed no interactions and no main effects of Order or Agent. Comparing the evaluation index to a chance score of 0 revealed that 5-year-olds selected more the reciprocator as opposed to the keeper than would be expected by chance in both conditions (*non-emotional:* F(1,16)=12.93, p<.01; *emotional:* F(1,16)=21.45, p<.001).

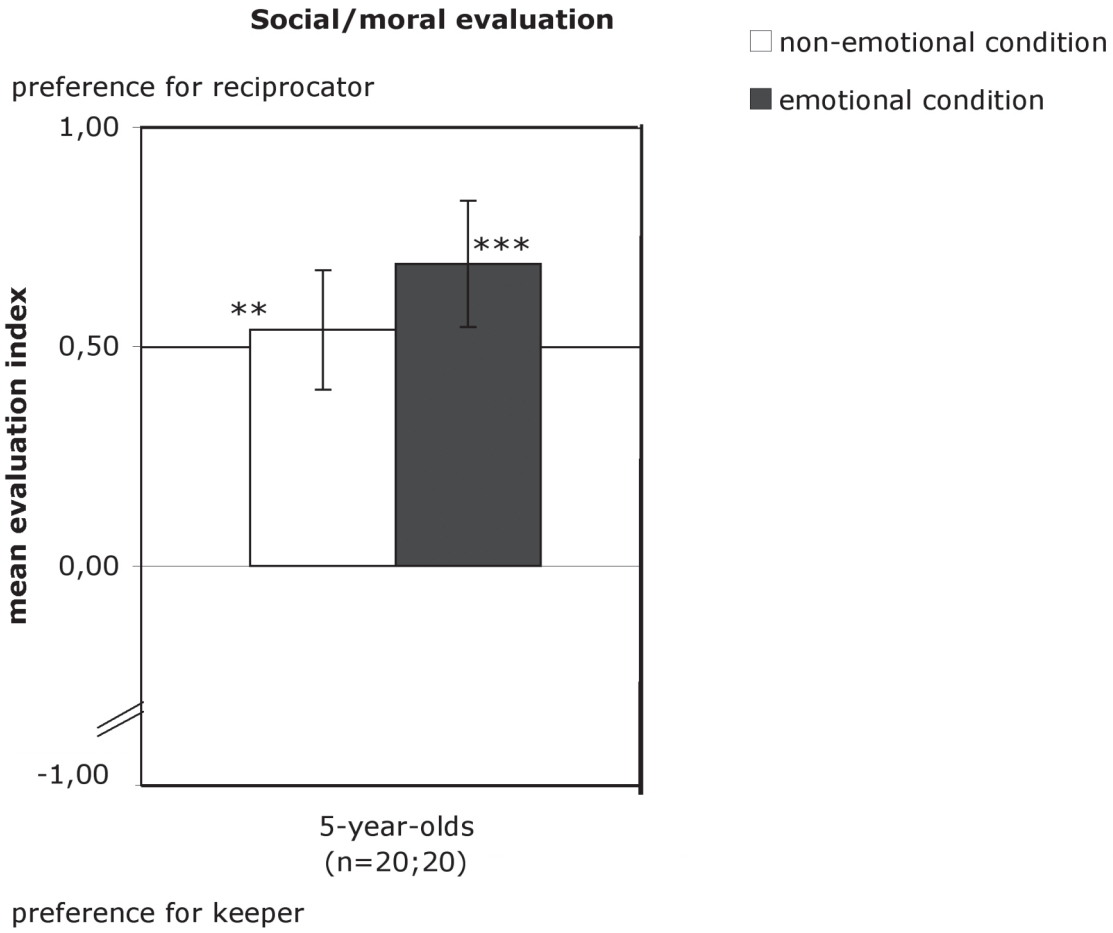


Figure C3-11. Social/moral evaluation by 5-year-old children of characters differing in their restitution behavior (no restitution vs. restitution), without (in white) or with (in black) emotion displayed by the first possessor, in Study 5. Answers were scored 1 if in favor of reciprocator, -1 if in favor of keeper, 0 if other or absent for each question. The figure shows the means of participants (and standard errors). ** p<.01 *** p<.001.

Comprehension

5-year-olds had a good understanding of the situations: they answered above chance to the comprehension questions in both conditions (*non-emotional:* F(1,16)=112.62, p<.001; *emotional:* F(1,16)=722.00, p<.001). All but six children answered correctly to both comprehension questions.

Property rights attribution

We analyzed 5-year-olds' attributions of property rights in particular to verify that restitution is important in their considerations of property transfers. This was assessed through the answers to the questions about the second possessor's right to keep the object and his obligation to give it back to the first possessor. The answers to the question about the second possessor's right to play with the ball gave us information about 5-year-olds' understanding of the legitimacy of the transfer. We performed a General Linear Model with Restitution (i.e. presence or absence of restitution) as within-subject factor, and Emotion, Order and Agent as between-subjects factors, for three measures corresponding to the three questions. The results (see Figure C3-12) revealed an effect of Restitution ($F(3,30)=8.06$, $p<.001$) and of Emotion ($F(3,30)=4.29$, $p<.02$), and an interaction between Restitution and Emotion ($F(3,30)=7.50$, $p=.001$). There were no interactions with and no effects of Order or Agent. We then analyzed the data separately for the non-emotional and the emotional conditions. In the non-emotional condition, the results were similar for both conditions of restitution, i.e. there was no effect of Restitution ($F(2,15)=1.87$, $p=.19$). In the emotional condition, the results revealed an effect of Restitution ($F(3,14)=7.28$, $p<.01$). This effect was present for the questions about the second possessor's right to keep the object ($F(1,16)=18.38$, $p=.001$) and obligation to give it back ($F(1,16)=19.06$, $p<.001$). When analyzing the results for each question, we see that 5-year-olds considered the transfer as legitimate by according the right to play with the ball to the second possessor in all conditions (*non-emotional: keep:* $F(1,16)=15.73$, $p=.001$; *return:* $F(1,16)=353.63$, $p<.001$; *emotional: keep:* $F(1,16)=10.29$, $p<.01$; *return:* $F(1,16)=4.77$, $p<.05$). As far as the rights to keep the object are concerned, in the non-emotional condition, 5-year-olds considered in both conditions of restitution that the second possessor is not allowed to keep the ball (*keep:* $F(1,16)=79.35$, $p<.001$; *return:* $F(1,16)=56.15$, $p<.001$) and has to return it to the first possessor (*keep:* $F(1,16)=353.63$, $p<.001$; *return:* $F(1,16)= 353.63$, $p<.001$). In the emotional condition, in the keep condition, 5-year-olds still consider that the second possessor should not keep the ball ($F(1,16)=361.00$, $p<.001$) and should return it to the first possessor (all participants answered "yes"). In the return condition, however, they are at chance for both questions (*right to keep:* $F(1,16)=0.20$, $p=.66$; *obligation to give back:* $F(1,16)=0.24$, $p=.63$). In fact, about half of the participants considered that the second possessor should return the ball despite the negative emotional reaction of the first possessor to the restitution, and about half the participants considered that the second possessor is not obliged to return the ball. In the absence of contradictory cues, restitution of the ball to the

first possessor is expected by almost all the participants, and even with contradictory emotional cues, still half of the participants considered that the second possessor should return the ball, showing a loan bias. The presence of emotion modulates 5-year-olds' attributions of property rights.

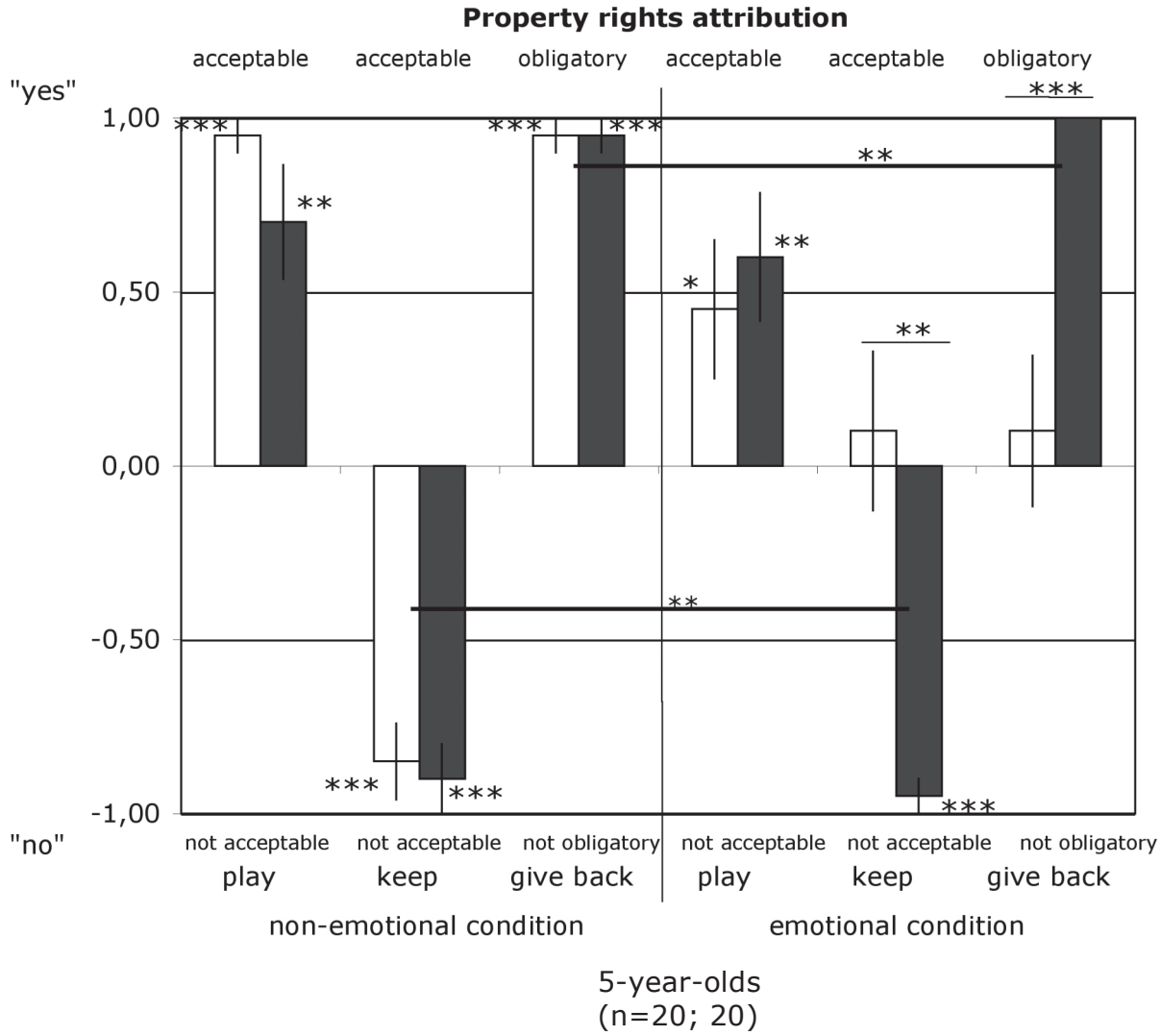


Figure C3-12. Attribution of property rights to second possessors by 5-year-old children, in Study 5.

Rights attributed to the keeper (in black), and to the reciprocator (in white), for the non-emotional (left) and the emotional (right) conditions. Answers were scored 1 if "yes", -1 if "no", 0 if other or absent for each question. The figure shows the means of participants (and standard errors).

* p<.05 ** p<.01 *** p<.001.

Evaluation of action and emotion

5-year-olds made the distinction between both conditions of restitution in their answers to the question "did [the second possessor] do something good or something bad" (*non-emotional*: $F(1,16)=22.17$, $p<.001$; *emotional*: $F(1,16)=38.37$, $p<.001$), and to the question "did [the first possessor] have a reason to be sad" asked in the emotional condition ($F(1,8)=6.78$, $p<.05$; not all children answered to this question). In the case where the second possessor returned the ball, 5-year-olds considered that he did something good in both conditions of emotion (*non-emotional:* $F(1,16)=31.02$, $p<.001$; *emotional:* $F(1,16)=8.33$, $p<.02$). Children were at chance when asked whether the first possessor had a reason to be sad when he received the ball back ($F(1,8)=1.36$, $p=.28>.1$). There was no correlation between their answer to this latter question and their reversed answer to the question about the second possessor's right to keep the ball ($r=-.45$, $t(10)=-1.60$, $p=.14$) and obligation to return the ball ($r=.17$, $t(10)=0.55$, $p=.60$). In the case where the second possessor kept the ball, 5-year-olds considered that he did something bad only in the emotional condition (*non-emotional:* $F(1,16)=2.39$, $p=.14$; *emotional:* $F(1,16)=57.80$, $p<.001$). There was a marginal effect of Emotion ($F(1,32)=3.94$, $p=.056$). Children also considered that the first possessor had a reason to be sad ($F(1,8)=8.00$, $p<.05$). There was a correlation between their answer to this latter question and their reversed answer to the question about the second possessor's right to keep the ball ($r=.67$, $t(10)=2.89$, $p<.02$).

Generally, considering both conditions of restitution, the presence of emotion led children to consider the action of the second possessor preceding the emotional display as more bad than in the absence of emotion ($F(1,32)=5.16$, $p<.05$). However, when considering each condition separately, this effect was present marginally only in the keep condition. Thus, the presence of emotion seems to lead to the amplification of the badness of the non-restitution, which is considered as bad in the presence of emotion, but not in the absence of emotion.

Overall, Study 5 showed that 5-year-olds considered the restitution behavior in their social and moral evaluations and preferred the agent reciprocating as opposed to the agent keeping the object. They showed this preference both in the non-emotional and the emotional conditions. They preferred the agent restituting the object even if the first possessor displayed a negative emotion when receiving the object back. Generally, 5-year-olds considered in their attributions of property rights that the second possessor should return the object to the first

possessor. However, the presence of emotion played a role in the attribution of property rights.

4.4. Discussion

Our results with 5-year-olds are similar to those obtained with adults in Studies 3 & 4. 5-year-olds distinguish between a character keeping a previously acquired object and a character returning the previously acquired object to the first possessor of the object, and prefer the reciprocator compared to the keeper. They do so as well in the absence and in the presence of a negative emotion following the restitution behavior. Importantly, the emotion displayed was the same in both conditions. Thus participants were forced to consider the presence of a transgression, instead of basing their judgment on the emotional consequences alone. In the emotional condition, if children would rely only on the emotion, they would have no preference between both agents as the action of both agents leads to the crying of the protagonist. This shows that 5-year-olds are already sensitive to the legitimacy of the emotion. In the condition where the agent moves the object away from the protagonist (keep condition), the agent's action is considered as bad, which is congruent with the negative emotion of the protagonist, however in the condition where the agent returns the object to the protagonist (return condition), the agent's action is considered as good despite the negative emotion of the protagonist (which is not considered as justified).

The presence of a negative emotion following the second possessor's action of keeping or returning does not influence participants' evaluations. However, emotion has a role in the attributions of property rights. Concerning the character keeping the object, children consider, already in the absence of a negative emotion, that he is not allowed to keep the object but has to return it to the first possessor, so the negative emotion confirming that the first possessor wants the object back does not change children's attributions of rights. In the return condition, children also consider that the second possessor has to restitute the object when there is no negative emotion displayed by the first possessor. However, in the presence of a negative emotion following the restitution, half of the children consider that the second possessor should keep the object and not return it. So, they take into account the negative consequence of the restitution behavior to modify their attributions of property rights. However, the presence of the negative emotion does not override the default consideration that the second possessor should restitute the object to the first possessor as only half of the participants take the emotion into account in their attributions of property rights. The fact that the other half of

the children still consider that the second possessor should return the object is another indication that 5-year-olds do not base their evaluation of the situation on the emotional consequences alone but consider the whole situation.

It is interesting to notice that there are two possible interpretations of the type of transfer being performed. Despite the negative emotion following restitution, half of 5-year-olds still consider that the transfer is a loan. The behavior of the first possessor is probably considered as weird, even by those children attributing to the second possessor the right to keep the object, but it seems to induce some of them to change their interpretation of the transfer and consider it as a gift.

5. Summary

In three studies we tested children's and adult's evaluation of characters returning or keeping a previously acquired object to its first possessor. We showed that 3-year-olds do not distinguish between a keeper and a reciprocator in their social/moral evaluation, despite their first possessor bias leading them to consider that an object should be returned to its first possessor. They also lack a comparative social/moral evaluation of restitution behaviors in the presence of emotional cues. 3-year-olds may have performed an evaluation based on harm detection or causal analysis, which led to attribute a similar valence to the two agents because harm was not detected following a legitimate transfer, or because both agents were causally responsible of the first possessor's distress. In any case, they seem not to consider property rights in their social/moral evaluation.

On the contrary, 5-year-olds evaluate restitution behaviors similarly to adults. They judge a character keeping a previously acquired object more negatively compared to a character returning the object to its first possessor. Importantly, 5-year-olds were able to recognize a transgression when the second possessor did not restitute the object to the first possessor even in the absence of a negative emotional reaction of the first possessor to the transgression. They also preferred the reciprocator when his action led to negative explicit emotional consequences being the same as those following the action of the keeper. This shows that children of this age do not base their evaluations on emotions alone. They judge the agents on their action in relation to property rights. Moreover, we showed that 5-year-olds (as adults) evaluate whether the distress of the first possessor is justified or not.

We have showed that the presence of emotional cues did not influence children's and adult's social/moral evaluation. However, the presence of a negative emotion (displayed by the first possessor after the action of restitution or keeping performed by the second possessor) influenced 5-year-olds' and adults' property rights attributions. In particular, in the restitution condition, the presence of emotion changed the interpretation of the transfer for half of the participants, who considered that the second possessor does not have to return the object to the first possessor. Thus half of 5-year-olds and adults seem to consider the transfer as a gift in the presence of emotion, whereas they considered it as a loan in majority in the absence of emotion. In the next Chapter, we describe the different interpretations that participants had of all transfers presented in the previous studies, by analyzing more in detail their answers to the questions about property rights.

CHAPTER 4: Different interpretations of legitimate transfers deduced from attributions of property rights

1. Introduction

We have already seen in the previous chapters that it is not obvious how a legitimate transfer is interpreted: as a gift or as a loan. On the basis of the answers to the questions about property rights (more particularly about the second possessor's right to leave with the object and his obligation to give it back to the first possessor), we analyze here the participant's interpretations of each of the legitimate transfers that we presented to them in our previous studies.

2. Method of analysis

2.1. Description of the situations

We describe in Table C4-1 the details of the actions performed after the legitimate transfers presented in our five studies. We then consider the actions in terms of cues of attachment and renunciation, such as crying when separated from the object, or leaving voluntarily without the object, respectively. In Table C4-2, we describe the actions performed after the transfer in each situation highlighting the cues of attachment or renunciation. The situations are ordered here on the basis of the presence of these cues, according to the potential interpretations suggested by the cues: from loan (with cues of attachment) to gift (with cues of renunciation).

S1a		2nd possessor plays with the ball	1st possessor refuses to have the ball back		2nd possessor leaves with the ball
S1b		2nd possessor plays with the ball	1st possessor leaves		2nd possessor leaves with the ball
S2_nE		2nd possessor plays with the ball	-	-	-
S2_E	1st possessor cries	2nd possessor plays with the ball	-	-	-
S3_k (= S1a)		2nd possessor plays with the ball	1st possessor refuses to have the ball back		2nd possessor leaves with the ball
S3_r		2nd possessor plays with the ball	1st possessor refuses to have the ball back	2nd possessor returns the ball	2nd possessor leaves without the ball
S4_k		2nd possessor plays with the ball		2nd possessor moves the ball away	1st possessor cries
S4_r		2nd possessor plays with the ball		2nd possessor returns the ball	1st possessor cries
S5_nE_k (~ S3_k)		2nd possessor plays with the ball		2nd possessor moves the ball away	-
S5_nE_r (~ S3_r)		2nd possessor plays with the ball		2nd possessor returns the ball	-
S5_E_k (= S4_k)		2nd possessor plays with the ball		2nd possessor moves the ball away	1st possessor cries
S5_E_r (= S4_r)		2nd possessor plays with the ball		2nd possessor returns the ball	1st possessor cries

Table C4-1. Description of the actions performed after the transfer for each situation.

S1a: legitimate condition of Study 1a.

S1b: legitimate condition of Study 1b.

S2_nE: legitimate condition in the non-emotional condition of Study 2.

S2_E: legitimate condition in the emotional condition of Study 2.

S3_k: keep condition of Study 3.

S3_r: return condition of Study 3.

S4_k: keep condition of Study 4.

S4_r: return condition of Study 4.

S5_nE_k: keep condition in the non-emotional condition of Study 5.

S5_nE_r: return condition in the non-emotional condition of Study 5.

S5_E_k: keep condition in the emotional condition of Study 5.

S5_E_r: return condition in the emotional condition of Study 5.

Loan ▲	**S2_E**	*Attachment* of the 1st possessor to the ball, expressed through crying		-	-	-
	S4_k / S5_E_k				2nd possessor moves the ball away	*Attachment* of the 1st possessor to the ball, expressed through crying
baseline	**S2_nE**			-	-	-
baseline	**S5_nE_r** (5yo)				2nd possessor returns the ball	-
baseline	**S5_nE_k** (5yo)				2nd possessor moves the ball away	-
▼	**S3_r** (3yo & adults)			*Renunciation* of the 1st possessor to the ball by refusing to have it back	2nd possessor returns the ball	2nd possessor leaves without the ball
	S3_k (3yo & adults)			*Renunciation* of the 1st possessor to the ball by refusing to have it back		2nd possessor leaves with the ball
	S1a			*Renunciation* of the 1st possessor to the ball by refusing to have it back		2nd possessor leaves with the ball
	S4_r / S5_E_r				2nd possessor returns the ball	*Renunciation* of the 1st possessor to the ball, expressed by crying when receiving it back [C4-1]
Gift	**S1b** (adults)			*Renunciation* of the 1st possessor to the ball by leaving	-	-

Table C4-2. Description of the actions performed after the transfer for each situation, with their meaning in terms of cues of attachment (leading to a potential interpretation of the transfer as a loan) or renunciation to the object (leading to a potential interpretation of the transfer as a gift), and ordered accordingly.

[C4-1] Can also be seen as second possessor's inappropriate behavior highlighted by 1st possessor's crying.

Baseline

◆ From the descriptions of the situations in Table C4-1 and Table C4-2, we can notice that S2_nE corresponds to a baseline. There are no cues of "*attachment*" neither "*renunciation*" of the first possessor to the ball. Thus this situation should give us the interpretation by default that participants have from a legitimate transfer. We suppose that it is a loan, such as we intended to present the situation when no cues were added. ◆ S5_nE_r and S5_nE_k are also baselines, as they include no cues of attachment or renunciation. The other situations can be described in terms of attachment or renunciation, and thus the interpretation of the transfer could be shifted respectively either towards a loan or towards a gift.

Shift towards a loan

◆ In S4_k (/S5_E_k), the first possessor cries when the second possessor moves the ball away from him, which could manifest an attachment to the object or a sign that the second possessor's behavior is inappropriate. It could lead people to interpret the transfer as a loan. ◆ In S2_E, the first possessor cries just after the transfer of the ball, which could be considered as an attachment to the object or as a weird behavior, but in any case this act could reinforce the interpretation of the transfer as being a loan.

Shift towards a gift

◆ On the contrary, the other situations present cues of the first possessor's renunciation to the ball, which could shift the default interpretation towards an interpretation of the transfer as a gift. In S3_r and S3_k, the first possessor refuses to have the ball back by moving away when the second possessor approaches to return it, which suggests that it is wrong to return the ball, and that the transfer was a gift. However, in S3_r, the second possessor insists, and the first possessor accepts to take the ball back. This could be confusing and participants may then disregard the renunciation cue and still consider the transfer to be a loan in this situation, as the first possessor is seen retrieving the ball. ◆ In S3_k, the second possessor does not insist and he does not return the ball after the refusal of the first possessor to have it back. Thus, here, participants may consider the renunciation cue because the second possessor considered it. But as this situation is compared to S3_r, where the second possessor manages to return the ball despite the first possessor's sign of unwillingness to retrieve it, participants

may consider that the second possessor in S3_k should have insisted if the transfer was a loan. Thus, according to the participants, the transfer could still be seen as a loan. For 5-year-olds, the corresponding situations are S5_nE_r and S5_nE_k, but with no cues of renunciation, so, as said above, we consider these two situations as baselines. The transfers may be considered as loans. ◆ S1a corresponds to the same situation than S3_k, but was not compared to the same condition (S1a was compared to theft and S3_k to restitution). Thus, we present separately these two cases. In S1a, participants may consider the renunciation cue more strongly as this situation is not compared to a situation where this cue is disregarded. ◆ In S4_r (/S5_E_r), the first possessor cries when the second possessor gives him the ball back. This behavior would seem weird if one considers the transfer to be a loan. To be explained, it may shift the interpretation towards a gift. ◆ In the previous situations with a renunciation cue, the first possessor nonetheless stays in front of the second possessor. So the second possessor still can (and does it in some situations) return the ball to him. The first possessor seems to want the second possessor to conserve the ball for the moment, but the second possessor might not be allowed to conserve the ball definitively as the first possessor stays looking at him and potentially controlling his use of the ball. On the contrary, in S1b, the first possessor leaves the place, letting the ball in the second possessor's hands. So the first possessor cannot even intend to return the object. This behavior consisting in leaving could be a strong cue of renunciation leading the participants to consider that the transfer was a gift.

