

The Ritualistic Child: Imitation, Affiliation, and the Ritual Stance in Human Development

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Submitted for the Degree of

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Short Abstract

Researchers have long argued that ritual plays a crucial role in marking social identities and binding individuals together in a system of shared actions and beliefs. The psychological processes underlying how and why ritual promotes group bonding and influences in- and out-group biases have not yet been fully elucidated. The research presented in this thesis was designed to examine the social and cognitive developmental underpinnings of conventional/ ritualistic behavior. Because learning cultural conventions is essential for participation in group behavior and for signaling group membership and commitment, I propose that conventional/ ritualistic learning is motivated by a drive to affiliate. Experiment 1 investigated the affiliative nature of ritualistic learning by examining the effects of third-party ostracism on imitation of an instrumental versus ritual action sequence and prosocial behavior. Individuals who do not participate in shared group conventions often face the threat of ostracism from the group. Given that attempting re-inclusion is an established response to ostracism, I predicted that the threat of ostracism increases affiliative motivations and thus will increase imitative fidelity, especially in the context of conventional learning. Experiment 2 examined the effects of first-person ostracism in the context of in- and out-groups on children's imitation of a ritualistic action sequence and pro-social behavior. I predicted that the experience of ostracism by an in-group versus an out-group has important implications for the construal of social exclusion and affiliative behavior. I hypothesized that children would be motivated to re-affiliate by imitating the model and acting pro-socially towards the group, especially when ostracized by in-group members. Based on the findings of this research and insight from anthropology, and social and developmental psychology, I will present a picture of how children acquire the conventions of their group and how these conventions influence social group cognition.

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Long Abstract

This thesis contains five chapters beginning with the introduction in Chapter 1, followed by a review of the social learning literature and presentation of the theoretical distinction of the thesis in Chapter 2, Chapters 3 and 4 present the experimental studies and Chapter 5 contains the general discussion.

In the introduction (Chapter 1) I present the overarching goals of the thesis to (1) situate the novel theoretical perspective of the ritual and instrumental stances (Legare, Whitehouse, Herrmann, & Wen, under review) within the larger body of literature on children's social learning, and (2) to experimentally examine affiliative motivations associated with the ritual stance. Because rituals are a ubiquitous feature of human culture, much research has examined the unique aspects of ritual action (Bell, 1992, 1997; Bloch, 1974, 2005; Grimes, 1996; Humphrey & Laidlaw, 1994; Rappaport, 1999; Whitehouse, 2004), as well as the relationship between ritual and social group dynamics (Durkheim, 1915; Gluckman, 1954; Turner, 1969; Whitehouse, in press). To date, there is a dearth of research exploring how children learn ritualistic behavior. Exploring children's cultural learning allows for examination of the psychological underpinnings of ritual transmission and the social effects of engagement in group-specific rituals. Imitation is proposed as a key mechanism facilitating children's cultural learning. The key question of this research is, what motivates imitation of ritualistic action, as distinct from instrumental action? I propose that blind imitation in association with affiliative goals motivates children's imitation of ritualistic action.

Chapter 2 includes an in-depth review of previous literature on children's social learning and the distinctions different authors have drawn between social learning mechanisms, mainly imitation and emulation. This work has variously focused on children's selective versus over-imitation. From the review, I argue that the vast majority of social learning research has focused on children's engagement in explicit physical-causal reasoning to copy/learn instrumental skills and problem solving. I go on to discuss the limitations of previous research and conclude that research exploring children's imitation of cultural conventions is limited. From this, I present the novel theoretical distinction between the ritual and instrumental stances. The ritual stance is associated with action that is interpreted as unknowable from a physical-causal perspective and is therefore conventional, socially stipulated behavior. The instrumental stance results in an interpretation of action as containing a potentially knowable physical-causal structure, even if that structure is currently opaque. I propose that because the ritual stance results in an interpretation of action as socially stipulated, conventional behavior, it is particularly associated with social motivations. I also propose that imitation can be accomplished via blind imitation as supported by the Associative Sequence Learning (ASL) model proposed by Heyes (2005; in press). In this way, imitation of ritualistic action can be accomplished implicitly and without direct intention to learn. Finally, I present the proposal that learning ritualistic behavior is motivated by a desire to affiliate with one's group due to the importance of group

membership to human survival. For this reason, the threat of social exclusion is likely to increase affiliative motivations.