2.2. Interpretations of the situations

To determine whether participants considered the transfer as being a loan or a gift, we looked at their answers to the questions about the rights to keep the object. Table C4-3 presents the interpretations attributed to participants depending on their answers to the questions. For studies S1a, S1b, S2_nE, S2_E, S3_k and S3_r (*first set of studies*), these questions were:

- "[The second possessor] was/is he allowed to **leave** with the ball?"
- "[The second possessor] did/does he have to **give** the ball **back** to [the first possessor]?"

For studies S4_k, S4_r, S5_nE_k, S5_nE_r, S5_E_k, S5_E_r (*second set of studies*), the questions were:

- "[The second possessor] was he allowed to **keep** the ball?"
- "[The second possessor] did he have to **give** the ball **back** to [the first possessor]?"

		Obligation to **Give** the ball **back**		
		yes	no	-
Right to **Leave** with the ball	yes	**Loan**	**Gift**	other
	no	**Loan**	other (incoherence)	other
	-	other	other	other

a.

		Obligation to **Give** the ball **back**		
		yes	no	-
Right to **Keep** with the ball	yes	other (incoherence)	**Gift**	other
	no	**Loan**	other (incoherence)	other
	-	other	other	other

b.

Table C4-3. Interpretations of the situations presenting a legitimate transfer of property.

a. In studies 1, 2 & 3, we consider mainly the answers to the question about the second possessor's obligation to give the ball back to the first possessor, but use the question about his right to leave with the ball to control for random answers (producing incoherence).

b. In studies 4 & 5, we used two formulations of the same question (about the second possessor's right to keep the ball, and his obligation to give it back to the first possessor) to better control for random answers (producing incoherence).

For the *first set of studies*, we did not distinguish between various interpretations of loan on the basis of the answers to the first question (about the right to leave with the object) (but see Appendix C4-1 for more details, with a distinction between short term loan and long term loan). Nevertheless, we used the answers to the first question in order to take into account possible noise in the responses and particularly incoherent answers (see Table C4-3a). Indeed, answering "no" to the question about the obligation to give the ball back was not sufficient to consider the transfer as a gift. To consider that a participant sees the transfer as a gift, he has also to answer that the second possessor is allowed to leave with the ball. For the *second set of studies*, the two questions correspond in fact to two formulations of the same question. Thus, we considered as coherent only the answers that correspond to the same attribution of rights/duties in both questions (see Table C4-3b). If we would consider only the answers to the question about the obligation to give the ball back, we would integrate a proportion of noise in our results.

To summarize (see Table C4-3), adults' answers were distributed in three categories depicting the two different interpretations of the situations (loan and gift) and the case of an incoherent or incomplete response. For the *first set of studies*, if a subject answered "yes the second possessor had/has to give the ball back to the first possessor", and answered "yes" or "no" to the question about the second possessor's right to leave with the ball, his interpretation of the situation was coded as a "loan". If a subject answered "no the second possessor did/does not have to give the ball back" and previously answered "yes he could/can leave with the ball", his interpretation was coded as "gift". Finally, if a subject answered "no he did/does not have to give the ball back" but previously answered "no he could not/cannot leave with the ball", or if he did not answer "yes" or "no" to one of the questions, his response was coded as "other". For the *second set of studies*, if a subject answered "yes the second possessor had to give the ball back to the first possessor", and "no he was not allowed to keep the ball", his interpretation of the situation was coded as a "loan". If a subject answered "no the second possessor did not have to give the ball back to the first possessor " and "yes he was allowed to keep the ball", his interpretation was coded as "gift". All other combinations of answers were coded as "other".

We present now the results of the interpretations of the transfers for each age group and each situation (see Figure C4-1). For adults, in Appendix C4-2, we also present the results of their answers to the explicit question "Did [the first possessor] give or lend the ball to [the second possessor]?".

3. Results and discussions

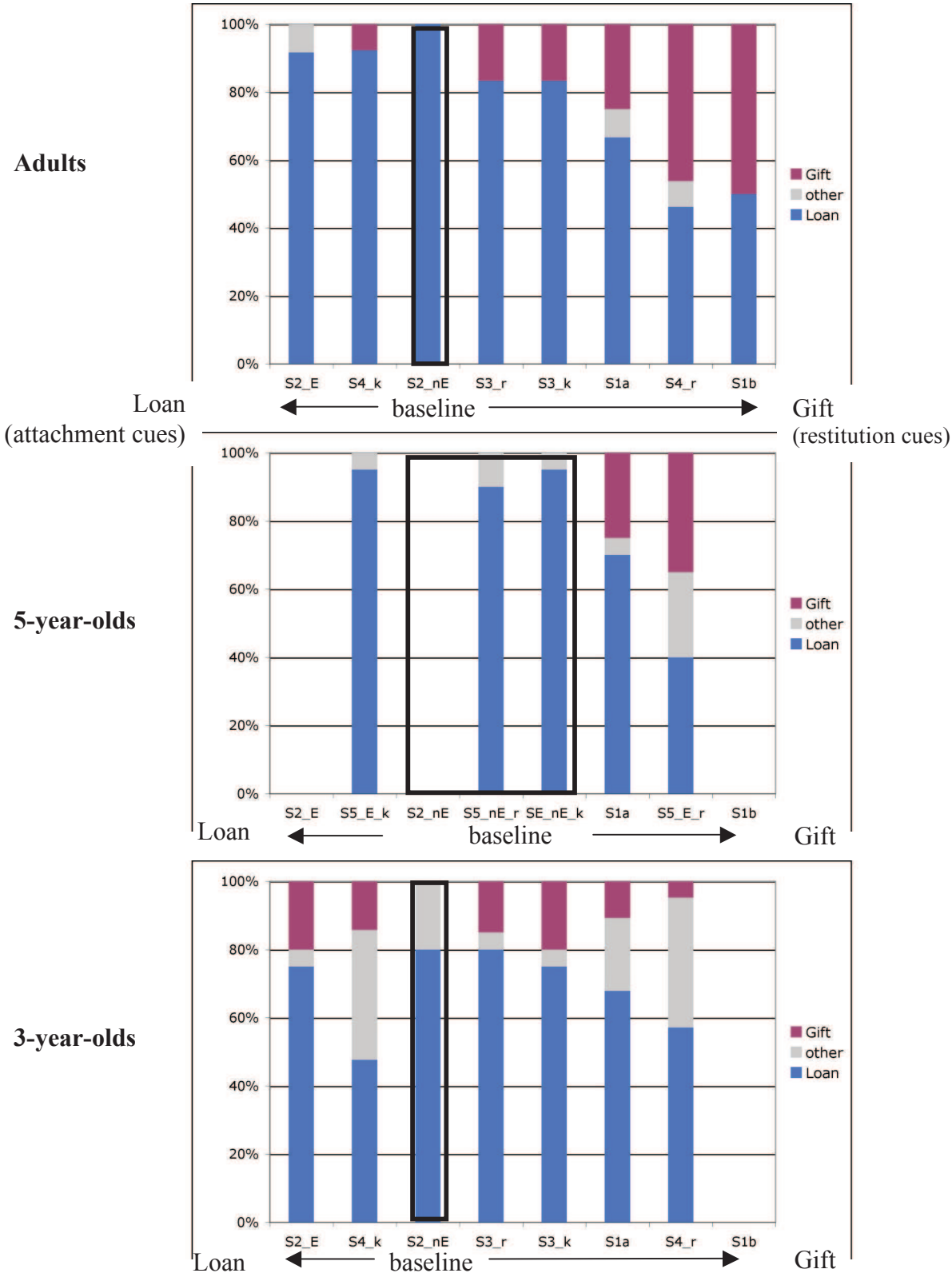


Figure C4-1. Proportion of participants of each age answering according to each interpretation of the transfer (gift, other, loan) for each situation (each legitimate condition of our previous studies).

3.1. Adults

◆ In the default situation with no cues of attachment or renunciation (S2_nE), representing the baseline, all participants interpreted the transfer as a loan. When there are no cues about the type of transfer being performed, the transfer is considered by default to be a loan. As participants are at ceiling interpreting the transfer as a loan in the baseline, we cannot see the effects of cues hypothesized to shift the interpretation towards a clear loan.

◆ We had such "loan cues" in two situations. The first possessor manifested a sign of attachment to the object by displaying a negative emotion when the second possessor moved the object far from him (S4_k), the majority of participants considered the transfer to be a loan (92%), only 1 participant (8%) considered it to be a gift. ◆ When adding cues of attachment of the first possessor towards the object by displaying a negative emotional reaction of the first possessor right after the transfer (S2_E), the only coherent interpretation of the situation corresponds to a loan (92% loan, 8% other). In these two situations, the interpretation of the transfer as a loan is the only significant interpretation, as in the default situation.

◆ We also presented to the participants several situations with cues intended to shift the interpretation towards a gift. When adding cues showing that the first possessor abandon the object, the proportion of participants interpreting the transfer as a loan decreased and the proportion of participants interpreting the transfer as a gift increased. A cue of renunciation that was presented in our stimuli was the refusal of the first possessor to have the object back when the second possessor approached to return it. In one situation (S3_r), the second possessor nevertheless managed to restitute the object by insisting to return it. Then the participants may not be sure if the refusal of the first possessor to retrieve the object was really a renunciation to the object, this may be ambiguous. The majority of participants still considered the transfer to be a loan (83%). The remaining participants (17%) considered the transfer to be a gift despite the restitution. These latter participants probably took into account the sign of renunciation to the object by the first possessor. ◆ In the compared situation, where the second possessor kept the object without insistence after the refusal of the first possessor to have the object back (S3_k), the same proportion of participants considered the transfer to be a loan (83%). Despite the absence of restitution (and the cue of renunciation), the transfer was considered to be a gift only by a minority of participants (17%). This could be due to the fact that in the compared condition (S3_r) the second possessor managed to return the object, and thus participants may consider that the second possessor in the

condition here (S3_k) should have insisted to return the object because the transfer was a loan according to them. ◆ When this same transfer was compared to theft (S1a), the proportion of participants considering the transfer as a loan decreased (67%). Still the majority of participants considered the transfer to be a loan, but the number of participants considering that it was a gift increased (25%). Comparing these two latter situations (S1a & S3_k) we can notice the importance of context (i.e. of the contrasted situation). ◆ Another way to signify renunciation of the first possessor to the object was to display negative emotion when the second possessor wanted to return the object (S4_r). This sign of renunciation was perceived more strongly than the refusal to have the object back, maybe because of the emotional content of this cue. Half of the participants giving a coherent response considered the transfer to be a gift (46%), and half of them considered it to be a loan (46%). ◆ In the most obvious case of renunciation to an object, the first possessor left the place of interaction letting the object to the second possessor (S1b). Indeed, in the other situations of non emotional signs of renunciation, i.e. when renunciation was shown by refusal to have the object back, the first possessor was seen as wanting the second possessor to keep the ball for the moment, but one does not know if the second possessor could keep it definitively as the first possessor stayed there to potentially control the second possessor's use of the object. Here, the second possessor had no option to restitute the object. In this situation, half of the participants (50%) interpreted the transfer as a gift, the other half (50%) interpreted it as a loan. This corresponds to the situation with the most interpretations of the transfer as a gift. We can notice however that only 50% of the participants considered the transfer to be a gift when presented with the departure of the first possessor abandoning the second possessor with the object. This shows the difficulty to present a transfer as a gift. It seems unnatural to consider a property transfer to be a gift.

3.2. Five-year-olds

◆ To 5-year-olds we did not present the same baseline situation as to 3-year-olds and adults (S2_nE). The baseline situations for this age group are the non-emotional situations of Study 5 comparing keeping and restitution (S5_nE_r and S5_nE_k), as they did not include cues of attachment or renunciation of the first possessor to the object. Alternatively, in S5_nE_r, the restitution could be seen as a cue showing that the transfer was a loan. In S5_nE_k, the absence of reaction of the first possessor to the second possessor's keeping of the ball could be seen as a cue showing that the transfer was a gift. However, as the transfer

was the same in both situations, and in the absence of other cues allowing the identification of its nature, it seems improbable that participants would give two distinct interpretations to it. The results show that the majority of children considered the transfer to be a loan in both situations (90% of participants in S5_nE_r, 95% in S5_nE_k). This interpretation was the only coherent or complete response.

◆ In the situation showing that the first possessor was attached to the object because he was sad when the second possessor kept it (S5_E_k), 5-year-olds correctly interpreted the transfer to be a loan (95% of the participants had this interpretation).

◆ In the situation where the first possessor manifested renunciation to the object by refusing the restitution (S1a), the majority of children still considered the transfer to be a loan (70 %). However, similarly to adults, an important proportion of 5-year-olds (25%) considered the situation to be a gift. ◆ In the other situation with cues of renunciation presented to 5-year-olds, where the first possessor cried after the restitution (S5_E_r), similarly to adults, about half of the participants who gave a complete or coherent answer considered the transfer to be a loan (40%) and about half of them considered it to be a gift (35%).

Generally, 5-year-olds have similar results than adults. For both adults and 5-year-olds, the proportion of participants considering the transfer to be a gift reaches 25% in a situation with "non-ambiguous" cues of renunciation (S1a), and corresponds to half of the participants giving coherent or complete answers in a situation showing a negative consequence to the restitution (S4_r/S5_E_r).

3.3. Three-year-olds

In the baseline situation (S2_nE), 3-year-olds, as adults, seemed to consider as a majority that the transfer was a loan (80%). However, a great number of 3-year-olds answered randomly (20%). In all situations, part of the young children gave random answers. With the exception of two situations (S4_k and S4_r), 3-year-olds seemed to consider as a majority the transfer to be a loan (75% in S2_E, 80% in S3_r, 75% in S3_k, 68% in S1a). In the situations with a display of emotion following the absence of restitution (S4_k) or the restitution (S4_r), a great percentage of children gave random answers, which suggests that 3-year-olds did not understand well these situations. Answers corresponding to an interpretation of the transfer as a loan were nonetheless more important (48% in S4_k and 57% in S4_r) than answers

corresponding to an interpretation of the transfer as a gift (14% in S4_k and 5% in S4_r). In almost all situations, some children seemed to consider the transfer as a gift, but this response was always under 25% and in most of the situations below the percentage of random answers. So we cannot consider that 3-year-olds have a notion of gift. Generally, irrespective of the presence of cues of renunciation to the object by the first possessor, 3-year-olds seemed to consider a transfer to be a loan. In fact, this consideration may arise from their first possessor bias (which was discussed in Study 3). Thus 3-year-olds may not really have an understanding of what is a loan.

4. General discussion

Our analyses showed that people consider by default a property transfer to be a loan. This interpretation was present in the responses of 3-year-olds, 5-year-olds and adults. We need to be careful when saying that all participants answering that the second possessor should return the ball to the first possessor considered the transfer to be a loan. Indeed, considering that the first possessor should retrieve the ball could come from a first possessor bias, and not from a mature understanding of different types of transfers. Blake & Harris (2009), comparing attributions of property rights to recipients of legitimate and illegitimate transfers, distinguished between a first possessor bias and a loan bias. They considered that children had a loan bias if they said, for both recipients, that the second possessor could take the object home but should return it to the first possessor. We can say that this interpretation consists in a long term bias. Blake & Harris (2009) considered that children had a first possessor bias if they answered in favor of the first possessor to five of the six asked questions (combining the questions about the legitimate and illegitimate recipients). In their attribution of biases to children, Blake & Harris considered both conditions of transfer; they did not analyze the situations separately. Thus, we cannot directly compare our results to theirs.

We investigated the effects of various cues on the interpretation of a property transfer. The effect of cues of attachment of the first possessor to the object, which should lead to consider the transfer as a loan, could not be seen because the default interpretation of a property transfer is already a loan and this interpretation is shared by almost all the participants (in particular by all the adults). Participants consider the transfer to be a loan even if the first possessor does not assess his rights over the object. Indeed, when the first possessor lets the second possessor leave with the ball without any reaction (S5_nE_k),

participants nevertheless consider the transfer to be a loan. Moreover, this interpretation persists even in the presence of contradictory cues. When the first possessor is refusing to retrieve the object, participants seem reluctant to take into account this behavior, and still consider as a majority that the transfer was a loan. The cues of renunciation seem not very convincing. Only when the first possessor's refusal to retrieve the object was manifested more strongly, by crying after restitution, or by leaving and abandoning the object in the hands of the second possessor, the percentage of 5-year-olds or/and adults considering the transfer to be a gift reached the level of participants considering it as a loan. It has been shown that it is difficult for young children to accept that a first possessor relinquishes rights over the object (Kim & Kalish, 2009). Our results suggest that adults also consider that the first possessor keeps rights over the object. There may be an exception when an abandoned object is of a natural kind (Beggan & Brown, 1994).

Generally, it seems difficult to conceive that a person abandons an object. Previous research has shown that it is difficult to present a situation to children that will be interpreted as a gift. Even 5-year-olds do not accept a complete transfer of ownership without being presented with a particular situation with strong cues indicating that the transfer is a gift: the object being said to be "given", presented as a wrapped gift, in the context of a birthday party (Blake & Harris, 2009; Friedman & Neary, 2008). The analyses of our studies show that it is difficult to represent a gift in a visual way even for adults. We wanted to indicate that a transfer was a gift with some cues presented after the transfer. We tried to represent the fact that the first possessor did not want the object back, and thus that the transfer was a gift, with cues such as moving away from the object or crying when receiving the object back, but a great proportion of adults still considered the transfer to be a loan in these situations. One can wonder what could be a clear (but non-verbal) sign of renunciation to the object. Another possible cue to test would be a positive emotion (happiness) of the first possessor when the second possessor leaves with the object. A strong contrast would be to present to participants a first possessor who is sad when receiving the object back and happy when seeing the other leaving with the object. This could lead participants to interpret the transfer as a gift a posteriori. However, the question of how to signify a gift at the very moment of the transfer (and not afterwards) remains. We avoided using cues such as a wrapped gift or a context of a birthday party because of their cultural dependence. Is there another way to show a gift? The characteristics of the transferred object, of the giver, and the context of transfer should be explored. Table C4-4 presents a summary of cues potentially influencing the interpretation of the nature of a property transfer.

	Loan	**Gift**
Cues after transfer	clear (?) begging for the object back	clear (?) refusal to have the object back
	1st possessor happy if receives object back, sad if other keeps it	1st possessor sad if receives object back, happy if other keeps it
Type of transferred object	previously used	wrapped
	artifact	natural kind (special case for food?)
Total number of objects available when one object is transferred	one	many
Hierarchy between participants of transfer	same level	different level
Context	play	ceremony (birthday, marriage) but which non-culturally-dependent context?
Presence or absence of reception of another object in return for the transferred object	no reciprocity (unidirectional transfer)	reciprocity (exchange)

Table C4-4. Hypothetical cues indicating that the transfer of an object is a loan or a gift.

As already discussed for a wrapped object, the kind of object being transferred may change the interpretation of the type of transfer being performed. For example, the transfer of a natural kind of object, such as a piece of wood or a stone, and the transfer of food, could be more easily seen as definitive transfers (see Neary et al., 2012, on inferences whether artifacts and natural kinds are owned). Also, we suggest that the transfer of an object of which the giver has several exemplars (compared to only one) could be considered as a definitive transfer. This latter characteristic of the object (as being part of a larger set of objects) could be seen as a characteristic of the giver as being wealthy. It would be interesting to investigate whether people consider more easily as a gift a transfer from a rich character to a poor one, or the contrary (see Rochat, 2009b, on attribution of ownership to wealthy and poor characters in different cultures). Moreover, we could investigate transfers between characters at a different level in a hierarchy. We hypothesize that a transfer to someone higher in the hierarchy would

be considered as a gift. It may also be the case for a transfer to someone lower in the hierarchy. Thus the only difference in hierarchy would lead to consider a transfer between two characters as definitive irrespective of the direction of the transfer. Furthermore, as already said, a transfer could be seen as definitive when it appears in a particular context. We should explore which non-culturally-dependent context would allow considering a transfer as a gift. To conclude, it is interesting to investigate when a transfer is seen as a gift, but we should first wonder why it seems so difficult to show giving in the absence of linguistic cues. The loan bias expressed by our participants may be coming from our stimuli that lack typical features of gifts, or facial expressions or specific gestures characteristic of gift-giving, but it may also be a real bias indicating that giving is not a "natural" situation and that there is expectation of some kind of reciprocity. To test this hypothesis, we could finally present to participants the transfer of an object in the context of an exchange, with reception of another object in return for the transferred object. Indeed, in some cultures, reciprocity (sooner or later) after an object transfer is very important and controlled (Mauss, 1952/1967; Malinowski, 1932).

5. Summary

The analysis of the responses to property questions revealed that across our eight situations with a legitimate transfer, adults and both 3- and 5-year-old children predominantly consider that when a character gives an object to another, this latter should then return the object to the first possessor. This response is modulated in adults and 5-year-olds by cues indicating that the first possessor does not want to have his possession back. Such a modulation is not clearly present in 3-year-olds. This suggests the interpretation that adults and 5-year-olds consider by default the object transfer in our movie cartoons as a form of temporary "loan", whereas in 3-year-olds the responses may be driven by a more rudimentary form of first possessor bias (without a clear understanding of the distinction between loan and permanent transfer). To conclude, we discussed several cues that could possibly lead the interpretation of a property transfer towards a gift (in comparison to cues leading to consider the transfer as being a loan). Without using these cues to show gifts, we nonetheless tried to present clearer transfers in our next studies. In the next chapter, we investigate the understanding of the previous studied contrasts (illegitimate vs. legitimate acquisition, and restitution vs. absence of restitution) by younger toddlers and infants, using an implicit measure.

CHAPTER 5: Toddlers' and infant's evaluations of property transfers – Methodological issues in toddlers' and infants' testing

1. Introduction

In the previous chapters we investigated children's explicit understanding of property transfers in terms of rights, and through their evaluation of agents involved in the transfers. However, children's evaluations were measured through a verbal response. A non-verbal measure of children's preferences would be more indicative of their implicit evaluation and understanding of the situations. Also, it would enable to study the development of evaluation of property transfers in preverbal infants. In Chapter 1 we have seen that children seem to have an earlier understanding of ownership transgressions when their evaluations are measured implicitly. Here we test children's evaluations of property transfers with a novel methodology assessing better their implicit processing of the situations. We also test younger children than in our previous studies: 24-, 18-, and 5-month-olds.

2. Toddlers' social evaluations of illegitimate and legitimate property acquirers

2.1. Study 6: Two-year-olds' social preferences between a *thief* and a *legitimate recipient* in the absence of emotional cues

As Study 1a, this study aimed at comparing characters based on their mode of acquisition of an object: illegitimate (theft) versus legitimate (legitimate reception). In this study, we used more dynamic stimuli, measured a more implicit response and tested younger children than in the studies presented in the previous chapters. Children were presented with two non-verbal movies depicting the transfer of a ball between two puppets. One movie represented an agent *stealing* a ball from another character. In the other movie, the agent was *receiving* the ball from the other character.

2.1.1. Method

Participants

Nineteen 2-year-olds (10 girls; mean age 25 months, 5 days; range: 24;1 to 26;9) were tested. Three additional children were tested but excluded due to absence of response (2 children) or of clarity of choice (1 child). Children were French speakers. They were recruited from a database of parents who accepted to participate with their child in our studies; they were tested in our laboratory. Children were assigned randomly to one of the four experimental groups allowing counterbalancing of the order of presentation of conditions (theft first or legitimate reception first) and of the characters associated to a condition (agent 1 in theft or agent 2 in theft).

Materials and setting

Children sat on their parent's lap at a table in front of a large screen on which were projected the movies. The dimension of the screen was such that the characters seen on the screen had almost the same dimension than the real puppets (22 cm) used to make the movies, and presented to the child before and after the movies.

As in all our previous studies, children were presented with movies depicting various interactions between two characters. Contrary to our previous studies, the movies used with

2-year-olds were not animated cartoons constructed with a computer software, but movies of puppet shows performed by hand by the experimenter. The use of hand puppets allowed us to perform biological motions, which were more realistic than the movements in the previously used animations. The movements were more natural, respecting the dynamics of the actions (e.g. quick movements during fight between the thief and the protagonist; a slow movement when the protagonist is approaching the agent to initiate contact), although trying to minimize the differences between the two compared actions. The new movies were also shorter than the previous animated cartoons in order to avoid loosing children's attention during the movie. They lasted 21 seconds.

In this study, three different characters were seen: a protagonist (the same in both cartoons: Pig) and two agents (one in each cartoon). The agents were a wolf and a hedgehog, but were not named at any time during the study. Only the protagonist was named: "Pig". The protagonist was the character first possessing the object. The agents were the characters acquiring the object either by theft or by legitimate reception, so they also corresponded to the second possessors. These two characters were those to be evaluated by the participants. The sequence of events in each condition (see Figure C5-1) is described bellow, with the differences between both conditions in bold.

At the beginning of each movie, two characters are present on the screen, the protagonist with a ball and one agent without any ball, both facing forward to the child.

In the theft condition:

1. The protagonist plays with the ball[C5-1], and then **keeps it in his hands**.
2. **The agent steals the ball from the protagonist's hands**
   (The agent comes close to the protagonist, fights with him, takes the ball, and comes back to his initial location).
3. The protagonist turns himself towards the agent.
4. The agent leaves with the ball.
5. The protagonist stays without the ball (and then vanishes).

[C5-1] The way the protagonist plays with the ball is identical to the play presented to infants by Hamlin & Wynn, 2011. The protagonist jumps up and down twice, and on his third jump he drops and retrieves the ball. This behavior is repeated three times.

In the legitimate reception condition:

1. The protagonist plays with the ball.
2. **The protagonist gives the ball to the agent**

   (The protagonist steps towards the agent, pats on his shoulder, gives the ball to him, and comes back to his initial location).
3. The protagonist turns himself towards the agent.
4. The agent leaves with the ball.
5. The protagonist stays without the ball (and then vanishes).

We can notice that contrary to the previous studies, here the agent does not play with the ball after the transfer. The total amount of time each agent was present on the screen was matched between the two movies. The orientations of the characters were matched as much as possible between the movies. However, the actions were not totally matched in intensity to be more realistic.

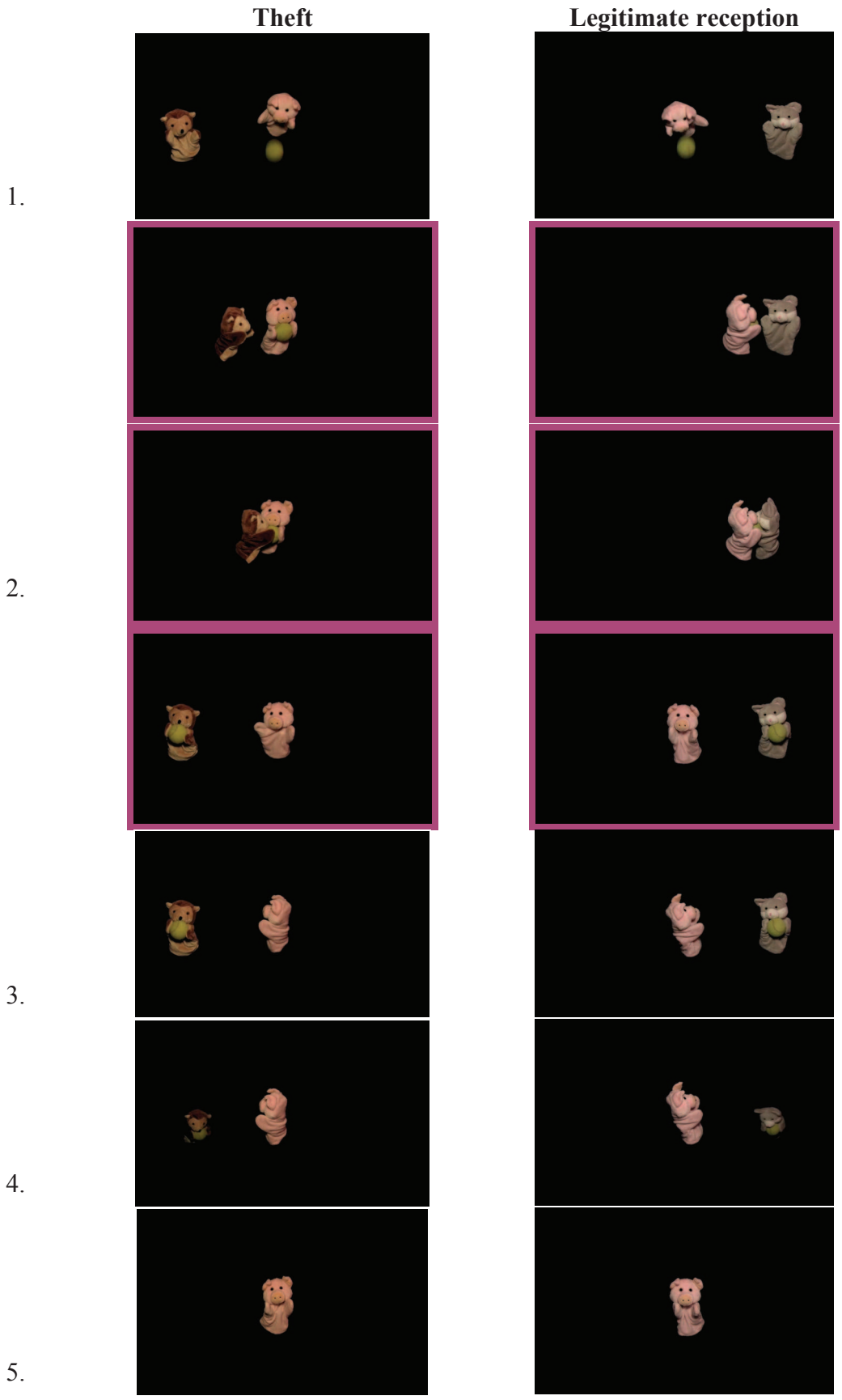


Figure C5-1. Images extracted from each of the movies in Study 6. Outlined in purple, the steps being different between both conditions.

Procedure

On the table, at a distance, the experimenter (being between the table and the screen) first presented in real to the child the puppets representing the two agents, and said, "Look, these are two little animals". Then the experimenter presented closer to the child the protagonist puppet Pig and asked the child to grab it. This was done to train the child to grab a real puppet, as this behavior is necessary for our measure. Pig and then together the two animals representing the agents were presented on the screen, and the experimenter pointed out to the child that these are the same characters than the real puppets. Then, the experimenter asked the parent to close his eyes, he hid below the table, and the movies began. The parent and the experimenter did not see the movies, not knowing in which experimental group was the child (but had opened eyes during the test). Compared to the previous studies with 3- and 5-year-olds, the movies were each presented three times in alternation before test. So, 2-year-olds saw the movies once more than 3- and 5-year-olds before giving their preference between the two agents. After the three presentations of the movies, both agents appeared on the screen and then for real in front of the child who was asked to choose one of them[C5-2]. The choice of a puppet represents a measure of the child's social preference between the two agents. Figure C5-2 presents a summary of the procedure.

- *Real* - Presentation of the 3 puppets + Training to grab
- *Screen* - Presentation of the puppets
- *Screen* - Playing of the movies
    - the two agents
    - movie 1 - movie 2 - movie 1 - movie 2 - movie 1 - movie 2
    - the two agents
- *Real* - Test: choice between the two agent puppets

Figure C5-2. Procedure in Study 6.

[C5-2] At the end, the child was given a ball and asked to give it to one of the agents as a gift. We do not present the results of this measure; the analyses revealed no significant results.

2.1.2. Results & Discussion

Measures

We measured children's attitudes towards the agents. Children were asked to choose between the two puppets. However, their choice was not always straightforward. Thus, we examined different measures. We coded child's *choice* (i.e. the first puppet actually grabbed). If the child's first reaching behavior led to the taking of the puppet, we considered that he made a *clear choice*. We also coded the delay between the presentation of the puppets close to the child and the initiation of the reach leading to grab a puppet. We deduced measures of *choice initiated in less than 10 seconds* (including choice initiated before the presentation of the puppets close to the child) and of *choice initiated between 0 and 10 seconds* (i.e. choice initiated after the presentation of the puppets close to the child but within 10 seconds), and measures of *clear choice initiated in less than 10 seconds* and of *clear choice initiated between 0 and 10 seconds.*

Results & Discussion

Number and percentage of children who		
• chose slowly (i.e. chose in more than 10 sec)	1/19	5%
• anticipated	5	26%
• intended to take both puppets at the same time	1	5%
• intended to take both puppets one after the other	6	32%
• (first intended to take both puppets at the same time, and then also intended to take both puppets one after the other)	(1)	(5%)

Table C5-1. Number and percentage of 2-year-olds performing different behaviors in Study 6.

Table C5-1 describes the choice behaviors of children. Children were generally willing to take a puppet. Only one child took more than 10 seconds to make his choice (so eighteen children remained for the measure of *choice in less than 10 seconds*). Five children were very fast at grabbing a puppet, anticipating their choice (so thirteen children remained for the measure of *choice between 0 and 10 seconds*). Children also generally were clear in their choice (17 of 19): only two children did not make a *clear choice* (one child first intended to

grab both puppets, and one child first reached for the opposite puppet of his final choice. In addition, we can notice that six children attempted to grab the other puppet once they grabbed one.

For the measure of *choice*, a General Linear Model with Gender, Order and Agent as between-subjects factors, considering a binomial distribution of responses, revealed no effects of Gender, Order or Agent (see Table C5-2).

Intercept	z = 0.25	p = .81
Gender	z = -1.10	p = .27
Order	z = -0.96	p = .34
Agent	z = -0.96	p = .34

Table C5-2. Logistic regression for the measure of 2-year-olds' *choice* between the two agents in Study 6.

Figure C5-3 shows the number of children choosing each of the agents for each measure. For the measure of *choice*, children's selection of the legitimate recipient and thief did not differ from chance (10 of 19 participants chose the legitimate recipient, binomial probability test, two-tailed, p=1). For all other measures, children did not either choose preferentially any of the puppets (see details in Table C5-3).

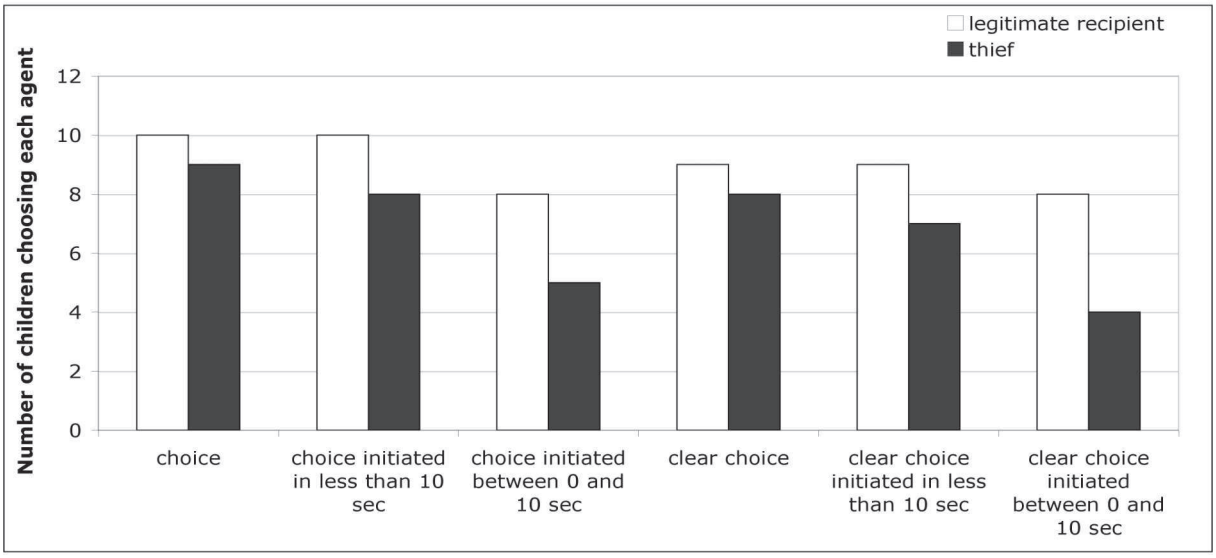


Figure C5-3. Number of 2-year-olds choosing each agent (in white, the legitimate recipient; in black, the thief) for different measures of choice in Study 6.

choice	*choice in less than 10 sec*	*choice between 0 and 10 sec*	*clear choice*	*clear choice in less than 10 sec*	*clear choice between 0 and 10 sec*
10; 9 p = 1	10; 8 p = .82	8; 5 p = .58	9; 8 p = 1	9; 7 p = .80	8; 4 p = .39

Table C5-3. For different measures of choice in Study 6, the first number represents the number of 2-year-olds choosing the legitimate recipient; the second number, the number of 2-year-olds choosing the thief; and the p-value the result of the two-tailed binomial probability test for these responses.

When seeing legitimate and illegitimate transfers of a ball between two puppets, 2-year-old children did not have any preference between a puppet receiving a ball legitimately and a puppet stealing a ball from another character. This result replicates previous findings with older children. Indeed, in Study 1 (Chapter 2), 3-year-old children did not evaluate differently a legitimate recipient and a thief. Despite the measure of a more implicit and non-verbal response, young children do not seem to evaluate property transfers. As in Study 1, after the transfers, the first possessor did not express any emotion. We have seen in Study 2 that emotional cues help to elicit social/moral evaluation in 3-year-old children. In the next study, we investigated whether the presence of emotion would help 2-year-olds to evaluate characters involved in legitimate and illegitimate property transfers.

2.2. Study 7: Two-year-olds' social preferences between a *thief* and a *legitimate recipient* in the presence of emotional cues

As Study 2, this study aimed at comparing characters based on their mode of acquisition of an object, illegitimate (theft) versus legitimate (legitimate reception), in the presence of an emotional distress of the first possessor after the transfer. As in Study 6, we used more dynamic stimuli, measured a more implicit response and tested younger children than in the studies presented in the previous chapters. Children were presented with two non-verbal movies depicting the transfer of a ball between two puppets. One movie represented an agent *stealing* a ball from another character, who cried after the transfer. In the other movie, the agent was *receiving* the ball from the other character, who also cried after the transfer.

2.2.1. Method

Participants

Twenty-nine 2-year-olds (18 girls; mean age 24 months, 27 days; range: 23;14 to 25;23) were tested. Six additional children were tested but excluded due to technical failure (1 child), inattentiveness (1 child), parental interference (2 children), and absence of clarity of choice (2 children). Children were French speakers. They were recruited from a database of parents who accepted to participate with their child in our studies; they were tested in our laboratory. Children were assigned randomly to one of the four experimental groups allowing counterbalancing of the order of presentation of conditions (theft first or legitimate reception first) and of the characters associated to a condition (agent 1 in theft or agent 2 in theft).

Materials and setting

The general materials and setting were the same as in Study 6:
- children saw the movies on a big screen,
- the movies represented hand puppet shows,
- each movie lasted 21 seconds,
- the agents (a wolf and a hedgehog) were not named during the study.

In this study, four different characters were seen: two protagonists (one in each cartoon: Pig or Duck) and two agents (one in each cartoon). The protagonist was the character first possessing the object, and crying after the transfer of the object. The agents were the characters acquiring the object either by theft or by legitimate reception, so they also corresponded to the second possessors. These two characters were those to be evaluated by the participants. The sequence of events in each condition (see Figure C5-3) is described bellow, with the differences between both conditions in bold.

At the beginning of each movie, two characters are present on the screen, one protagonist with a ball and one agent without any ball, both facing forward to the child.

In the theft condition:

1. The protagonist plays with the ball[C5-3], and then **keeps it in his hands**.
2. **The agent steals the ball from the protagonist's hands**

   (The agent comes close to the protagonist, fights with him, takes the ball, and comes back to his initial location).
3. The protagonist starts to cry[C5-4].
4. The protagonist turns himself back to face the child (then both characters vanish).

In the legitimate reception condition:

1. The protagonist plays with the ball.
2. **The protagonist gives the ball to the agent**

   (The protagonist steps towards the agent, pats on his shoulder, gives the ball to him, and comes back to his initial location).
3. The protagonist starts to cry.
4. The protagonist turns himself back to face the child (then both characters vanish).

The total amount of time each agent was present on the screen was matched between the two movies. The orientations of the characters were matched as much as possible between the movies. However, the actions were not totally matched in intensity to be more realistic.

[C5-3] see supra note C5-1 (i.e. as in Hamlin & Wynn, 2011, the protagonist jumps up and down twice, and on his third jump he drops and retrieves the ball. This behavior is repeated three times).
[C5-4] The protagonist puts his hands on his eyes, and shows verbal expression of distress.

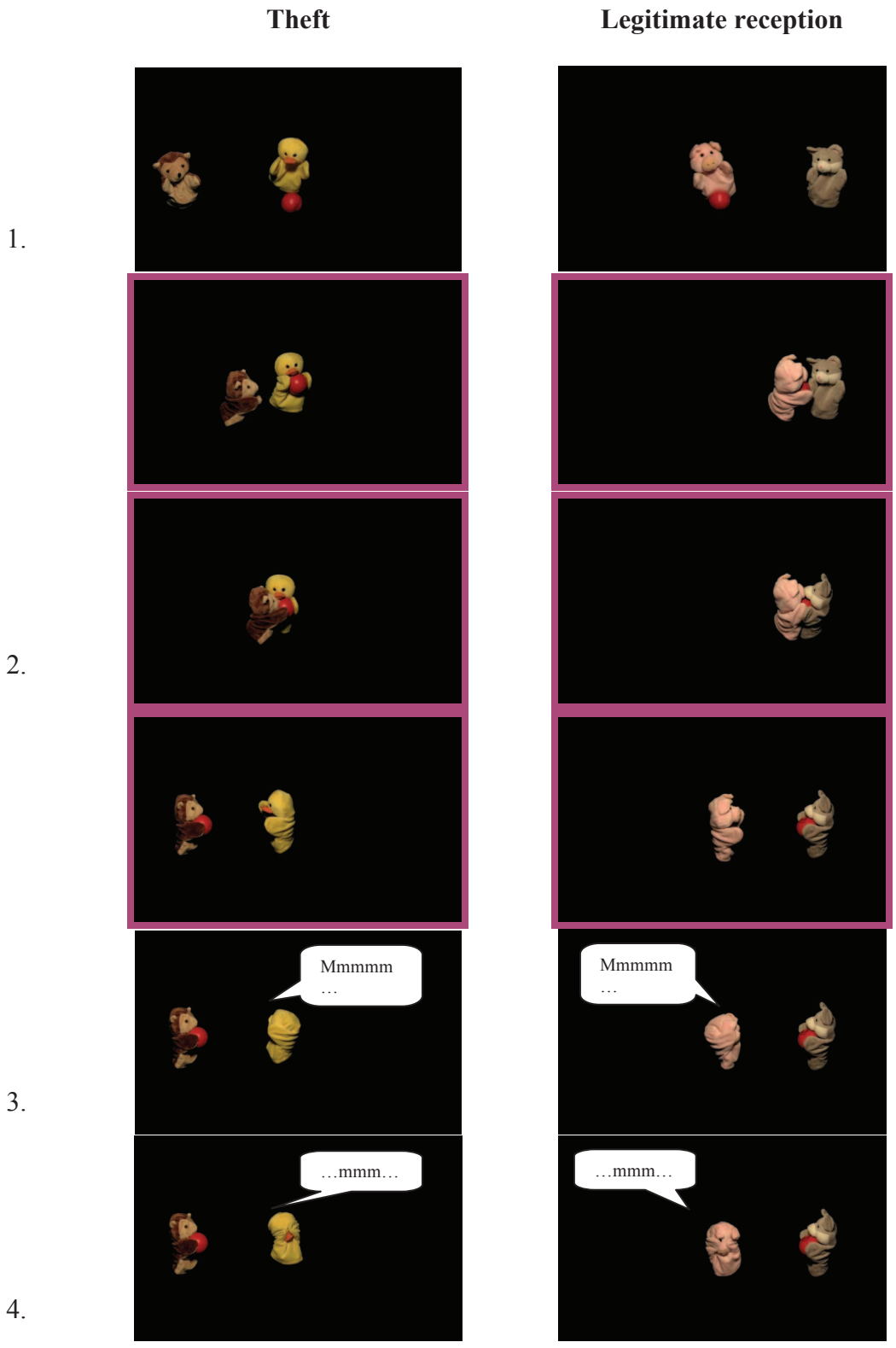


Figure C5-3. Images extracted from each of the movies in Study 7. Outlined in purple, the steps being different between both conditions.

Procedure

As in Study 6, the child first participated to a training phase where the different characters were presented to him for real. Here, two protagonists were presented to the child, Pig and then Duck, and the child was encouraged to grab each of them. Then, the different characters, Pig, then Duck, and then together the two animals representing the agents were presented on the screen, and the experimenter pointed out to the child that these are the same characters than the real puppets. Then the two movies were shown to the child. As in Study 6, the parent and experimenter were blind to condition (they closed their eyes during the display of the movies, but opened their eyes during the measure of choice). The movies were each presented three times in alternation. At the end both agents appeared on the screen and then for real in front of the child who was asked to choose one of them[C5-5]. The choice of a puppet represents a measure of the child's social preference between the two agents. Figure C5-4 presents a summary of the procedure.

- *Real* - Presentation of the 4 puppets + Training to grab
- *Screen* - Presentation of the puppets
- *Screen* - Playing of the movies
    - the two agents
    - movie 1 - movie 2 - movie 1 - movie 2 - movie 1 - movie 2
    - the two agents
- *Real* - Test: choice between the two agent puppets

Figure C5-4. Procedure in Study 7.

[C5-5] We also had a measure of *gift-giving*, where the experimenter asked the child to give a ball to one of the puppets. Furthermore, we also assessed children's social preferences between the protagonist puppets by asking them to choose one of them (*choice of protagonist*). We do not present the results of these measures; the analyses revealed no significant results.

2.2.2. Results & Discussion

Measures

As in Study 6, we examined different measures of children's attitudes towards the agents. We coded child's *choice* (i.e. the first puppet actually grabbed). If the child's first reaching behavior led to the taking of the puppet, we considered that he made a *clear choice*. We also coded the delay between the presentation of the puppets close to the child and the initiation of the reach leading to grab a puppet. We deduced measures of *choice initiated in less than 10 seconds* and of *choice initiated between 0 and 10 seconds* (i.e. choice not initiated before the presentation of the puppets close to the child but within 10 seconds), and measures of *clear choice initiated in less than 10 seconds* and of *clear choice initiated between 0 and 10 seconds*.

Results & Discussion

Number and percentage of children who		
• chose slowly (i.e. chose in more than 10 sec)	8/29	28%
• anticipated	6	21%
• intended to take both puppets at the same time	9	31%
• intended to take both puppets one after the other	11	38%
• (first intended to take both puppets at the same time, and then also intended to take both puppets one after the other)	(5)	(17%)

Table C5-4. Number and percentage of 2-year-olds performing different behaviors in Study 7.

Table C5-4 describes the choice behaviors of children. Children were generally willing to take a puppet. Eight children took more than 10 seconds to make their choice (so twenty-one children remained for the measure of *choice in less than 10 seconds*). Six children were very fast at grabbing a puppet, anticipating their choice (so fifteen children remain for the measure of *choice between 0 and 10 seconds*). In this study, the number of children making a *clear choice* was low (17 of 29). A lot of children were not clear in their choice due to the fact that they first tried to take both puppets (nine children); also two children first reached for the opposite puppet of their final choice and one child alternated reach toward the puppets two

times before choosing. In addition, we can notice that eleven children attempted to grab the other puppet once they grabbed one.

For the measure of choice, a General Linear Model with Gender, Order, and Agent as between-subjects factors, considering a binomial distribution of responses, revealed an effect of Gender (and a marginal effect of Agent). There was no effect of Order (see Table C5-5).

Intercept	z = 1.60	p = .11
Gender	z = -2.38	p = .017 *
Order	z = 0.91	p = .36
Agent	z = 1.72	p = .086 ~

Table C5-5. Logistic regression for the measure of 2-year-olds' *choice* between the two agents in Study 7.

Figure C5-5 shows the number of children choosing each of the agents for each measure. For the measure of *choice*, children's selection of the legitimate recipient and thief did not differ from chance (18 of 29 participants chose the legitimate recipient, binomial probability test, two-tailed, p=.27). However, when considering only children who answered quickly, they preferred (or tended to prefer) the legitimate recipient (*choice in less than 10 sec*: 15 of 21, p=.078; *choice between 0 and 10 sec*: 12 of 15, p=.035). For the three measures of clear choice, children did not choose preferentially either puppet (see Table C5-6). For the measure of *choice*, boys preferred the legitimate recipient (10 of 11 boys chose the legitimate recipient, p=.012); girls did not prefer one character compared to the other (8 of 18 girls chose the legitimate recipient, p=.82; see Table C5-6 for details of the other measures). No effect of gender was expected, and we do not have enough data to discuss this effect further.

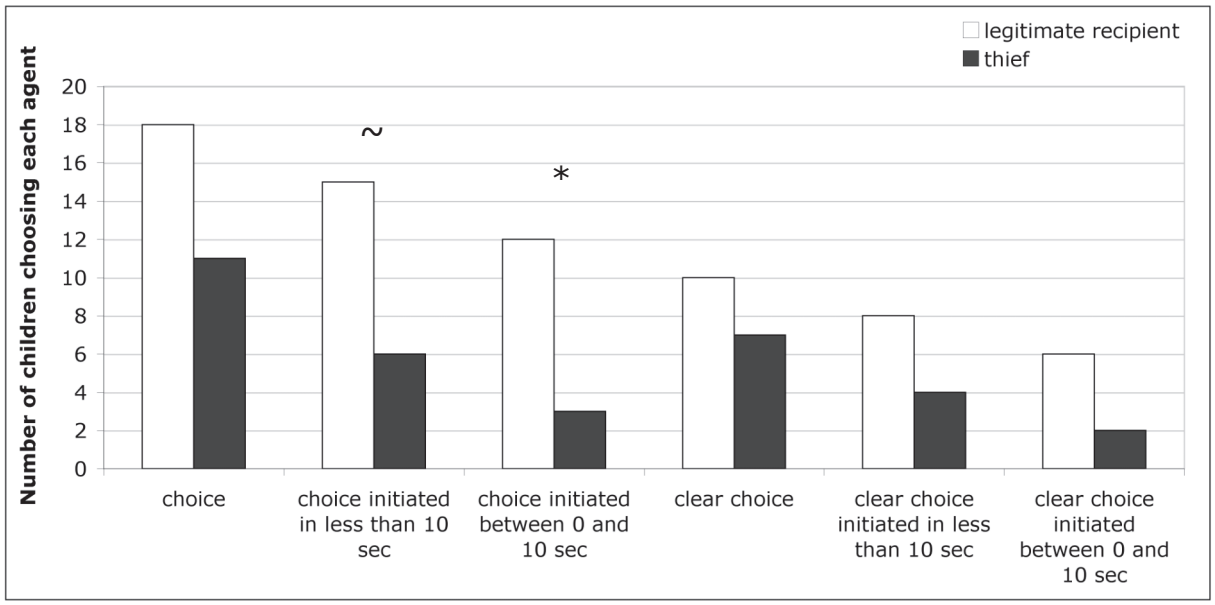


Figure C5-5. Number of 2-year-olds choosing each agent (in white, the legitimate recipient; in black, the thief) for different measures of choice in Study 7. ~ p<.1 * p<.05

	choice	*choice in less than 10 sec*	*choice between 0 and 10 sec*	*clear choice*	*clear choice in less than 10 sec*	*clear choice between 0 and 10 sec*
all children	18; 11 p=.27	15; 6 p=.078 ~	12; 3 p=.035 *	10; 7 p=.63	8; 4 p=.39	6; 2 p=.29
boys	10; 1 p=.012 *	9; 0 p=.004 **	7; 0 p=.016 *	5; 0 p=.063 ~	4; 0 p=.13	2; 0 p=.5
girls	8; 10 p=.82	6; 6 p=1	5; 3 p=.73	5; 7 p=.77	4; 4 p=1	4; 2 p=.69

Table C5-6. For different measures of choice in Study 7, the first number represents the number of 2-year-olds choosing the legitimate recipient; the second number, the number of 2-year-olds choosing the thief; and the p-value the result of the two-tailed binomial probability test for these responses.

We presented to 2-year-old children illegitimate and legitimate transfers of a ball between two puppets, followed by a negative emotion displayed by the first possessor. Children, who chose quickly between the two puppets, preferred the legitimate recipient compared to the thief. This result partially replicates previous findings with older children. Indeed, in Study 2 (Chapter 2), 3-year-old children evaluated more positively a legitimate

recipient compared to a thief, when the property transfers were followed by a negative emotion of the first possessor. The willingness of 2-year-olds to interact with both puppets may have interfered with their choice (52% of participants wanted to grab both puppets, simultaneously and/or sequentially). However, our results suggest that children as young as 2-year-old do make some evaluation of property transfers, at least in presence of emotional cues, and when asked to give an implicit and non-verbal response.

2.3. Summary & Conclusion

In Studies 6 and 7, we tested 2-year-olds social evaluation of characters acquiring an object illegitimately (by theft) or legitimately (by legitimate reception), in the absence or presence of distress of the first possessor after the transfer. We noticed that a lot of children (particularly in Study 7) wanted to take both puppets before making a choice (5% in Study 6 and 31% in Study 7) or after their first grasp (32% and 38%). The results partially replicated what we have found with 3-year-olds (in Studies 1a and 2). In the absence of an emotional reaction of the first possessor to the transfer (Study 6), 2-year-olds did not choose preferentially one agent compared to the other; despite the use of an implicit measure, young children did not show comparative evaluation. In the presence of distress expressed by the first possessor after the transfer (Study 7), a sub-group of 2-year-olds (those who chose quickly) preferred the legitimate recipient compared to the thief. This preference was significant only when considering toddlers who responded in less than 10 seconds and without anticipation. Their ability to distinguish between the illegitimate and legitimate recipients could not be based on the emotion alone, as the emotion was the same in both conditions of legitimacy. However, emotion was necessary to elicit comparative evaluation of illegitimate and legitimate agents. It seems that young children need this cue to evaluate agents involved in property transfers. In the next studies, we were interested in 2-year-olds' evaluation of restitution, in the presence of another type of cue: begging of the first possessor to have the ball back.

3. Toddlers' and infants' social evaluations of restitution behaviors following a property transfer

3.1. Introduction

It is important to understand that non-definitive transfers of property need to be followed by restitution. In our previous studies exploring young children's evaluation of restitution behaviors (Studies 3 and 4) we found that 3-year-olds have no preference between a reciprocator and a keeper. However, Hamlin & Wynn (2011) have found that 5-month-olds do show a preference for a reciprocator. Hamlin & Wynn used a measure of infant's social preference. In the studies presented here, we used this same measure to assess toddlers' and infants' evaluations of restitution. We also optimized the stimuli and procedure to be closer to the one used by Hamlin & Wynn. As Study 3, the studies presented here (Studies 8 and 9) aimed at comparing characters based on their restitution of an object to the first possessor: no restitution (keep condition) versus restitution (return condition). In contrast to Study 3, in these studies, we used more dynamic stimuli, measured a more implicit response and tested younger children: 24-, 18-, and 5-month-olds.

3.2. Study 8: Eighteen- and twenty-four-month-old toddlers' social preferences between a *reciprocator* and a *keeper*

Children were presented with two non-verbal movies depicting the transfer of a ball between two puppets (a first possessor dropped a ball that was picked up by a second possessor) and then the restitution or not of this ball by the second possessor to the first possessor. One movie represented an agent *keeping* the ball and leaving with it. In the other movie, the agent was *returning* the ball to the other character.

3.2.1. Method

Participants

Sixteen 18-month-olds (9 girls; mean age 17 months, 21 days; range: 17;2 to 18;8) and twenty-one 24-month-olds (13 girls; mean age 24 months, 12 days; range: 23;1 to 25;3) were tested. Ten additional children were tested but excluded due to technical failure (two 24-month-olds), inattentiveness (one 24-month-old and three 18-month-olds), and absence of choice (two 24-month-olds and two 18-month-olds). Children were French speakers. They were recruited from a database of parents who accepted to participate with their child in our studies; they were tested in our laboratory. Children were assigned randomly to one of the four experimental groups allowing counterbalancing of the order of presentation of conditions (keep first or return first) and of the characters associated to a condition (agent 1 in keep condition or agent 2 in keep condition).

Materials and setting

The general materials and setting were the same as in Study 6:
- children saw the movies on a big screen,
- the movies represented hand puppet shows,
- the agents (a wolf and a hedgehog) were not named during the study.

Here, each movie lasted 30 seconds.

In this study, three different characters were seen: a protagonist (the same in both cartoons: Pig) and two agents (one in each cartoon). The protagonist was the character first

possessing the object. The agents were the second possessors of the object, picking up the ball when the protagonist dropped it, and then returning it or not to the protagonist after his request. These two characters were those to be evaluated by the participants. The sequence of events in each condition (see Figure C5-6) is described bellow, with the differences between both conditions in bold. The beginning of each movie is the same.

1. The protagonist enters and grabs a ball already present on the ground.

The agent arrives.

2. The protagonist plays with the ball[C5-6].
3. The protagonist drops the ball towards the agent.

The agent picks the ball up.

4. The protagonist turns himself towards the agent[C5-7]. (This happens two times).

In the keep condition:

5. On the third turn of the protagonist, the agent leaves with the ball.

6. The protagonist turns himself back and faces forward without the ball.

In the return condition:

5. On the third turn of the protagonist, the agent returns the ball to the protagonist (by rolling it to him) and leaves the scene.

6. The protagonist faces forward with the ball.

The total amount of time each agent was present on the screen was matched between the two movies, as well as the orientations of the characters.

[C5-6] see supra note C5-1 (i.e. as in Hamlin & Wynn, 2011, the protagonist jumps up and down twice, and on his third jump he drops and retrieves the ball. This behavior is repeated three times).

[C5-7] The protagonist turns himself towards the agent and opens his arms as if "asking" for the ball back. The agent turns himself towards the protagonist, and then both puppets turn to face forward again (as in Hamlin & Wynn, 2011).

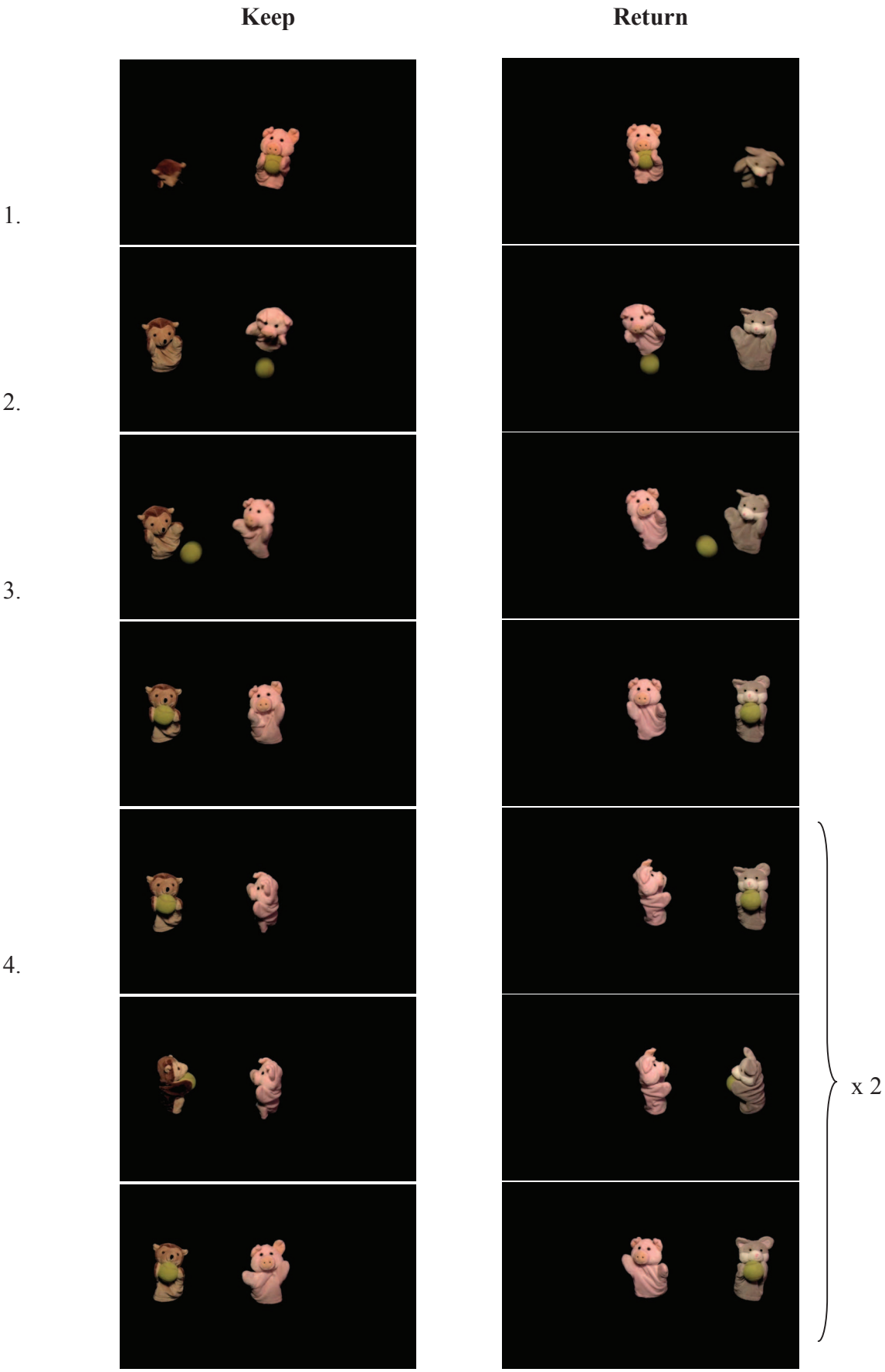

Keep
Return
1.
2.
3.
4.
x 2

Figure C5-6. Images extracted from each of the movies in Study 8. Outlined in purple, the steps being different between both conditions.

Procedure

The general procedure was the same as in Study 6.

- children were trained to grab a puppet,
- the puppets were presented to the children for real and then on the screen,
- the parent and experimenter were blind to condition (they closed their eyes during the display of the movies, but opened their eyes during the measure of choice)
- the movies were each presented three times in alternation.

After the display of the movies, both agents appeared on the screen and then for real in front of the child who was asked to choose one of them[C5-8]. The choice of a puppet represents a measure of the child's social preference between the two agents. Figure C5-7 presents a summary of the procedure.

- *Real* - Presentation of the 3 puppets + Training to grab
- *Screen* - Presentation of the puppets
- *Screen* - Playing of the movies
    - the two agents
    - movie 1 - movie 2 - movie 1 - movie 2 - movie 1 - movie 2
    - the two agents
- *Real* - Test: choice between the two agent puppets

Figure C5-7. Procedure in Study 8.

Similarities and differences with the study of Hamlin & Wynn (2011)

Compared to Studies 3, 4, and 5, the stimuli used here were closer to those used by Hamlin & Wynn (2011). We notably included the requesting behavior of the first possessor that was lacking in our previous studies of children's evaluations of restitution behaviors. Also, compared to our previous studies, the movements of the characters were here more natural, and the characters (hand puppets) were similar to those used by Hamlin.

[C5-8] At the end, the child (only 24-month-olds) was given a ball and asked to give it to one of the agents as a gift. We do not present the results of this measure; the analyses revealed no significant results. We did not measure gift-giving with 18-month-olds because when testing this measure on a few children it appeared that they were not willing to give a gift to any character but rather play with it themselves or launch it to the experimenter.

However, some differences in the stimuli remained between our study and the study performed by Hamlin. Our agents were a grey wolf and a brown hedgehog. They were not bright colored puppets as in Hamlin's study. In our study, only one of the agents was present in each condition, whereas in Hamlin's study, both agents were seen in both conditions. An important difference in the materials between our study and the study performed by Hamlin is that we presented the events as movies on a screen, whereas Hamlin presented the events in real puppet shows.

Also differences in the procedure between our study and Hamlin's study remained. We identified a possible bias in Hamlin's study. In her study, parents were looking at the events with their infant, and only closing their eyes during the test phase, i.e. the measure of choice. Even if parents were instructed not to react to the scenes, they could have had uncontrolled slight movements of pressure of their infant or changes in their heart rate, that could have been perceived by the infant, allowing him to associate positive and negative feelings with each agent. The infant could then have used these associations for his choice of one puppet. We wanted to avoid this possible bias, and thus asked the parents to close their eyes during the display of the events. Thus the parents and experimenter were blind to the condition presented to the infant. Finally, another difference with Hamlin's study relies on the number of trials given to the children. Contrary to Hamlin, we presented a fixed number of trials (6 trials) to all children and did not use a habituation criterion. As the population tested here consisted in older children than those tested by Hamlin & Wynn (2011) (i.e. we tested 2-year-olds instead of 5-month-olds), we considered that a habituation procedure was not necessary to ensure that the child has seen the events enough times before test.

3.2.2. Results & Discussion

Measures

As in Studies 6 & 7, we examined different measures of children's attitudes towards the agents. We coded child's *choice* (i.e. the first puppet actually grabbed). If the child's first reaching behavior led to the taking of the puppet, we considered that he made a *clear choice*. We also coded the delay between the presentation of the puppets close to the child and the initiation of the reach leading to grab a puppet. We deduced measures of *choice initiated in less than 10 seconds* and of *choice initiated between 0 and 10 seconds* (i.e. choice not initiated before the presentation of the puppets close to the child but within 10 seconds), and

measures of *clear choice initiated in less than 10 seconds* and of *clear choice initiated between 0 and 10 seconds.*

Results & Discussion

24-month-olds

Number and percentage of children who		
• chose slowly (i.e. chose in more than 10 sec)	2/21	9.5%
• anticipated	6	29%
• intended to take both puppets at the same time	2	9.5%
• intended to take both puppets one after the other	8	38%
• (first intended to take both puppets at the same time, and then also intended to take both puppets one after the other)	(1)	(5%)

Table C5-7. Number and percentage of 24-month-olds performing different behaviors in Study 8.

Table C5-7 describes the choice behaviors of 24-month-old children. Children were generally willing to take a puppet. Two children took more than 10 seconds to make their choice (so nineteen children remained for the measure of *choice in less than 10 seconds*). Six children were very fast at grabbing a puppet, anticipating their choice (so thirteen children remained for the measure of *choice between 0 and 10 seconds*). Five children were not clear in their first choice: two children first tried to take both puppets, two children first reached for the opposite puppet of their final choice and one child alternated reach between the puppets two times before choosing. In addition, we can notice that eight children attempted to grab the other puppet once they grabbed one.

For the measure of *choice*, a General Linear Model with Gender, Order, and Agent as between-subjects factors, and considering a binomial distribution of responses, revealed a marginal effect of Gender and Order. There was no effect of Agent. There was a significant effect for the Intercept term (see Table C5-9).

Figure C5-8 shows the number of children choosing each of the agents for each measure. For the measure of *choice*, 24-month-old children tended to prefer the reciprocator compared to the keeper (15 of 21 participants chose the reciprocator, binomial probability

test, two-tailed, p=.078). The same result is obtained when considering only children who answered quickly (*choice in less than 10 sec*: 14 of 19 participants chose the reciprocator, p=.064). For the measure of *choice between 0 and 10 sec* and the three measures of *clear choice*, children did not choose preferentially either puppet (see Table C5-10). For the measure of *choice*, 24-month-old boys did not prefer one character compared to the other (4 of 8 boys chose the reciprocator, p=1); girls preferred the reciprocator (11 of 13 girls chose him, p=.023; see Table C5-10 for details of the other measures). No effect of gender was expected, and we do not have enough data to discuss this effect further.

18-month-olds

Number and percentage of children who		
• chose slowly (i.e. chose in more than 10 sec)	4/16	25%
• anticipated	8	50%
• intended to take both puppets at the same time	7	44%
• intended to take both puppets one after the other	11	69%
• (first intended to take both puppets at the same time, and then also intended to take both puppets one after the other)	(6)	(37.5%)

Table C5-8. Number and percentage of 18-month-olds performing different behaviors in Study 8.

Table C5-8 describes the choice behaviors of 18-month-old children. Children were generally willing to take a puppet. Four children took more than 10 seconds to make their choice (so twelve children remained for the measure of *choice in less than 10 seconds*), but for three of them it was due to the fact that they wanted to grab both puppets and took a long time to choose one of them. Eight children were very fast at grabbing a puppet, anticipating their choice (so only four children remained for the measure of *choice between 0 and 10 seconds*). Eight children were not clear in their first choice: seven children first tried to take both puppets, and one child looked at the opposite puppet at the beginning of his reaching. In addition, we can notice that eleven children attempted to grab the other puppet once they grabbed one.

For the measure of *choice*, a General Linear Model with Gender, Order, and Agent as between-subjects factors, and considering a binomial distribution of responses, revealed no effects of Gender, Order or Agent (see Table C5-9).

For the measure of *choice*, 18-month-old children's selection of the reciprocator and keeper did not differ from chance (8 of 16 participants chose the reciprocator, binomial probability test, two-tailed, p=1). For all other measures, children did not either choose preferentially any of the puppets (see Figure C5-8 and Table C5-10).

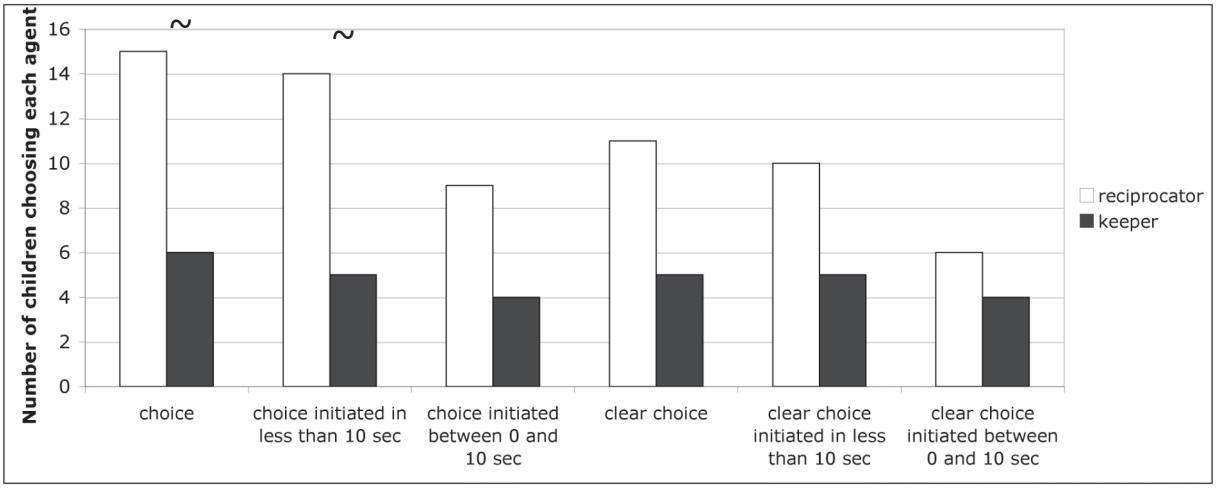
18- and 24-month-olds

For the measure of *choice*, a General Linear Model with Gender, Order, and Agent as between-subjects factors, and considering a binomial distribution of responses, revealed no effects of Gender, Order or Agent (see Table C5-9).

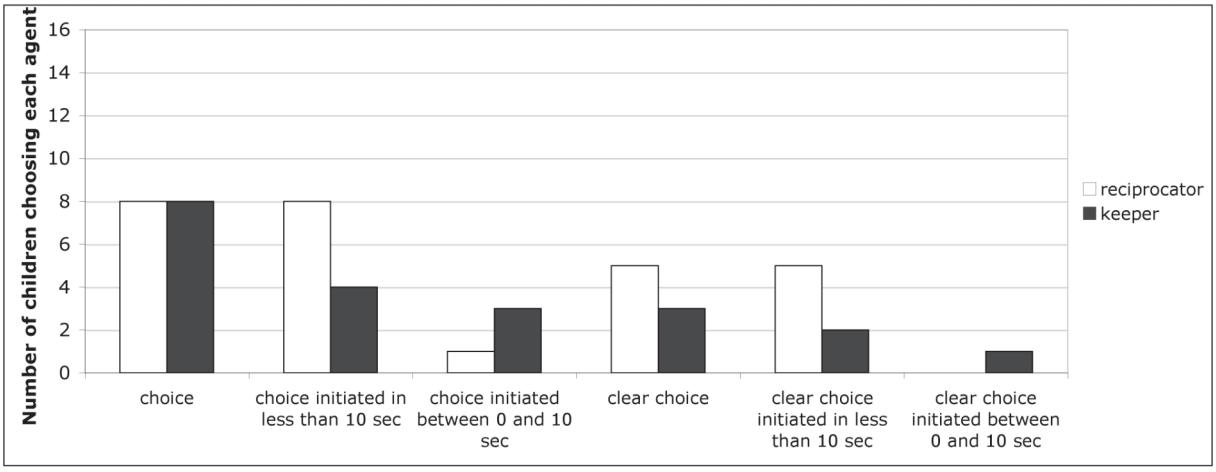
For the measure of *choice*, children's selection of the reciprocator and keeper did not differ from chance (23 of 37 participants chose the reciprocator, binomial probability test, two-tailed, p=.19). When considering only children who answered quickly (*choice in less than 10 sec*), children preferred the reciprocator compared to the keeper (22 of 31 participants chose the reciprocator, p=.029). For the other measures, children did not choose preferentially either puppet (see Figure C5-8 and Table C5-10).

	24-month-olds		*18-month-olds*		*18- and 24-month-olds*	
Intercept	z = 1.99	p = .047 *	z = -0.007	p = .99	z = 1.52	p = .13
Gender	z = 1.71	p = .087 ~	z = 0.001	p = 1	z = 1.65	p = .10
Order	z = -1.14	p = .25	z = 1.18	p = .24	z = -0.52	p = .60
Agent	z = -1.94	p = .053 ~	z = .93	p = .35	z = -1.15	p = .25

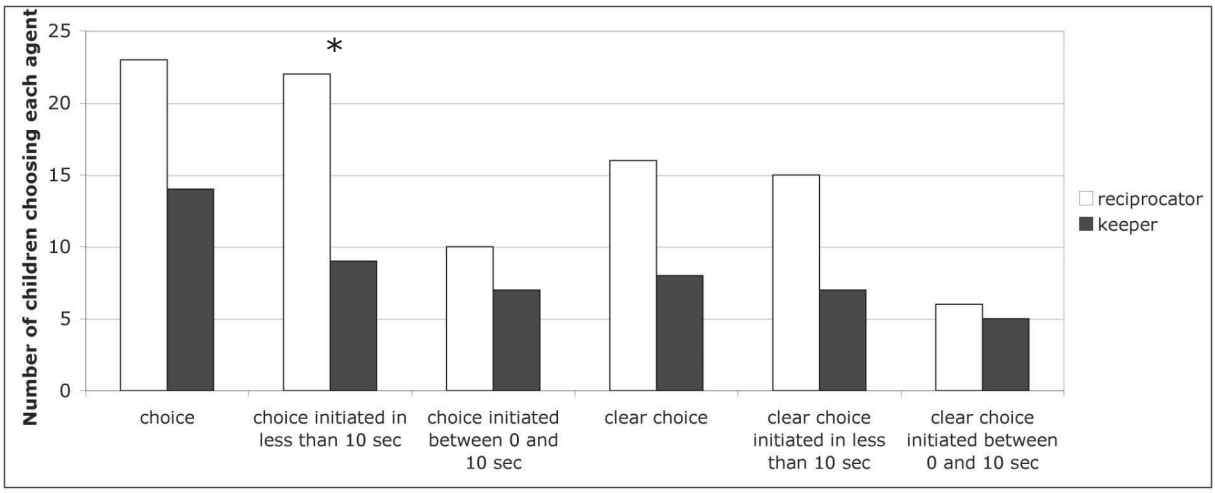
Table C5-9. Logistic regressions for the measures of 24-month-olds' and 18-month-olds' *choice* between the two agents in Study 8.



a. 24-month-olds



b. 18-month-olds



c. 18- and 24-month-olds together

Figure C5-8. Number of children choosing each agent (in white, the reciprocator; in black, the keeper) for different measures of choice in Study 8. (a) 24-month-olds, (b) 18-month-olds, (c) 18- and 24-month-olds together. ~ p<.1 * p<.05

	choice	*choice in less than 10 sec*	*choice between 0 and 10 sec*	*clear choice*	*clear choice in less than 10 sec*	*clear choice between 0 and 10 sec*
all 24mo	15; 6 p=.078 ~	14; 5 p=.065 ~	9; 4 p=.27	11; 5 p=.21	10; 5 p=.30	6; 4 p=.75
24mo boys	4; 4 p=1	4; 4 p=1	2; 3 p=1	3; 4 p=1	3; 4 p=1	2; 3 p=1
24mo girls	11; 2 p=.023 *	10; 1 p=.012 *	7; 1 p=.070 ~	8; 1 p=.039 *	7; 1 p=.070 ~	4; 1 p=.38
all 18mo	8; 8 p=1	8; 4 p=.39	1; 3 p=.63	5; 3 p=.73	5; 2 p=.45	0; 1 p=1
all 18+24mo	23; 14 p=.19	22; 9 p=.029 *	10; 7 p=.63	16; 8 p=.15	15; 7 p=.13	6; 5 p=1

Table C5-10. For different measures of choice in Study 8, the first number represents the number of children choosing the reciprocator; the second number, the number of children choosing the keeper; and the p-value the result of the two-tailed binomial probability test for these responses.

When presented with transfers of a ball between two puppets, where one puppet restitutes the ball to the first possessor, whereas the other keeps it, 18-month-old children did not have any preference for one of the second possessor puppets. However, 24-month-olds did show a tendency to prefer the reciprocator. In a previous study with older children (Study 3 in Chapter 3), we found that 3-year-olds did not evaluate differently a reciprocator and a keeper. Here, by measuring children's social preferences through an implicit and non-verbal response, it seems that 2-year-olds do perform some evaluation of a reciprocator and a keeper. In addition, Hamlin & Wynn (2011) have shown that 5-month-olds do prefer a "giver" (i.e. reciprocator) compared to a "taker" (i.e. keeper). So young children may be evaluating restitution in property transfers, but our experimental procedure may not be optimized to elicit clear preferences.

In the next study we optimized the procedure to test infants' preferences between a puppet restituting a ball to the first possessor and a puppet keeping the ball. The stimuli were made even closer to those used by Hamlin & Wynn (2011). In Study 8, only one of the agents was seen at a time during the movies. This could potentially have led children to confuse them. In the next study, all three characters (both agents and the protagonist) were present in each movie, thus allowing a better distinction between the agents. The procedure was also optimized to keep and follow infant's attention. We used a habituation procedure to ensure that infants see the movies enough times before test to be able to understand what is happening. We tested infants of the same age than in Hamlin & Wynn's study (2011): 5-month-olds.

3.3. Study 9: Five-month-old infants' social preferences between a *reciprocator* and a *keeper*

As in Study 8, infants were presented with two non-verbal movies depicting the transfer of a ball between two puppets (a first possessor dropped a ball that was picked up by a second possessor) and then the restitution or not of this ball by the second possessor to the first possessor. One movie represented an agent *keeping* the ball and leaving with it. In the other movie, the agent was *returning* the ball to the other character.

3.3.1. Method

Participants

Twenty 5-month-olds (10 girls; mean age 5 months, 3 days; range: 4;23 to 5;14) were tested. Eight additional infants were tested but excluded due to technical failure (3), inattentiveness (1), and absence of choice or clarity of choice (4). Infants were French speakers. They were recruited from a database of parents who accepted to participate with their infant in our studies; they were tested in our laboratory. Infants were assigned randomly to one of the four experimental groups allowing counterbalancing of the order of presentation of conditions (keep first or return first) and of the characters associated to a condition (agent 1 in keep condition or agent 2 in keep condition).

Materials and setting

As for 18- and 24-month-olds, 5-month-olds saw movies representing hand puppets' interactions. Again, the use of hand puppets allowed us to perform biological motions, which were more realistic than in animations. The movements were more natural, respecting the dynamics of the actions, although we tried to minimize the differences between the two compared actions. The movies used with 5-month-olds were even shorter than the movies used for this contrast with toddlers (and the animated cartoons used with older children) in order to keep infants' attention during the whole movie. They lasted 21 seconds. Also, to attract the infant's attention back between movies, we optimized the attractiveness of what is

happening in front of him: a curtain raised and lowered with the display of a sound between each movie.

Furthermore, we improved the experimental setup to prevent the infant from being distracted by his environment (besides the screen): the infant was placed in a kind of small "booth". He was sitting on his parent's lap before a table surrounded by curtains, only with a large screen in front of him. Above the screen, there was space to present the puppets for real. The movies were displayed on the screen.

In each movie and at whole, three different characters were seen: a protagonist (Pig) and two agents (both agents were present in each movie, but only one agent was acting per movie). In each movie, one of the agents was interacting with the protagonist and the other one stayed still during the whole movie. In the second movie the previously still agent was interacting with the protagonist, and now the other agent stayed still. All characters were present in each movie to avoid possible confusion between the agents. As in Study 8, the agents were a wolf and a hedgehog, but were not named at any time during the study. Only the protagonist was named: Pig. The protagonist was the character first possessing the object. The agents were the characters picking up the ball when the protagonist dropped it, and then returning it or not to the protagonist after his request. These two characters were those to be evaluated by the participants.

The situations presented here were the same than those presented to 18- and 24-month-olds in Study 8 except that both agents were present in each movie, and that they were on the scene before the arrival of the protagonist. Also, here, a sound and the raising and lowering of a blue curtain indicated the beginning and end of a scenario. Additionally, the duration of a trial was not fixed (contrary to the trials with 18- and 24-month-old toddlers) but depended on the infants' attention to the screen. The sequence of events in each condition is described bellow, with the differences between both conditions in bold.

At the beginning of each movie, a blue curtain is down. A sound indicates the beginning of the event and the curtain rises.

1. On the screen are present the two agents, one on each side, and a ball in the middle.
2. The protagonist enters, grabs the ball and starts to play with it[C5-9].
3. The protagonist drops the ball towards one agent.

The agent picks the ball up.

4. The protagonist turns himself towards the agent[C5-10]. (This happens two times).

In the keep condition:

5. On the third turn of the protagonist, the agent leaves with the ball.

6. The protagonist turns himself back and faces forward without the ball.

In the return condition:

5. On the third turn of the protagonist, the agent returns the ball to the protagonist (by rolling it to him) and leaves the scene.

6. The protagonist faces forward with the ball.

At the end of each movie, action pauses, infant's looking time is recorded and the last image stays on the screen until the infant looks away for 2 consecutive seconds or after 30 seconds have elapsed. Then, a sound indicates the end of the event and the curtain lowers.

The total amount of time each agent was present on the screen was matched between the two movies, as well as the orientations of the three characters.

[C5-9] see supra note C5-1 (i.e. as in Hamlin & Wynn, 2011, the protagonist jumps up and down twice, and on his third jump he drops and retrieves the ball. This behavior is repeated three times).

[C5-10] see supra note C5-7 (i.e. The protagonist turns himself towards the agent and opens his arms as if "asking" for the ball back. The agent turns himself towards the protagonist, and then both puppets turn to face forward again (as in Hamlin & Wynn, 2011)).

Procedure

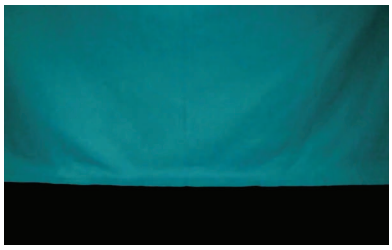
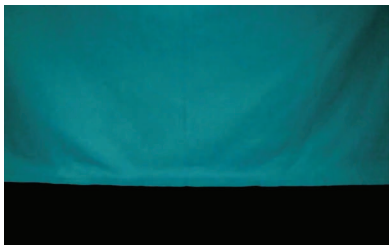
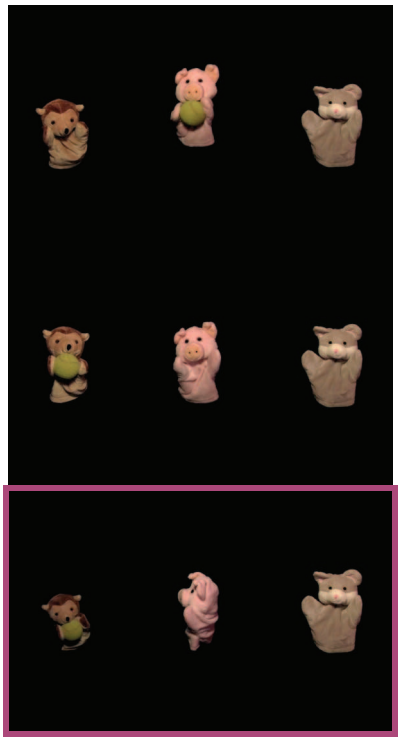
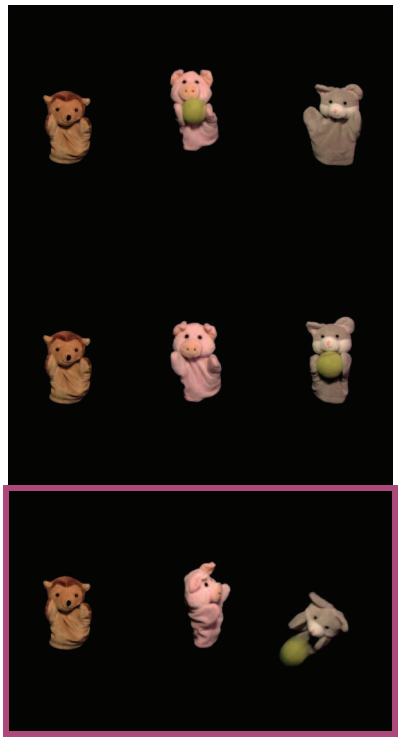
The infant first participated in a training phase. Parents were sitting on a chair, turned 90° away from the screen. The infant was encouraged to grab Pig in order to train him to grab a real puppet. Then the two agents were also presented to the infant but at a distance. The parents were asked to turn their chair towards the screen, on which was displayed a blue curtain (they did not close their eyes). The experimenter pulled a curtain on their side to close the booth, and went behind the screen. The two agents were presented once more for real above the screen, and then disappeared behind it as if they were disappearing behind the blue curtain. Figure C5-9 presents the following procedure.

First, a presentation movie was displayed. Then followed the habituation phase. The first movie began with the raising of the blue curtain letting appear the two agents on the scene. The two movies were shown to the infant several times in alternation. Instead of being fixed as in the previous studies, the number of presentations of the movies depended on the reaction of the infant. The movies were displayed continuously and in alternation until the infant reached a habituation criterion. The habituation criterion was reached when the summed looking time (during the pause at the end of each movie) for 3 consecutive trials was less than or equal to 50% of the sum of the looking time on the first 3 trials. This criterion was the same than the one used by Kuhlmeier et al. (2003) and Hamlin et al. (2007; Hamlin & Wynn, 2011). Then both agents were presented on the screen. For the test phase, the parent was asked to turn his chair away from the screen and to close his eyes. The experimenter (who did not see the movies) then pulled the curtain, and appeared with the two puppets representing the agents on his hands. The infant was encouraged to choose one of the puppets. Following this first measure of choice, the movies were presented once more with reversed positions of the agents on the screen, and with a fixed amount of time for the pause on the last image (3 seconds). After the presentation of the movies, both agents appeared on the screen, and infant's looking time to each agent was recorded until the infant looked away for 4 seconds (after the 6 first seconds) or until 30 seconds had elapsed. The agents were then presented for real to the infant for another measure of choice. This sequence of "presentation of movies – measure of preferential looking – measure of choice" was repeated two more times. In total, as a maximum, we had four measures of choice and three measures of preferential looking for each infant. The experiment ended earlier if the infant got too agitated. The choices of a character and the preferential looking to a character represent measures of the infant's social preference between the two agents.

Presentation

the two agents greet the infant

Habituation

	Keep	Return
beginning of the movie		
movie		
last image of the movie, stays on screen until the infant looks away for 2 consecutive sec (or after 30 seconds have elapsed)		

end of the movie

The two movies are played alternatively until the habituation criterion is met

End of the habituation

presentation of both agents

Test

measure of looking time at the agents on the screen ***(except for 1st test)***

measure of choice between the two puppets presented for real

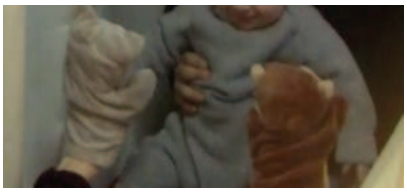


Figure C5-9. Procedure following the Presentation of the 3 puppets for real and the Training to grab, in Study 9. Presentation (on screen), Habituation (on screen: movie1 – movie2 – movie1 – movie2 – movie1 – movie2 – etc, until habituation criterion is met; outlined in purple, the images being different between both conditions), Test (for real). Repeated 4 times at whole.

Similarities and differences with the study of Hamlin & Wynn (2011)

The stimuli used here are even closer to those used by Hamlin & Wynn (2011) than those used for 18- and 24-month-olds. As in Study 8, we included the requesting behavior that was lacking in our previous studies. Also, the movements of the characters were more natural and the characters (hand puppets) were similar to those used by Hamlin. Moreover, here, all characters were present in each movie to avoid possible confusion between the agents. Also a curtain raising and lowering and a sound were present to attract the infant's attention back for each new presentation. The general setup ("booth") was close to the puppet stage used by Hamlin. The procedure was also closer to the one used by Hamlin. The end of each trial, and the number of presentations depended on the infant's attention (with the same criteria as those used by Hamlin et al., 2007; Hamlin & Wynn, 2011). The habituation criterion used implied that a participant might not see both movies an equal number of times. We would have preferred to present both situations an equal number of times, but to be closer to a replication of the study by Hamlin & Wynn (2011) we used their criterion[C5-11]. Also, in this study, to be closer to a replication of Hamlin's study, we let the parents look at the events with the infants (thus they were not blind to condition, closing only their eyes during test; only the experimenter was blind to condition). As highlighted in Study 8, this implied a possible bias in the interpretation of infant's preferences.

Despite trying to maximize the similarities between our study and Hamlin's one, two differences still remained. As in Study 8, our agents were a grey wolf and a brown hedgehog; they were not bright colored puppets as in Hamlin's study. More importantly, we still presented the events to the participants as movies and not as live puppet shows.

[C5-11] However, in some cases the experimenter had to end manually the habituation phase because the infant got agitated without reaching the habituation criterion. In that case, the experimenter tried to end the habituation phase after an equal number of presentations of both movies.

3.3.2. Results & Discussion

Measures

Infants were encouraged to reach for one of the puppets. We coded infant's *choice* of a puppet (i.e. the first puppet actually grabbed). Here, infant's *clear choice* was defined as the choice of a puppet if that choice was the same as the first lateralized intention (without considering intention to grab both puppets or potential alternations between the puppets before the first grasp). We also coded the delay between the presentation of the puppets close to the infant and the moment when the infant touched the chosen puppet. We thus determined measures of *choice made in less than 10 seconds*, and *clear choice made in less than 10 seconds.* No infant intended to grab one of the puppets before they were approached, i.e. no infant anticipated his choice. We had up to four measures of each kind for an infant. After the first choice, we also had three measures of infant's *preferential looking time*, one before each of the subsequent choices. Concerning the various measures of choice, we present here only the analyses of the first test. The analyses of tests 2, 3, 4 are presented in Appendix AC5-1.

Results & Discussion

Choice

Number and percentage of infants who		
• chose slowly (i.e. chose in more than 10 sec)	4/17	23.5%
• anticipated	0	0%
• intended to take both puppets at the same time	2	12%
• intended to take both puppets one after the other	8	47%
• (first intended to take both puppets at the same time, and then also intended to take both puppets one after the other)	(0)	(0%)

Table C5-11. Number and percentage of 5-month-olds performing different behaviors in Study 9.

Table C5-11 describes infant's behaviors. Infants were generally willing to take a puppet. Two infants did not want to grab any puppet during the first test and one infant

grabbed both almost simultaneously, so seventeen infants made a *choice* during this test. Four infants took more than 10 seconds to make their choice (so thirteen infants remained for the measure of *choice in less than 10 seconds*). We can notice that only two infants first reached for both puppets before making a choice, but it was not considered here in the definition of a clear choice. All infants were clear in their choice. Also, we can notice that eight infants attempted to grab the other puppet once they grabbed one.

For the measure of *choice*, a General Linear Model with Gender, Order, and Agent as between-subjects factors, and considering a binomial distribution of responses, revealed no effects of Gender, Order or Agent (see Table C5-12).

Intercept	z = 0.003	p = 1
Gender	z = 0.003	p = 1
Order	z = 0.004	p = 1
Agent	z = 0.004	p = 1

Table C5-12. Logistic regression for the measure of 5-month-olds' *choice* between the two agents in Study 9.

Figure C5-10 shows the number of infants choosing each of the agents for each measure of choice. Infant's selection of the reciprocator and keeper did not differ from chance (*choice* and *clear choice:* 11 of 17 participants chose the reciprocator, binomial probability test, two-tailed, p=.33). However, when considering only infants who answered quickly, they tended to prefer the reciprocator (*choice in less than 10 sec* and *clear choice in less than 10 sec*: 10 of 13 chose the reciprocator, p=.092; see Table C5-13).

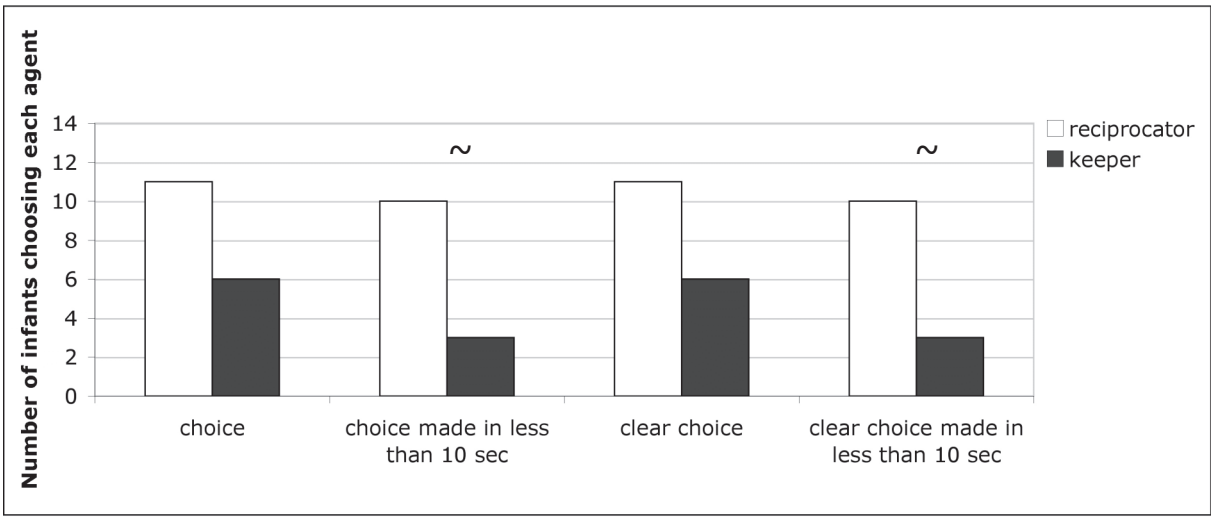


Figure C5-10. Number of 5-month-olds choosing each agent (in white, the reciprocator; in black, the keeper) for different measures of choice in Study 9. ~ p<.1

choice	*choice in less than 10 sec*	*clear choice*	*clear choice in less than 10 sec*
11; 6 p=.33	10; 3 p=.092 ~	11; 6 p=.33	10; 3 p=.092 ~

Table C5-13. For different measures of choice in Study 9, the first number represents the number of 5-month-olds choosing the reciprocator; the second number, the number of 5-month-olds choosing the keeper; and the p-value the result of the two-tailed binomial probability test for these responses.

Looking time

The two agents were presented up to 30 seconds to the infant for the measure of his looking time to each agent. A lot of infants were not looking enough to the agents, so that the phase of presentation of the agents ended earlier. We had 54 measures of looking time with a presentation of the agents between 8 and 30 seconds (8 measures only were obtained with a presentation time of 30 seconds). Because of this difference in total duration of the presentation, we considered the percentage of time the infant looked at each agent. Analyzing the results of all three tests together revealed that generally infants looked longer to the

reciprocator (4.78s (SE=0.67), 24.43% (SE=2.17)) than to the keeper (3.46s (SE=0.45), 18.55% (SE=1.72)) (t(53)=2.05, p=.045). Considering the results of each test separately, infants tended to look longer to the reciprocator than to the keeper during the first test (27.53% (SE=3.42) vs. 19.22% (SE=2.83), t(19)=1.74, p=.099), but not during the second (27.53% (SE=3.42) vs. 19.74% (SE=2.74), t(17)=.63, p=.53) and third (22.76% (SE=4.68) vs. 16.37% (SE=2.54), t(15)=1.05, p=.31) tests (see Figure C5-11).

When analyzing infants' individual responses, we did not find any preference. For the first test 13 of 19 infants looked longer at the reciprocator (binomial probability test, two-tailed, p=.17), for the second test 8 of 17 infants looked longer at the reciprocator (p=1), and for the third test 9 of 16 infants looked longer at the reciprocator (p=.80); in total there were 30 of 52 instances of longer looks to the reciprocator (p=.33).

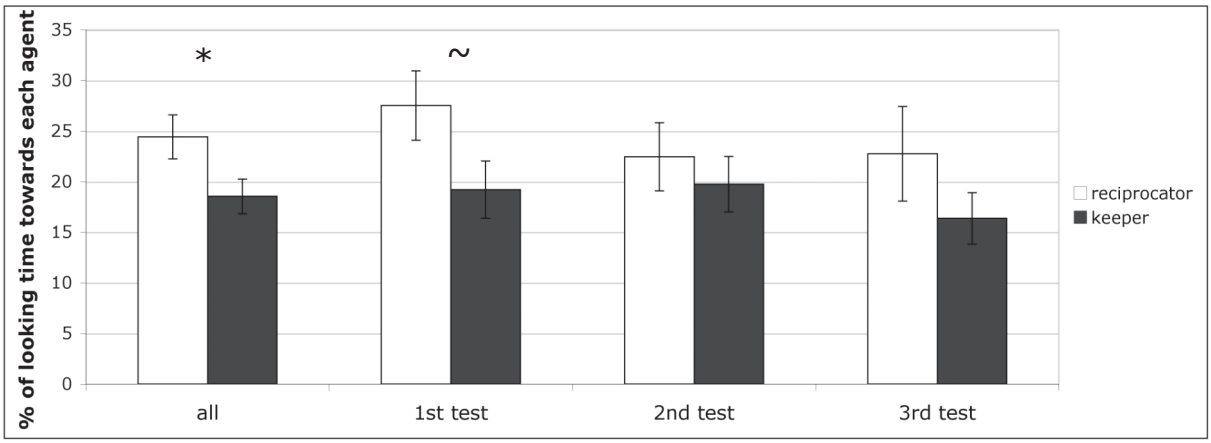


Figure C5-11. Percentage of 5-month-olds' looking time towards each agent (in white, the reciprocator; in black, the keeper) in different tests in Study 9 (and standard error).
~ p<.1 * p<.05

In this study, we tested infants' preferences between a puppet returning a ball to a first possessor who requested it and a puppet who kept the ball. Compared to our previous studies, the setup and experimental procedure were modified to be closer to the experimental conditions of Hamlin & Wynn (2011). The modifications allowed optimizing infants' attention to the presented situations. In particular, we used a habituation criterion to ensure that infants recognized the actions of the different scenarios. However, some differences with Hamlin's study remained. The major one is the use of movies instead of real puppet shows.

When considering all participants, our results showed that 5-month-olds did not prefer to take a reciprocator compared to a keeper. However, when considering only infants who chose quickly between the two puppets, 5-month-olds tended to show preference for the reciprocator. For the first measure of looking time, infants tended to look longer at the reciprocator, but there was no difference between looking time to each agent for subsequent measures. The effect of the condition of restitution on looking time was significant only when considering all measures together. Hamlin & Wynn (2011) found a much larger effect with one measure with 3-month-olds. Considering 5-month-olds' choices, they found a large preference for the reciprocator (10 of 12 infants preferred the reciprocator in their study). Only considering a sub-group of infants (those who chose quickly) we managed to approach their results (10 of 13 infants preferred the reciprocator in this case), but without being able to replicate their effect. This suggests that the experimental setup, materials and procedure are important in eliciting infants' preferences.

3.4. Summary & Conclusion

Children's responses

We tested toddlers' and infants' preferences between a reciprocator and a keeper. 18-month-old children showed no preference between both puppets. They do not seem to evaluate restitution after property transfers. 24-month-old children showed a trend towards a preference for the reciprocator. 5-month-old infants also showed this tendency but only under certain conditions (when considering only fast responses).

	Age		
	24mo	18mo	5mo (1^{st} test)
Number of children excluded due to			
• (technical failure)	(2)	(0)	(3)
• inattentiveness	1	3	1
• absence of choice or clarity of choice	2	2	7
Number of children remaining for the analyses	21	16	17
Percentage of children who			
• intended to take both puppets at the same time	9.5%	44%	12%
• intended to take both puppets one after the other	38%	69%	47%
• (first intended to take both puppets at the same time, and then also intended to take both puppets one after the other)	(5%)	(37.5%)	(0%)
• anticipated	29%	50%	0%
• chose slowly (i.e. chose in more than 10 sec)	9.5%	25%	23.5%

Table C5-14. Number of 5-, 18- and 24-month-olds excluded from the analyses, and percentage of children of each age performing different behaviors in Studies 8 and 9.

We observed great variability in children's behaviors when asked to choose between both agents (see Table C5-14). At 18 months, children did not prefer to take one puppet rather

than the other. A lot of children wanted to take both puppets (44% of children first tried to reach for both puppets when they were presented to them, and 31.5% of additional children tried to take both puppets one after the other). Moreover, a lot of 18-month-olds immediately reached for the puppets before they were approached (i.e. 50% of children anticipated their choice). This suggests that 18-month-olds are more interested in social interaction than in selective evaluation. At that age children are generally willing to provide help and interact with others (e.g. Warneken & Tomasello, 2006; 2009; Warneken et al., 2006). Our experimental procedure may not be adapted to test 18-month-old children.

24-month-old children showed a tendency to prefer the reciprocator, but this preference did not reach significance. Compared to 18-month-olds, the great majority of 24-month-olds first reached towards one of the puppets and not both (90.5%), but a lot of them (38%) wanted to take the other puppet right afterwards, which could also be due to a general willingness to be involved in social interactions (also, 29% of 24-month-olds anticipated their choice). Only when analyzing the answers of 18- and 24-month-olds together we found a significant preference for the reciprocator, but restricted to children who chose quickly.

We optimized the procedure and stimuli and tested 5-month-old infants. At 5 months of age, infants tended to prefer the reciprocator, but this preference was marginally significant only when considering infants who chose a character in less than 10 seconds. We had to restrict the population to find a (marginal) preference in participants' choices. These results are far from those obtained by Hamlin & Wynn (2011) presenting the same situations in a very similar experimental procedure. We can notice that an important proportion of 5-month-olds (47%), as older children, also attempted to grab the other puppet once they grabbed one.

When considering all tested toddlers and infants together, we found a tendency to prefer the reciprocator with the measure of *choice*. This preference was only significant for children who chose quickly (with a *choice/clear choice in less than 10sec*, see Figure C5-12). Without considering 18-month-olds because of their apparent unwillingness to perform the task (as discussed above), and analyzing only 5- and 24-month-olds together, we found a significant preference for the reciprocator with the measure of *choice* (see Figure C5-13). It is the only analysis showing a significant preference with this measure (without restriction on delay of choice). It involves 38 children, instead of 12 in Hamlin & Wynn (2011). Evidently, our results are less powerful than those obtained by Hamlin & Wynn.

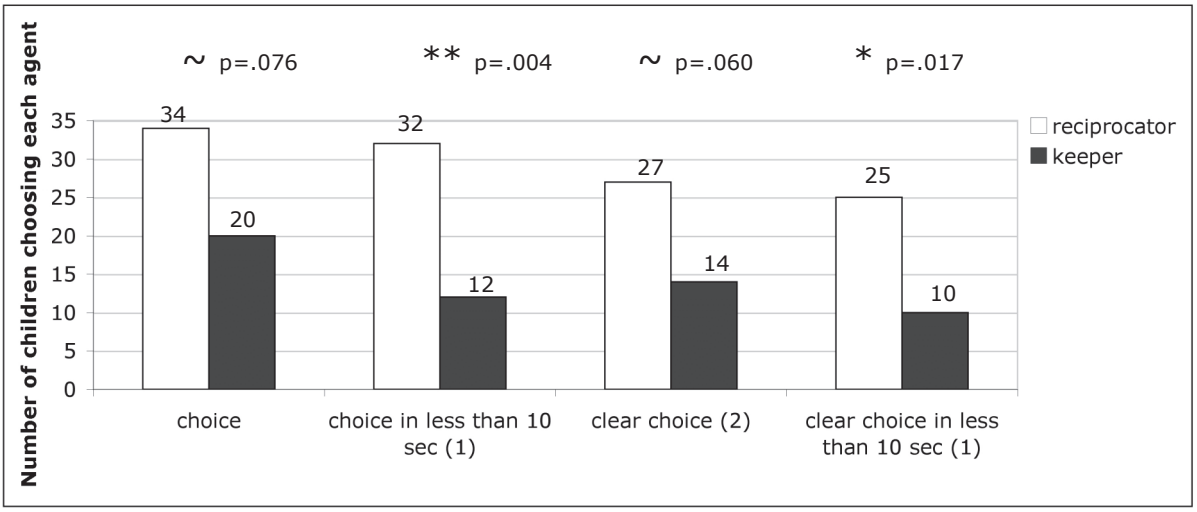


Figure C5-12. Number of children choosing each agent (in white, the reciprocator; in black, the keeper) for different measures of choice in Studies 8 and 9, considering all 5-, 18-, and 24-month-olds together. The p-value is given for a two-tailed binomial probability test for these responses.

(1) 18- and 24-month-olds: choice and clear choice initiated in less than 10 seconds. 5-month-olds: choice and clear choice made in less than 10 seconds. (2) See materials of Studies 8 and 9 for the definitions of clear choice.

~ p<.1 * p<.05 ** p<.01

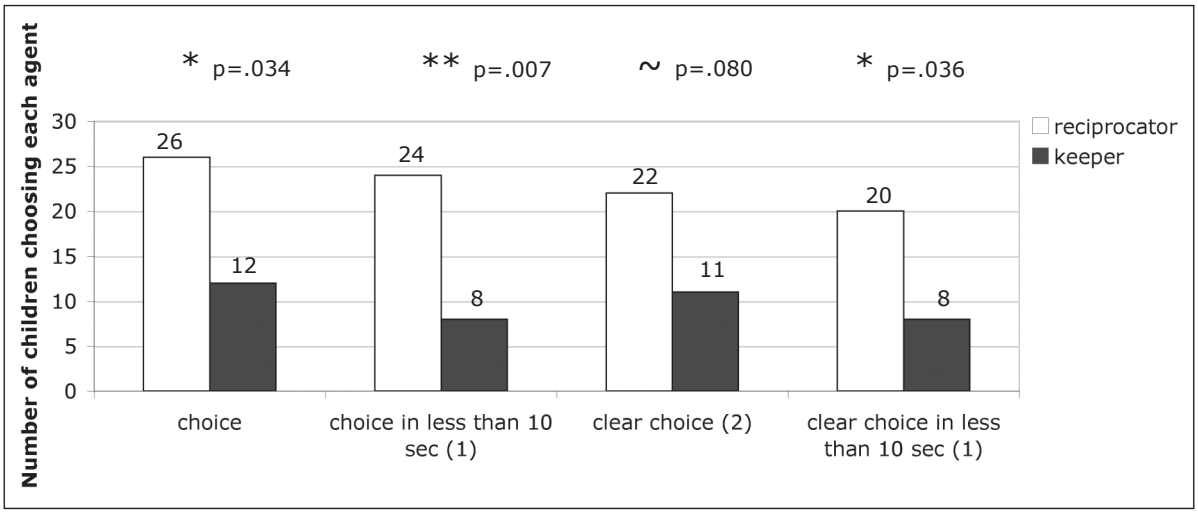


Figure C5-13. Number of children choosing each agent (in white, the reciprocator; in black, the keeper) for different measures of choice in Studies 8 and 9, considering 5-, and 24-month-olds together. The p-value is given for a two-tailed binomial probability test for these responses.

(1) 24-month-olds: choice and clear choice initiated in less than 10 seconds. 5-month-olds: choice and clear choice made in less than 10 seconds. (2) See materials of Studies 8 and 9 for the definitions of clear choice.

~ p<.1 * p<.05 ** p<.01

Methodology

Two differences remained between the stimuli and procedure that we used to test 5-month-olds in Study 9 and those used by Hamlin & Wynn (2011). These differences were also present for our study of the same contrast with 18- and 24-month-olds (Study 8). Concerning the stimuli, our agents were a grey wolf and a brown hedgehog. They were not bright colored puppets. We selected two unfamiliar animals as agents in order to avoid a clear preference for one of them by default. Despite the fact that the two characters were different animals, they may not be enough distinguishable and some children may have confused them. However, Hamlin's puppets, despite wearing bright colored shirts, were only distinguishable by the color of their shirt and not other features as they were the same animal. It seems improbable that our puppets were less distinguishable as they differed not only by color but also by aspect. One difficulty leading to possible confusion for children could be that the agents were not named. As they were probably unfamiliar animals for young children, the children may not distinctively label them. This absence of label could prevent children from recognizing the animals. However, the puppets were not named in Hamlin's study either. Furthermore, in the test phase we presented the puppets for choice on the same side as their side on the screen during the movies, which should give to children help for the localization of each agent.

A more important difference between our experimental procedure and the procedure used by Hamlin & Wynn (2011) is that we presented the two puppet interactions on a screen as movies and not for real as live puppet shows. Live puppet shows may be more attractive and thus infants may pay more attention to the different actions taking place. However, in our studies infants did not seem uninterested by what happened on the screen; they quietly watched both movies at least three times before loosing attention. The difficulty that could remain for infants is to map the puppets seen in the movies with the real puppets presented to them before and after the movies, and particularly for the test. However other studies used a similar procedure with success (Kinzler et al., 2007; Buon et al., 2008; Buon et al., in revision). In these studies, infants or toddlers were also watching situations on a screen. Then the agents in the movies offered each a toy to the infant, and the real version of the toys appeared on a table in front of the infant, who could grasp one of them.

It would be important to test again infants' preferences between a reciprocator and a keeper ("giver" and "taker" in Hamlin & Wynn, 2011) with the best experimental conditions to ensure the reliability of results. Also, it would be important to perform this investigation

avoiding the possible bias that we identified in Hamlin's study. As discussed previously, parents should be prevented from watching the situations with their infant, as they could potentially influence the infants' feelings about the situations.

4. General Conclusion

We conducted four studies with 18- and 24-month-old toddlers and 5-month-old infants. Study 6 and Study 7 looked at 24-month-olds social evaluations of illegitimate and legitimate recipients of an object. We showed that some children (those answering quickly) tended to prefer the legitimate recipient when the transfer was followed by a negative emotion of the first possessor, but not in absence of an emotion. Study 8 and Study 9 tested toddlers' and infants' evaluations of characters returning or not an object to the first possessor. We showed that 18-month-olds had no preference between a reciprocator and a keeper. 24-month-olds and some 5-month-olds tended to chose the reciprocator. Concerning 5-month-olds this tendency was only present with infants choosing quickly. Only when considering two or three age groups together (18- and 24-month-olds; 5-, 18- and 24-month-olds; or 5- and 24-month-olds) we obtained significant preferences for the reciprocator. This preference was obtained for the measure of choice without restriction on the delay of choice only when analyzing 5- and 24-month-olds together.

In our four studies we observed a large variability in children's behaviors. Globally, a lot of children wanted to take both puppets, simultaneously or/and sequentially (5% to 69% depending on the Study). Some children (except 5-month-olds) "anticipated their choice", by reaching towards the puppets before they were approached (21% to 50%). Other children, on the contrary, were slow to make a choice (5% to 28%). Some of them did not really want to choose, either wanting both puppets as reported above, or none of them. These latter children (with those lacking clarity in choice) were excluded from the analyses (5.5% to 25% of the total of tested children in each Study). In particular, 25% of 5-month-olds that had been tested had to be excluded for this reason. In comparison, in Hamlin & Wynn (2011), only 4% of 5-month-olds tested are reported not to reach for one puppet, and the paper did not report any difficulty in coding for a proper reaching response (choice anticipation, simultaneous or sequential choice). In brief, the variability that we observe in children's responses in our studies does not seem to us unreasonable given the general behavior of children at this age,

but is not found in other published studies such as Hamlin & Wynn (2011). It is possible that these studies either did not report some of this variability, or found a particularly efficient way to channel the children's behavior such that they only perform one clear choice. Informal discussion with some of the authors did not enable us to clarify further this issue.

Even ignoring these differences in behavior there seems to be a difference in effect size between the studies. In Hamlin & Wynn (2011), 83.5% of infants chose the giver (reciprocator) and 16.5% chose the taker (keeper), whereas in our Study 9, we found between 64.5% and 77% of choices for the reciprocator (i.e. 35.5% and 23% of choices for the keeper, respectively, depending on the measure). This is a much smaller effect, which requires testing many more infants to become significant. As already mentioned, we found significant results only when considering several age groups together to include more children in the analyses. It is only when considering 38 children (5- and 24-month-olds together) that we found a significant effect for the measure of choice, compared to 12 infants in Hamlin & Wynn (2011).

It is unclear what differences in experimental setups yield such a difference in behaviors between our studies and other studies of the literature, in particular between Study 9 and the study of Hamlin & Wynn (2011), as we tried in Study 9 to replicate the setup used by this latter study. As in Hamlin & Wynn (2011), we used puppet interactions as stimuli, a procedure of habituation (with the same habituation criterion), a measure of choice between the two puppets. The only remaining differences, as discussed in the previous section, concern the color of the puppets, and the use of movies instead of live puppet shows. However, it is unclear how these differences could have such an important influence on children's behaviors. It may be that other factors, not reported and thus not identified, are important, such as the way of making the infant enter into the experiment, or the way of presenting the choice. Another hypothesis is that the differences between studies could be due to the population tested: French infants (with French parents) in our study and American infants (with American parents) in Hamlin's study. The potential role of the parent in infant's preferences that we discussed in the previous section as a possible bias could have different influences in each of these cultures. Further studies are needed with an optimized experimental setup to obtain less noisy data and replicate the findings of Hamlin & Wynn (2011).

To conclude, the use of implicit measures in principle allows testing very young children and infants. These implicit measures of social preferences could also be used with

older children to assess their implicit understanding of ownership, and compare it directly to their explicit understanding of property rights. This should be done systematically with different situations involving ownership. We tested toddlers' and infants' evaluation of illegitimate and legitimate acquisition, and restitution. Infants' understanding of gift-giving as compared to lending still needs to be explored. Infants' evaluation of restitution also needs more investigation. Our results together with those of Hamlin & Wynn (2011) suggest that infants may be evaluating restitution in property transfers. But they may also be evaluating the situations without any consideration for ownership. Hamlin & Wynn propose that infants are evaluating a helper and a hinderer with respect to a protagonist's goal. We suggest that infants in the presented situations may also be evaluating a cooperator and a non-cooperator, or an agent responding to a request of communication compared to an agent breaking communication. Further studies should be performed to shed light on these various interpretations.

CHAPTER 6: Conclusion and future directions

The aim of this dissertation was to study the early development of the concept of ownership in children. In nine studies, we presented children from 5 months to 5 years of age with illegitimate and legitimate actions regarding a transfer of object through movie clips. We investigated their explicit understanding of ownership as a set of property rights, and their more indirect understanding of this concept through their social and moral evaluations of property transfers. Our studies are the first to directly investigate the relation between explicit understanding of ownership/property rights, and social/moral evaluations in children. They are also the first studies to use similar stimuli across a large age range (5, 18 and 24 months, 3 and 5 years), while testing for implicit social preferences in the young age group and explicit evaluation in the older one. Furthermore, we tested two types of transgressions that have not been extensively explored previously: theft, and absence of restitution to an owner.

1. Summary of results

The first transgression was studied through the comparison between illegitimate acquisition (theft) and legitimate acquisition (gift-reception). The second transgression opposed restitution and non-restitution (after a voluntary or an accidental transfer).

As far as the comparison between theft and legitimate acquisition is concerned, we found a correlation between social/moral evaluation and attribution of property rights. Both are present at 5 years, but not at 3 years of age (Study 1). However, when the first possessor expressed a negative emotion after both kinds of transfer, the distinction between theft and legitimate reception (as measured through social/moral evaluation) emerged in 3-year-olds (Study 2). Using an implicit measure of social evaluation with 2-year-olds, we partially replicated this effect. Without emotions, they did not prefer any of the recipients (Study 6); with the presence of emotion, some 2-year-olds (those choosing quickly) preferred the legitimate recipient compared to the thief (Study 7). Thus the presence of an emotional cue helps young children to evaluate ownership transgressions, even though these cues were applied to both the legitimate and illegitimate transfers.

In addition, across our studies, we evidenced the presence of a *first possessor bias* or *loan bias*, which is present from 3 years of age to adulthood. This bias led the participants to interpret a voluntary transfer as being a loan (temporary) and not a gift (definitive) (see Chapter 4). Indeed, they claimed that the second possessor cannot leave with the object and

has to return it to the first possessor (Studies 3, 4, 5). However, only 5-year-olds and adults evaluated negatively the character that does not restitute the object to the first possessor (compared to the character that returns the object). The first possessor bias therefore did not lead 3-year-olds to evaluate the characters as a function of whether they keep or return the object. This suggests that 3-year-olds do not really have an understanding of what is a loan, and do not really consider the first possessor's right to retrieve the object. This null result at 3 years stays unchanged even in the presence of emotional cues. However, using a different methodology with younger children and infants, and introducing cooperation cues between the two characters, we partially replicated a result found by Hamlin & Wynn (2011), showing a tendency in toddler's and infant's choices to prefer the agent who returns the object to the first possessor (Studies 8 and 9). It is therefore possible that, as emotions can boost the social/moral evaluation of the stealing/giving contrast (enhancing the harmful consequence of the illegitimate transfer), cooperation can boost the social/moral evaluation of the returning/not returning of an object to the first possessor (enhancing the social link between the two agents).

2. Conclusion about methodology

In our review of the literature on children's understanding of ownership transgressions, one of the outcomes is the lack of consensus regarding the techniques and methods used across research questions and age groups. Some of these methodological differences introduce large differences in the age at which sensitivity to aspects of ownership can be measured. Generally speaking, we found that when explicit protocols or sophisticated questions are used, the concept of ownership seems to emerge relatively late (5 years or more), whereas implicit protocols (social preferences measured through prosocial/antisocial behavior, choice or preferential looking time) may yield responses in younger children (at 2 years of age or earlier). In addition, we found that ownership is not a unitary concept, but is constituted of several components. We distinguished a normative component (an owner has a distinct set of rights) and an evaluative component (transgressions of some of these rights are judged immoral).

Regarding rights, in our studies we tested the right to use and the right to keep an object. Other property rights have been investigated (such as the right to alter, or destroy an object, the right to interfere with owner's use or with non-owner's use) and others still need to be investigated, such as the right of a new acquirer to transfer the object. It is not the case that

the understanding of these rights necessarily emerges at the same age. In our review, we suggested in particular that the destruction or alteration of an object may elicit an earlier response in children than some of the other, less violent, actions.

Concerning social/moral evaluations, we used simple concrete questions rather than abstract ones regarding responsibility or permissibility. In our studies with 3- and 5-year-olds, we combined measures of social preference ("show me the one you like"; "show me with whom you would like to play") and moral evaluation ("show me which one is the good guy"; "show me which one is the bad guy") in order to obtain a statistically more robust measure. In the research on early moral development, it is usually considered that children's social preferences and prosocial behaviors are at the basis of their later moral judgments. Nevertheless, it is possible that these two types of evaluations give different results. Furthermore, Cushman (2008) argued that within moral evaluations in adults, one can observe different results between assignment of blame and assessment of wrongness.

In younger toddlers and preverbal infants, social preferences were assessed implicitly through their choice of a puppet, and/or their preferential looking time. We found that these measures give very variable results, necessitating to increase the number of participants in order to reach sufficient statistical power. Other possible measures could be done through a habituation-dishabituation paradigm (e.g. Premack & Premack, 1997) in order to test for the infant's expectations regarding an interaction involving property.

Although our measures were different, they gave overall consistent results. However, the use of implicit methods in preverbal infants raised an important concern regarding the replicability of the measures themselves. We were surprised to find that some of apparently well-established results of the literature are so difficult to replicate. We found much larger variability in the dependant measure (infant's choice) than reported in published studies. Indeed, the proportion of children showing a "clear choice" was much lower than has been reported in the study we attempted to replicate. The reasons for these differences were not uncovered, despite trying to mimic the setup of the study as closely as possible and communication with some of the authors of these studies. In addition, the effect size that we reported was much lower than in these studies. The result being that instead of having a significant result with 12 infants, we had to combine the results of two age groups (a total of 38 children) to obtain a significant effect with a similar measure. Replicability being one of standards of scientific investigation, the use of such implicit social preference measures in the context of the study of the developmental basis of ownership remains, for us, an open question. Only further attempts at replication will settle this issue.

One variable, whose effect was tested in several studies, is the presence of emotion. Below we discuss two different roles of emotional cues for social/moral evaluation of and property rights attribution to agents involved in property transfers.

3. The role of emotional cues

Transgressions of property rights are typically not pleasant situations for the legitimate owner, who may, as a result of losing his or her property, display negative emotions. We tested the role of the first possessor's emotional distress on participant's answers, and observed two different effects of the presence of emotion on our measures depending on measure and age. The first effect of emotion appeared on children's social/moral evaluation, particularly for young children but was not homogeneous across situations. The second effect of emotion concerned the interpretation of the transfers deduced from the attribution of property rights by older children and adults. These different effects may be due to the fact that negative emotions can be a cue of the presence of harm, but also a cue of the presence of a norm transgression. We examine these two possibilities in turn.

The role of first possessor's emotion for social/moral evaluation

In the comparison between theft and legitimate reception (Studies 2 and 7), we showed that young children (2- and 3-year-olds) are sensitive to the presence of an emotional cue to make social and moral evaluations, despite the fact that this cue is not informative by itself. Indeed, the emotional cue (negative emotion representing sadness) was also present in the case of a voluntary transfer, where this emotion seems unjustified (it is not due to a harmful action). This indicates that children can activate or not a social and/or moral evaluation depending on the presence of harm. In contrast, in the comparison between restitution and absence of restitution, the presence of emotion did not change children's and adults' social/moral evaluations. 3-year-olds had no preference between the agent returning the object to the first possessor and the agent keeping it, independently of the presence or not of a negative emotion after the restitution or absence of restitution. The first result could be interpreted by saying that without an emotional cue, young children simply do not engage in social/moral evaluation. However, this would not explain why the manipulation of emotion did not work in the second case. We discussed an alternative explanation in which emotions are interpreted as evidence that a harmful action has been accomplished, and trigger the

research for a responsible agent. In the first case, the responsible agent could be identified as the agent performing the last action before the first possessor displays distress cues. This would give rise to the observed preference for the legitimate recipient against the thief. In the second case, the last action is always performed by the same agent (the borrower), who either moves the object away from the first possessor or returns that object to him, giving rise to no preference. Under both interpretations, the sense of ownership in 2- and 3-year-olds, if it exists, functions differently than in older children. Indeed, in both 5-year-olds and adults, the dispreference for the thief and the keeper was found with and without emotion, indicating that the presence of visible distress reactions is not necessary to trigger social/moral evaluation in these age groups.

Note that there was however a more subtle effect of emotion on evaluations of older children: its presence amplified the badness of the non-restitution for 5-year-olds. When not making a comparison between both agents, but asking whether the second possessor did something bad or something good individually for each condition of restitution, 5-year-old children considered that he did not do something bad in the absence of emotion but yes in the presence of emotion. Thus without a negative emotion of the first possessor in reaction to the keeping, they did not evaluate the keeper negatively by itself but only in comparison to the reciprocator, whereas in the presence of emotion, they evaluated the action of the keeper as bad. Apart from these effects of emotion on social/moral evaluation, emotional cues played another role. As said above, the second effect of emotion was observed on property rights attributions.

The role of first possessor's emotion for property rights attribution

In the comparison between restitution and no restitution, the presence of emotional cues modulated the attribution of property rights in 5-year-olds and adults. We have seen (in Chapter 4) that when the second possessor was seen to keep the object, the participants considered the transfer to be a loan independently of the presence of the first possessor's negative emotion or not. However, the presence of emotion changed 5-year-olds' and adults' interpretation of the transfer when the second possessor was seen returning the object to the first possessor. In the absence of emotion, they considered the transfer to be a loan (i.e. the second possessor has to give the object back to the first possessor), but in the presence of emotion, half of them considered it to be a gift (i.e. the second possessor does not have to give the object back to the first possessor), thus taking into account the negative emotion displayed

by the first possessor after receiving the object back for their attribution of property rights. They probably revised their interpretation of the transfer as a gift instead of a loan at this moment. Emotion had an effect on the interpretation of the transfer, where other cues such as renunciation of the first possessor to the object by moving away from it had not (i.e. this latter cue did not lead adults to interpret the transfer as a gift).

We have observed differences between young children's and older ones' use of emotional cues in their evaluation and understanding of property transfers. The evaluation of characters involved in property transfers and the attribution of property rights to them was different between 3- and 5-year-olds in general, showing a development in the explicit understanding of ownership between 3 and 5 years.

4. Development of the notion of ownership

If the ability of 5-year-olds to use the concept of ownership seems well established, the existence of this concept in children of 3 years of age and younger stays uncertain. Indeed, as discussed above, the results found with 2- and 3-year-olds for the contrast between theft and legitimate reception with emotional cues can be explained as children's understanding of the notion of illegitimate/legitimate transfers (i.e. ownership), but also in terms of a causal analysis and a sensibility to emotions as cues of harm. The results found with 5-, 18- and 24-month-olds in the contrast between restitution and absence of restitution (if they are replicated), can be explained without involving the concept of ownership, but through other concepts such as cooperation, attachment, or help. If these alternative explanations were validated with future studies, this would indicate that the notion of ownership, if present before 5 years, is very incomplete and different from the adult concept.

As we have seen in the introduction of this dissertation (Chapter 1), the notion of ownership is not an elementary notion, but is composed of simpler concepts. The notions of theft, gift, loan, restitution, may not be conceptually "primitive", but be based on a combination of simpler elements such as those identified in the Introduction: possession, control (and self), attachment, exclusivity, and reciprocity. Even though these notions can be viewed as components of or preconditions for the notion of ownership, they are not in and of themselves *about* ownership. Indeed, we have argued that at least some of these components exist in non-human animals that, arguably, do not have a high-level concept of ownership. A possible extension of our work would therefore be to investigate individually infants'

understanding of these components, as well as the way in which these components give rise to the full-blown concept of ownership.

In the introduction we have seen that several of these components are present in infants when these latter have an interest in the interaction. However, infant's understanding of some of these potential components of ownership remain to be investigated when applied to others. For example, to our knowledge, the understanding of the relation of attachment between a third-party and an object has only been studied in older children but not in infants. In Chapter 1 we hypothesized that attachment to objects may derive from attachment to people, on the basis of the argument of Winnicott (1953) that attachment to "transitional objects" comes from attachment to parent. It remains to be tested whether toddlers and infants can understand a relation of attachment between a person and an object, in the same way as they understand attachment between people (Johnson et al., 2007; 2010). We propose here an example of experiment to test the presence of the concept of attachment to objects in infants observing the interaction between a third-party and an object. A group of infants would be habituated to a condition where a character shows attachment to an object by expressing positive emotion when holding the object, and then the character is separated from the object. During test, infants would be presented either with the character crying, or not crying. If infants understand attachment to objects in others, we expect them to be more surprised if the character does not cry, revealing that they expect the attached character to be sad if separated from his object of attachment. On the contrary, another group of infants, habituated to see a character not attached to the object (showing negligence, or even dislike), and then separated from object, would be supposed to show more surprise if the character cries after separation from the object, revealing that they expect the non-attached character not to be sad if separated from the object. Another possible measure to investigate the concept of attachment to objects in older toddlers is the measure of sympathy for a person separated from an object. We expect children to show more concern, and more prosocial behavior for a person separated from an object when that person was attached to the object compared to when she was not attached to the object. If this concept of third-party object-attachment is present since infancy, we could expect that young children may be able to evaluate agents who either help or hinder attachment. Thus after presenting infants with an attachment relationship between an agent and an object, we may find a more potent evaluation of theft and absence of restitution at a younger age than what we reported here. However, it would not mean that children understand the concepts of theft and restitution as they could be evaluating only

transgressions of a component of ownership (here, attachment) and not transgressions of property rights.

Similar investigations should be done for the other potential components of ownership: possession, control (and self), exclusivity, and reciprocity. Finally, the combination of several components should be investigated. For example, we hypothesized in Chapter 1 that control of possessed objects might lead to attachment to these objects. Do infants understand this link? If presented with a character, who controls an object (manipulates it, moves it), do infants expect him to show later attachment to this object (i.e. are they more surprised if the character shows absence of emotional attachment to or dislike for the object rather than attachment)? Such combinations of the potential components of ownership should be tested to explore how children construct the full concept of ownership.

It is possible that, prior to 5 years of age, young children are solely reacting through the above mentioned components, and that the concept of ownership as such only emerges in 5-year-olds. Other high-level concepts have also been reported to emerge around this age. Below, we discuss the possible link between ownership and another concept emerging after 4 years of age: explicit theory of mind (Gopnik & Astington, 1988; Wellman, 2002).

5. Possible links between ownership and other concepts

We found a development in the evaluation and understanding of property transfers occurring between 3 and 5 years of age. A similar development is seen for another concept: explicit theory of mind, notably the ability to attribute false beliefs in verbal tasks (Wimmer & Perner, 1983), with a development between 3 and 5 years across cultures (Callaghan et al., 2005). Could there be a link between the emergences of these two concepts?

At a superficial level, both concepts require the representation of invisible properties: ownership is an invisible characteristic of objects (or rather of an object and an agent); mental representations and intentions are invisible characteristics of agents. Furthermore, intentions play an important role in the definition of property transfer. To differentiate between illegitimate and legitimate transfers, one needs to understand the intention of transfer of the first possessor. Without this distinction, theft and legitimate reception would look similar. The intention of the owner not to be separated from his object is one aspect of the definition of theft. In addition, intentions could also matter regarding the action of the thief. Can we consider that an agent is a thief if he does not know that he is performing a theft (for example if he does not know that the object belongs to someone)? Does the notion of theft include the

thief's intention to harm? An intentional thief and an "accidental thief" are both transgressing the same property rights. Rossano et al. (2011) presented to children an "accidental theft", with a puppet taking an object while being ignorant of the fact that the object was owned and not abandoned (even if it might seem temporarily abandoned). Young children protested against the action of the puppet, thus considering it as a transgression. However, if asked to evaluate the puppet, they may not consider him as being as bad as a puppet intentionally stealing someone else's property. Indeed, Vaish et al. (2010) have shown that the intention is important in the evaluation of another property transgression: destroying the object belonging to another. In their study, children helped less a person who intentionally destroyed or who intended to destroy someone else's property, but not a person who accidentally destroyed someone else's property, compared to a neutral person.

Returning to the owner, intentions matter not only during the transfer but also after the transfer. They distinguish between a gift and a loan (as we have seen in Chapter 4), as the intention of the owner to retrieve the object is crucial to determine whether the transfer was definitive or not, and thus whether the absence of restitution of the object to the previous possessor is a transgression or not. Hook (1993) showed that children as young as 4-year-olds considered someone refusing to return an object to the first possessor requesting it as being very bad, but they had difficulties taking into account the intentions of the owner. Indeed they also considered that a gift-recipient was bad if he refused to return the object to the previous owner.

Given the importance of intention understanding for ownership understanding, it would be interesting to investigate simultaneously children's development of theory of mind and ownership as a set of property rights (see Rochat & Passos-Ferreira, 2008, for a discussion about the parallel development of theory of mind and negotiation). Also, intention understanding is important in moral judgments. To make explicit verbal evaluations of moral transgressions, children take into account the intention of the transgressor at 5 but not at 3 years of age (e.g. Wellman et al., 1979; Zelazo et al., 1996). More generally children also develop an "ethical stance", or explicit sense of justice and fairness, between 3 and 5 years of age (Rochat, 2009b; Robbins & Rochat, 2011). Rochat relates the development of this ethical stance, parallel to the development of explicit theory of mind, to the development of "ethical property" (2011a), and "moral self-awareness" (2011b). Further experimental research is needed to explore the parallel development of these different concepts.

6. Ownership and beyond…

To conclude, we discussed the study of the developmental bases of ownership in infancy. We sketched some theoretical directions, introducing potential conceptual components of ownership, and a possible developmental trajectory. Testing these ideas, however, will require further research, taking into account potential variations in the concept of ownership across different kinds of objects, such as territory, songs, ideas (see Olson & Shaw (2011) for a recent study on children's understanding of intellectual property). Further research should also consider potential cultural variations in the acquisition of ownership and the rights attached to it. Rochat (2009b) showed that there is some variability across cultures in children's attribution of ownership, when it involves notions of ethics and fairness. Finally, beyond understanding of a simple transfer, understanding of ownership is related to reciprocity, sharing, and cooperation. Furthermore, Friedman & Ross (2011) propose how the study of ownership in general can bring understanding in several other domains. More research is needed to bridge the gap between the studies of ownership and of other potentially related concepts.

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APPENDICES

APPENDIX AC2

Appendix AC2-1. Detailed description of the stimuli used in Study 1

Study 1a. Theft vs. Gift-reception.

In the theft condition, the protagonist arrives first with a ball, and the agent arrives with empty hands (1). The protagonist plays with the ball not looking at the agent (2). Then he keeps the ball under his arm and the agent steals it from him while he is not looking (3). The protagonist turns himself towards the agent and makes two steps forward (until a barrier separating the two characters) but the agent turns away and plays with the ball (4). When he has finished, the agent turns himself towards the protagonist and makes two steps forward, and the protagonist puts his hands forward to receive the ball (5). However, the agent leaves with the ball (6). Finally the protagonist leaves without the ball (7). In the gift-reception condition, the protagonist arrives first with a ball, and the agent arrives with empty hands (1). The protagonist plays with the ball not looking at the agent (2). Then he turns himself towards the agent, makes two steps forward and gives him the ball (3). The agent plays with the ball while the protagonist is looking (4). When he has finished, the agent turns himself towards the protagonist and makes two steps forward, but the protagonist makes two steps backward (as if indicating that he does not want the ball back) (5). The agent leaves with the ball (6). Finally the protagonist leaves without the ball (7). In both conditions, the agent's body motions are exactly the same, frame by frame. The actions of the protagonist differ, but only in steps 3 and 5. These steps differ in protagonist's body orientation, and timing of the steps forward or backward and movements of raising the hands.

Study 1b. Theft vs. Giving.

In the theft condition, the protagonist arrives first with a ball, and the agent arrives with empty hands (1). The protagonist plays with the ball not looking at the agent (2). Then he keeps the ball under his arm and the agent steals it from him while he is not looking (3). The protagonist turns himself towards the agent and puts his hands forward to reclaim the ball (4). However, the agent turns away and plays with the ball (5). When he has finished, the agent leaves with the ball (6). Finally the protagonist leaves without the ball (7). In the giving condition, the protagonist arrives first with empty hands, and the agent arrives with a ball (1). The agent plays with the ball not looking at the protagonist (2).. The protagonist turns himself

towards the agent and puts his hands forward to ask for the ball (3). The agent turns himself towards the protagonist and gives him the ball (4). The protagonist plays with the ball not looking at the agent (5). When the protagonist has finished to play, the agent leaves without the ball (6). Finally the protagonist leaves with the ball (7). Comparing both conditions, the agent's body motions are exactly the same, but in inverse order. The actions of the protagonist are also reversed. Moreover, the transfers (step 3 or 4) differ in the protagonist's body orientation.

Appendix AC2-2. Original version of the questions asked in French in Studies 1 & 2

Study 1a (and Study 2)

Q_{i_eval} (training): - Est-ce que tu l'aimes bien ? – Est-ce qu'il est gentil ? – Est-ce qu'il est méchant ? – Est-ce que tu voudrais jouer avec lui ?

Q_{c_eval} (social and moral evaluation)	Q_{prop} (property rights attribution)	Q_{comp} (comprehension)
- Tu me montres celui que tu aimes bien (adults : C'est lequel que tu aimes bien ?) - Tu me montres le gentil - Tu me montres le méchant - Tu me montres celui avec lequel tu voudrais jouer	- M. Vert/Bleu, est-ce qu'il avait le droit de jouer avec le ballon ? - M. Vert/Bleu, est-ce qu'il avait le droit de partir avec le ballon ?	- M. Rouge il a donné le ballon à qui ? - C'est lequel qui a volé le ballon à M. Rouge ?

Study 1b

Q_{i_eval} (training): - Est-ce que tu l'aimes bien ? – Est-ce qu'il est gentil ? – Est-ce qu'il est méchant ? – Est-ce que tu voudrais jouer avec lui ?

Q_{c_eval} (social and moral evaluation)	Q_{prop} (property rights attribution)	Q_{comp} (comprehension)
- Tu me montres celui que tu aimes bien (adults : C'est lequel que tu aimes bien ?) - Tu me montres le gentil - Tu me montres le méchant - Tu me montres celui avec lequel tu voudrais jouer	- M. Vert/Bleu/Rouge, est-ce qu'il avait le droit de jouer avec le ballon ? - M. Vert/Bleu/Rouge, est-ce qu'il avait le droit de partir avec le ballon ?	- C'est lequel qui a donné le ballon à M. Rouge ? - C'est lequel qui a volé le ballon à M. Rouge ?

Appendix AC2-3. Detailed results concerning attributions of property rights in Study 1

Study 1a

For both questions, 3-year-olds made no distinction between the illegitimate and legitimate conditions (play: $F(1,24)=3.45$, $p<.1$; leave: $F(1,24)=0.57$, $p>.1$) and were answering at chance to both questions in both conditions (play: theft: $F(1,24)=2.37$, $p>.1$; gift-reception: $F(1,24)=0.33$, $p>.1$; leave: theft: $F(1,24)=1.29$, $p>.1$; gift-reception: $F(1,24)=3.95$, $p<.1$). 3-year-olds seem not to consider any property right. 5-year-olds' answers about the right of the second possessor to play with the ball were significantly different between both conditions ($F(1,16)=12.38$, $p<.01$). In the theft condition, 5-year-olds tended to answer "no" but it was not significantly more than predicted by chance ($F(1,16)=2.42$, $p>.1$). In the gift-reception condition, 5-year-olds answered "yes" significantly above chance ($F(1,16)=15.68$, $p=.001$). Considering the right of the second possessor to leave with the ball, 5-year-olds' answers were not significantly different between the two conditions ($F(1,16)=1.05$, $p>.1$). In the theft condition, 5-year-olds answered "no" significantly above chance ($F(1,16)=5.61$, $p<.05$). In the gift reception condition, 5-year-olds were at chance ($F(1,16)=0.95$, $p>.1$). As for 5-year-olds, adults' answers about the right of the second possessor to play with the ball were significantly different between both conditions ($F(1,8)=40.50$, $p<.001$). In the theft condition, they tended to answer "no" but it was not significantly more than predicted by chance ($F(1,8)=4.50$, $p<.1$). In the gift-reception condition all adults answered "yes". In addition, adults' answers were also significantly different between both conditions as far as the right of the second possessor to leave with the ball is concerned ($F(1,8)=529.00$, $p<.001$). In the theft condition, they all answered "no". In the gift reception condition, they answered "yes" significantly above chance ($F(1,8)=121.00$, $p<.001$). (see Table AC2-3).

	3-year-olds	5-year-olds	adults
	Comprehension Questions		
	I=0.04 (0.09) F(1,24)=0.17 ns	I=0.45 (0.17) F(1,16)=6.54 *	I=1.00 (0.00) n/a
	Property rights Questions		
	Right to play with ball		
thief	I=0.25 (0.18) F(1,24)=2.37 ns	I=-0.35 (0.21) F(1,16)=2.42 ns	I=-0.50 (0.26) F(1,8)=4.50 ~
gift recipient	I=-0.11 (0.19) F(1,24)=0.33 ns	I=0.65 (0.17) F(1,16)=15.68 **	I=1.00 (0.00) n/a
difference	F(1,24)=3.45 ~	F(1,16)=12.38 **	F(1,8)=40.50 ***
	Right to leave with ball		
thief	I=-0.21 (0.18) F(1,24)=1.29 ns	I=-0.50 (0.20) F(1,16)=5.61 *	I=-1.00 (0.00) n/a
gift recipient	I=-0.36 (0.18) F(1,24)=3.95 ~	I=-0.25 (0.22) F(1,16)=0.95 ns	I=0.92 (0.08) F(1,8)=121.00 ***
difference	F(1,24)=0.57 ns	F(1,16)=1.05 ns	F(1,8)=529.00 ***

Table AC2-1. Understanding of property transfers in Study 1a.

Comprehension questions: answers are scored 1 if correct, -1 if incorrect, 0 in absence of choice, and averaged into an index between -1 and 1 for each subject. Property rights questions: answers are scored 1 if "yes", -1 if "no", 0 if other or absent for each question. The table shows the means of participants (and standard errors).

Study 1b

For both questions, 3-year-olds made no distinction between the illegitimate and legitimate conditions (play: $F(1,8)=2.00$, $p>.1$; leave: $F(1,8)=0.17$, $p>.1$). Concerning the right of the second possessor to play with the ball, 3-year-olds were at chance in the theft condition ($F(1,8)=3.00$, $p>.1$), and answered "yes" significantly above chance in the gift-reception condition ($F(1,8)=25.00$, $p=.001$). Considering the right of the second possessor to leave with the ball, 3-year-olds answered "no" significantly above chance in the theft condition ($F(1,8)=8.00$, $p<.05$), and were at chance in the gift reception condition ($F(1,8)=3.00$, $p>.1$). The results of 5-year-olds and adults were similar. Both 5-year-olds and adults' distinguished the two conditions in both questions (5-year-olds: play: $F(1,6)=30.00$, $p<.01$; leave: $F(1,6)=14.40$, $p<.01$; adults: play: $F(1,8)=50.00$, $p<.001$; leave: $F(1,8)=27.00$, $p=.001$). Concerning the right of the second possessor to play with the ball, they answered significantly

above chance "no" in the theft condition (5-year-olds: $F(1,6)=15.00$, $p<.01$; adults: $F(1,8)=25.00$, $p<.01$), and "yes" in the gift-reception condition (5-year-olds: $F(1,6)=15.00$, $p<.01$; adults: $F(1,8)=25.00$, $p<.01$). Considering the right of the second possessor to leave with the ball, they answered "no" significantly above chance in the theft condition (5-year-olds: $F(1,6)=16.20$, $p<.01$; adults: all answered "no"), and were at chance in the gift-reception condition (5-year-olds: $F(1,6)=1.80$, $p>.01$; adults: $F(1,8)=3.00$, $p>.01$). (see Table AC2-4).

	3-year-olds	5-year-olds	adults
	Comprehension Questions		
	I=0.45 (0.18) F(1,16)=7.20 *	I=0.50 (0.23) F(1,8)=4.50 ~	I=1.00 (0.00) n/a
	Property rights Questions		
	Right to play with ball		
thief	I=0.50 (0.26) F(1,8)=3.00 ns	I=-0.80 (0.20) F(1,6)=15.00 **	I=-0.83 (0.17) F(1,8)=25.00 **
gift recipient	I=0.83 (0.17) F(1,8)=25.00 **	I=0.80 (0.20) F(1,6)=15.00 **	I=0.83 (0.17) F(1,8)=25.00 **
difference	F(1,8)=2.00 ns	F(1,6)=30.00 **	F(1,8)=50.00 ***
	Right to leave with ball		
thief	I=-0.67 (0.22) F(1,8)=8.00 *	I=-0.80 (0.20) F(1,6)=16.20 **	I=-1.00 (0.00) n/a
gift recipient	I=-0.50 (0.26) F(1,8)=3.00 ns	I=0.10 (0.31) F(1,6)=1.80 ns	I=0.50 (0.27) F(1,8)=3.00 ns
difference	F(1,8)=0.17 ns	F(1,6)=14.40 **	F(1,8)=27.00 ***

Table AC2-2. Understanding of property transfers in Study 1b.

Comprehension questions: answers are scored 1 if correct, -1 if incorrect, 0 in absence of choice, and averaged into an index between -1 and 1 for each subject. Property rights questions: answers are scored 1 if "yes", -1 if "no", 0 if other or absent for each question. The table shows the means of participants (and standard errors).

In Study 1a, 5-year-olds considered that only the legitimate recipient was allowed to play with the ball, and the illegitimate recipient was not allowed to leave with the ball. In Study 1b 2, this pattern of results was found at 3 years of age.

In Study 1b, with the attribution of the right to keep the object, we observed a development in the understanding of the gift-reception condition: 3-year-olds tend to answer "no", 5-year-olds are at chance, and adults tend to answer "yes".

Appendix AC2-4. Correlation between measures of social/moral evaluation and of property rights attribution in Study 1

We analyzed whether there is a correlation between participant's evaluation and comprehension and property rights attribution in Studies 1a and 1b. The answers concerning the attributions of property rights were scored 1 if "correct", -1 if "incorrect", 0 if other or absent (see Table AC2-3), and averaged into an index between -1 and 1 for each subject.

	Thief		Gift recipient	
	correct	incorrect	correct	incorrect
Was he allowed to play with the ball?	No	Yes	Yes	No
Was he allowed to leave with the ball?	No	Yes	Yes	No

Table AC2-3. Answers considered as "correct" and "incorrect" for each question and each condition in Studies 1a and 1b.

Considering the answers of all children for both studies together, we found that the measures of social and moral evaluation, and of property rights attribution are correlated ($r=.40$, $t(68)= 3.56$, $p<.001$; see Figure AC2-1 for a graphical representation of the distribution of answers). We also found a correlation between evaluation and comprehension ($r=.47$, , $t(68)= 4.35$, $p<.001$), and between comprehension and property rights attribution ($r=.37$, $t(68)= 4.32$, $p<.01$; see Table AC2-4 for more detailed analyses).

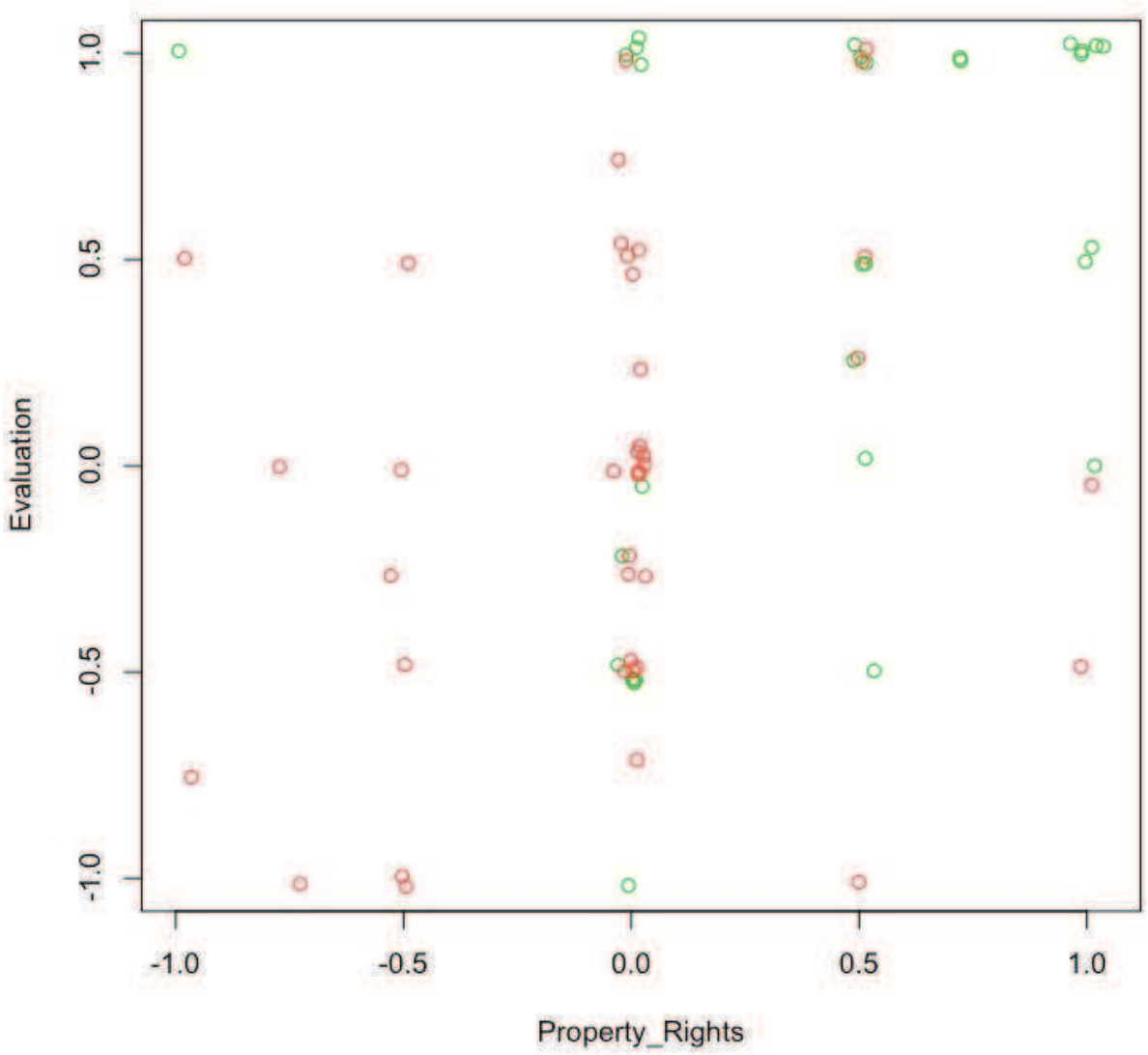

Figure AC2-1. Representation of the correlation between the evaluation index and the property rights index. In red, 3-year-olds; in green, 5-year-olds.

		3-year-olds	5-year-olds	3- & 5-year-olds
Study 1a	Evaluation - Property rights	**r = 0.52** t (26) = 3.14 p = 0.004 [0.19; 0.75]	r = 0.31 t (18) = 1.38 p = 0.18 [-0.15; 0.66]	**r = 0.50** t (46) = 3.91 p = 0.0003 [0.25; 0.69]
	Evaluation - Comprehension	r = 0.10 t (26) = 0.53 p = 0.60 [-0.28; 0.46]	**r = 0.67** t (18) = 3.84 p = 0.001 [0.33; 0.86]	**r = 0.49** t (46) = 3.77 p = 0.0005 [0.23; 0.67]

	Property rights - Comprehension	**r = 0.40** t (26) = 2.19 p = 0.037 [0.03; 0.67]	**r = 0.47** t (18) = 2.27 p = 0.036 [0.04; 0.76]	**r = 0.51** t (46) = 4.05 p = 0.0002 [0.27; 0.70]
Study 1b	Evaluation - Property rights	r = -0.31 t (10) = -1.01 p = 0.33 [-0.75; 0.33]	r = 0.29 t (8) = 0.87 p = 0.41 [-0.41; 0.78]	r = 0.24 t (20) = 1.09 p = 0.29 [-0.21; 0.60]
	Evaluation - Comprehension	r = 0.43 t (10) = 1.49 p = 0.17 [-0.20; 0.80]	**r = 0.65** t (8) = 2.42 p = 0.042 [0.03; 0.91]	**r = 0.49** t (20) = 2.49 p = 0.022 [0.08; 0.75]
	Property rights - Comprehension	r = -0.03 t (10) = -0.09 p = 0.93 [-0.59; 0.56]	r = 0.21 t (8) = 0.60 p = 0.57 [-0.49; 0.74]	r = 0.08 t (20) = 0.37 p = 0.72 [-0.35; 0.49]
Studies 1a & 1b	Evaluation - Property rights	r = 0.25 t (38) = 1.57 p = 0.12 [-0.07; 0.52]	r = 0.30 t (28) = 1.65 p = 0.11 [-0.07; 0.59]	**r = 0.40** t (68) = 3.56 p = 0.00069 [0.17; 0.58]
	Evaluation - Comprehension	r = 0.17 t (38) = 1.04 p = 0.30 [-0.15; 0.45]	**r = 0.66** t (28) = 4.67 p = 0.00007 [0.40; 0.83]	**r = 0.47** t (68) = 4.35 p = 0.00005 [0.26; 0.63]
	Property rights - Comprehension	r = 0.25 t (38) = 1.57 p = 0.12 [-0.07; 0.52]	**r = 0.38** t (28) = 2.17 p = 0.039 [0.02; 0.65]	**r = 0.37** t (68) = 3.32 p = 0.0015 [0.15; 0.56]

Table AC2-4. Correlation analyses between the various measures: evaluation, comprehension, and property rights attribution, in Studies 1a and 1b.

We divided the social/moral evaluation in two indexes (Eval1 and Eval2), and found a correlation between them (see Table AC2-5); we also found a correlation between two indexes of property rights attribution. Thus, we can consider that our measures of evaluation and of attribution of property rights are reliable.

		3-year-olds	5-year-olds	3- & 5-year-olds
Study 1a	Eval1 (like+nice) – Eval2 (bad+play)	**r = 0.73** t (26) = 5.38 p = 1.2 e-5 [0.48; 0.86]	**r = 0.72** t (18) = 4.42 p = 0.0003 [0.41; 0.88]]	**r = 0.74** t (46) = 7.49 p = 1.7 e-9 [0.58; 0.85]
	Prop1 (play+play) – Prop2 (leave+leave)	**r = 0.45** t (26) = 2.54 p = 0.017 [0.09; 0.70]	**r = 0.50** t (18) = 2.48 p = 0.023 [0.08; 0.77]	**r = 0.49** t (46) = 3.86 p = 0.0003 [0.25; 0.68]
Study 1b	Eval1 (like+nice) – Eval2 (bad+play)	**r = 0.58** t (18) = 3.03 p = 0.007 [0.19; 0.81]	**r = 0.79** t (10) = 4.03 p = 0.002 [0.39; 0.94]	**r = 0.72** t (30) = 5.74 p = 2.9 e-6 [0.50; 0.86]
	Prop1 (play+play) – Prop2 (leave+leave)	**r = 0.64** t (10) = 2.64 p = 0.025 [0.11; 0.89]	r = 0.48 t (8) = 1.54 p = 0.16 [-0.22; 0.85]	**r = 0.61** t (20) = 3.45 p = 0.003 [0.25; 0.82]
Studies 1a & 1b	Eval1 (like+nice) – Eval2 (bad+play)	**r = 0.66** t (46) = 5.97 p = 3.3 e-7 [0.46; 0.80]	**r = 0.72** t (30) = 5.75 p = 2.8 e-6 [0.50; 0.86]	**r = 0.72** t (78) = 9.27 p = 3.2 e-14 [0.60; 0.81]
	Prop1 (play+play) – Prop2 (leave+leave)	**r = 0.50** t (38) = 3.57 p = 0.001 [0.60; 0.81]	**r = 0.53** t (28) = 3.32 p = 0.003 [0.21; 0.75]	**r = 0.55** t (68) = 5.37 p = 1.0 e-6 [0.36; 0.69]

Table AC2-5. Correlation analyses between pairs of questions to assess reliability of measures in Studies 1a and 1b.

APPENDIX AC3

Appendix AC3-1. Original version of the questions asked in French in Studies 3, 4, & 5

Study 3

Q_{i_eval} (training): - Est-ce que tu l'aimes bien ? – Est-ce qu'il est gentil ? – Est-ce qu'il est méchant ? – Est-ce que tu voudrais jouer avec lui ?

Q_{c_eval} (social and moral evaluation)	Q_{prop} (property rights attribution)
- Tu me montres celui que tu aimes bien (adults : C'est lequel que tu aimes bien ?) - Tu me montres le gentil - Tu me montres le méchant - Tu me montres celui avec lequel tu voudrais jouer	- M. Vert/Bleu, est-ce qu'il avait le droit de jouer avec le ballon ? - M. Vert/Bleu, est-ce qu'il a le droit de partir avec le ballon ? - M. Vert/Bleu, est-ce qu'il doit rendre le ballon à M. Rouge ?

Study 4

Q_{i_eval} (training): - Est-ce que tu l'aimes bien ? – Est-ce qu'il est gentil ? – Est-ce qu'il est méchant ? – Est-ce que tu voudrais jouer avec lui ?

Q_{c_eval} (social and moral evaluation)	Q_{prop} (property rights attribution)
- Tu me montres celui que tu aimes bien (adults : C'est lequel que tu aimes bien ?) - Tu me montres le gentil - Tu me montres le méchant - Tu me montres celui avec lequel tu voudrais jouer	- M. Vert/Bleu, est-ce qu'il avait le droit de jouer avec le ballon ? - M. Vert/Bleu, est-ce qu'il avait le droit de garder avec le ballon ? - M. Vert/Bleu, est-ce qu'il devait rendre le ballon à M. Jaune/Rouge ?

$Q_{i\_eval\_action\_emotion}$ (evaluation of action and emotion)	Q_{comp} (comprehension)
- M. Vert/ Bleu, est-ce qu'il a fait quelque chose de mal ? - M. Jaune/Rouge, est-ce qu'il avait raison d'être triste ?	- C'est lequel qui a rendu le ballon ? - C'est lequel qui a gardé le ballon ?

Study 5

Q_{i_eval} (training): - Est-ce que tu l'aimes bien ? – Est-ce qu'il est gentil ? – Est-ce qu'il est méchant ? – Est-ce que tu voudrais jouer avec lui ?

Q_{c_eval} (social and moral evaluation)	Q_{prop} (property rights attribution)
- C'est lequel que tu aimes bien ? - C'est lequel le gentil ? - C'est lequel le méchant ? - Avec lequel tu voudrais jouer ?	- M. Vert/Bleu, est-ce qu'il avait le droit de jouer avec le ballon ? - M. Vert/Bleu, est-ce qu'il avait le droit de garder avec le ballon ? - M. Vert/Bleu, est-ce qu'il devait rendre le ballon à M. Jaune/Rouge ?

$Q_{i\_eval\_action\_emotion}$ (evaluation of action and emotion)	Q_{comp} (comprehension)
- M. Vert/ Bleu, est-ce qu'il a fait quelque chose de bien ou quelque chose de mal ? + in the emotional condition only: - M. Jaune/Rouge, est-ce qu'il avait raison d'être triste ?	- C'est lequel qui a rendu le ballon ? - C'est lequel qui a gardé le ballon ?

APPENDIX AC4

Appendix AC4-1. Coding of interpretations of the type of legitimate transfer in Studies 1, 2, 3, with a distinction between short term loan and long term loan

For studies 1, 2, and 3, in Table AC4-1, adults' answers were distributed in four categories depicting the three different interpretations of the situations and the case of an incoherent or incomplete response. If a subject answered "no the second possessor could not/cannot leave with the ball" and "yes the second possessor had/has to give the ball back to the first possessor", his interpretation of the situation was coded as "Short Term Loan" (STL). If a subject answered "yes the second possessor could/can leave with the ball" and "yes he had/has to give the ball back", his interpretation was coded as "Long Term Loan" (LTL). If a subject answered "yes the second possessor could/can leave with the ball" and "no he did/does not have to give the ball back", his interpretation was coded as "Gift". Finally, if a subject answered "no the second possessor could not/cannot leave with the ball" and "no he did/does not have to give the ball back", or if he did not answer "yes" or "no" to one of the questions, his response was coded as "other". The results are presented in Figure AC4-1.

		Obligation to **Give** the ball **back**		
		yes	no	-
Right to **Leave** with the ball	yes	**Long Term Loan**	**Gift**	other
	no	**Short Term Loan**	other (incoherence)	other
	-	other	other	other

Table AC4-1. Interpretations of the situations presenting a legitimate transfer of property in Studies 1, 2 and 3, by considering the answers to both questions: "[The second possessor] was/is he allowed to **leave** with the ball?", and "[The second possessor] did/does he have to **give** the ball **back** to [the first possessor]?".

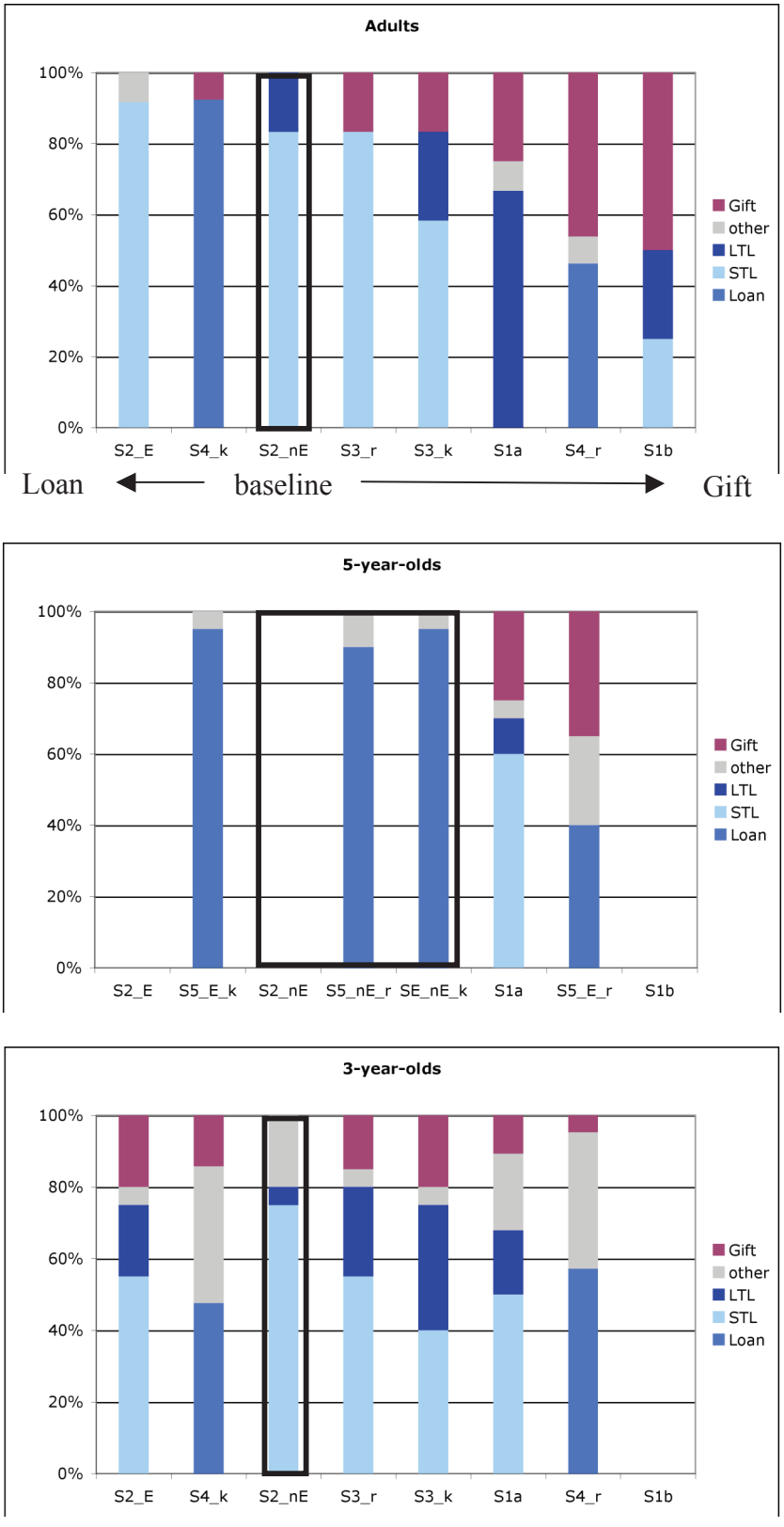

Figure AC4-1. Proportion of participants of each age answering according to each interpretation of the transfer (gift, other, long term loan (LTL), short term loan (STL), loan (no possible distinction between LTL & STL)) for each situation (each legitimate condition through all studies of Chapters 2 and 3).

Appendix AC4-2. Results of adult's answers to the explicit question "did [the first possessor] give or lend the ball to [the second possessor]?" in Studies 1 to 5

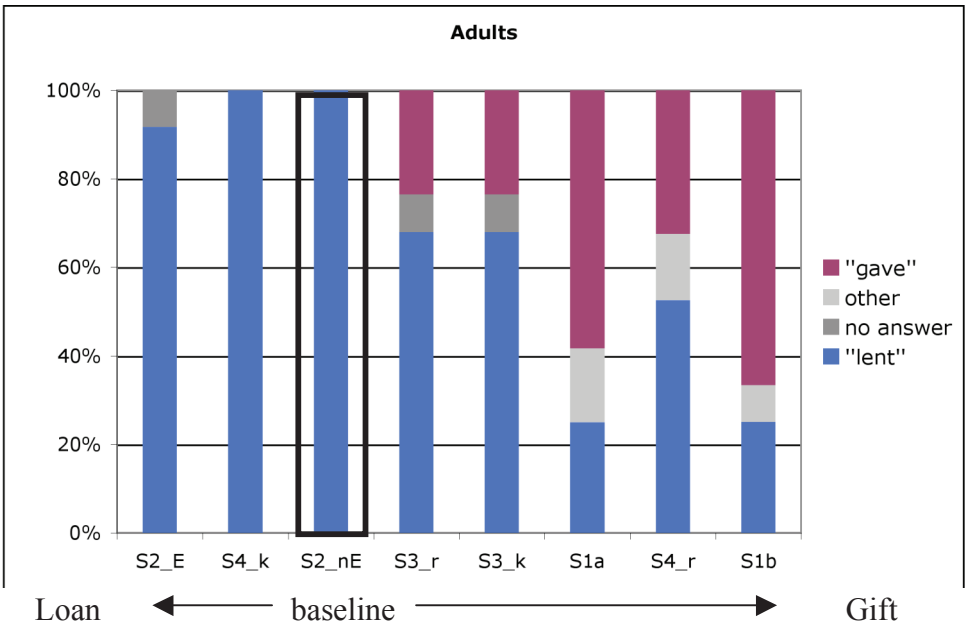

Figure AC4-2. Proportion of adults answering "gave", other (i.e. "lent; maybe gave"; "lent then gave"; "lent but in fact gave"), no answer (because question not asked), and "lent", to the explicit question "Did [the first possessor] give or lend the ball to [the second possessor]?", for each situation.

APPENDIX AC5

Appendix AC5-1. Results for tests of choice 2 to 4 in Study 9

	choice	*choice in less than 10 sec*	*clear choice*	*clear choice in less than 10 sec*
Test 2	11; 7 p=.48	6; 6 p=1	7; 5 p=.77	4; 5 p=1
Test 3	10; 8 p=.81	9; 6 p=.60	9; 6 p=.60	9; 5 p=.42
Test 4	7; 8 p=1	7; 8 p=1	7; 5 p=.77	7; 5 p=.77

Table AC5-1. For different measures of choice in Study 9, the first number represents the number of 5-month-olds choosing the reciprocator; the second number, the number of 5-month-olds choosing the keeper; and the p-value the result of the two-tailed binomial probability test for these responses.

Publications

Gabalda, B., Jacob, P., Dupoux, E. (submitted). Thou shalt not steal ? Evaluation of property transfers in children.

Gabalda, B., Jacob, P., Dupoux, E. (in preparation). The role of emotional cues in young children's evaluation of ownership transgressions.

Gabalda, B., Jacob, P., Dupoux, E. (in preparation). Developmental bases of the concept of ownership: possession, control, attachment, exclusivity, and reciprocity.

Gabalda, B., Jacob, P., Dupoux, E. (in preparation). Meta-analysis of evaluations of ownership transgressions in ontogeny.

Development of the sense of ownership: Social and moral evaluations

Since a very young age, the majority of human social interactions involve objects. In these interactions, children seem to take into account who owns what. How does the sense of ownership develop? Our work deals with children's understanding of the notion of ownership. Before an explicit mastery of the notion of ownership, do children have a more implicit understanding of it? We explored the understanding and evaluation of illegitimate and legitimate transfers of property in children from 5 months to 5 years of age. We studied two types of ownership transgressions: illegitimate acquisition of an object, and absence of restitution of an object to its owner. In all our studies, we presented to children property transfers between two characters using non-verbal animated cartoons or movies with puppets as actors, and then measured children's understanding and evaluation of those transfers. We showed that 5-year-old children make the distinction between a character acquiring an object by theft, and a character acquiring an object by gift. They make this distinction both in their attribution of property rights, and in their social/moral evaluation, preferring the legitimate recipient. In contrast, 2- and 3-year-old children evaluate comparatively these situations only in the presence of emotional cues (the first possessor being sad after the transfer). It is interesting to remark that the legitimate transfers that we presented to the participants were interpreted by default as loans by the adults. Investigating the restitution of an object to its first possessor, we showed that 5-year-old children evaluate more positively a character returning an object to its first possessor compared to a character keeping it. At 3 years of age, children do not make any distinction between the two situations. Adding cues potentially expressing a request for restitution, in some conditions (depending on the rapidity and clarity of choice) 5-month-olds and 2-year-olds tend to prefer the character restituting the object. The studies of this dissertation show an important development in the explicit understanding of ownership between 3 and 5 years. With younger children, our results show tendencies to implicitly evaluate illegitimate and legitimate property transfers. We also underlie the importance of the methodology used to test young children.

Ownership, property rights, moral development, moral judgment, social cognition, social evaluation, cognitive development.