Chapter 3 includes the first experiment aimed at examining the affiliative motivations underlying imitation of ritualistic behavior and how its effects on subsequent prosocial behavior. Within this chapter I review research related to mental security systems (Boyer & Lienard, 2006; Szechtman & Woody, 2004) and the relationship between threat and ritual (Malinowski, 1948; Sosis, 2007, 2008; Sosis & Handwerker, 2011). I contend that the ostracism-detection system proposed by Williams (2007) acts as a mental security system that, when activated by threats to inclusion, will result in increased affiliative goals that involve attempts at reinclusion. For this reason ostracism is used as a window into the affiliative basis of the ritual stance. In this chapter I also discuss the possible relationship between socially motivated overt imitation and non-conscious affiliative mimicry of an interaction partner's gestures (Chartrand & Bargh, 1999). Using a between-subjects design, participants ($N = 96$, 3-6-year-olds) either viewed a video priming ostracism or affiliation and then either witnessed an adult demonstrating a ritualistic or instrumental action sequence. Children were then given the object set and their behavior was coded for imitative fidelity of the action sequences. Following this, children were asked to explain their behavior and were given the opportunity to share a resource with the model they saw in the video.

I hypothesized that children would imitate a ritual action sequence, as opposed to an instrumental action sequence, with higher fidelity when primed with ostracism as opposed to affiliation. I also hypothesized that children primed with ostracism in the ritual stance would be more likely to provide social explanations for their behavior and to share more of a resource. The results of the first experiment demonstrate a main effect of prime (ostracism versus affiliation) and a main effect of type of action sequence (ritual versus instrumental) with some additional evidence that priming ostracism in the ritual stance results in the highest imitative fidelity. Results also show that children are more likely to provide social explanations for their behavior when primed with ostracism in the ritual stance. There was no evidence that the primes or the type of action sequence affected sharing. These findings provide preliminary evidence that imitation of ritualistic action is motivated by social affiliative concerns, but there is no evidence that this affects subsequent prosocial behavior.

Chapter 4 presents the second experiment that is aimed at exploring how ostracism and group membership affect imitation of a group's ritualistic action sequence and prosocial behavior. Experiment 2 uses a first-person experience of ostracism or inclusion using Cyberball (Yeager, Williams, Cheung, & Choi, 2010), an online ball tossing game used in ostracism research with adults. Within this chapter I first review literature related to children's understanding of group membership and social categories and describe studies using the minimal group paradigm (Tajfel, 1970) before moving on to a discussion of the relationship between ritual and group cohesion. I conclude that when group membership is threatened affiliative motivations are increased and this may result in increased adherence to social norms. From this, I review literature related to adult participants' responses to ostracism when possessing a

group membership (Williams, Cheung, & Choi, 2001; Wirth & Williams, 2008; Lakin, Arkin, & Chartrand, 2008). Much of this research has found that the initial reaction to ostracism is the same regardless of the group that is ostracizing, but group membership affects subsequent reflection on the experience (Williams, 2007). I propose that being excluded versus included by in-group members as opposed to out-group members will affect how children imitate that group's ritualistic action sequence, explanations for their behavior, and prosocial behavior directed at that group.

Using a between-subjects design and the minimal group paradigm, participants ($N = 104$, 5-6-year-olds) were either included or excluded by in- or out-group members and then shown a video of a group member performing a novel ritualistic action sequence. Participants were also asked to explain their imitative behavior and were given the opportunity to share a resource with group members. Participants were also asked about their attitudes toward in- and out-group members. I hypothesized that participants that had been excluded by in-group members would engage in the highest fidelity imitation, provide more social explanations for their behavior, share more of a resource with group members, and endorse increased liking for their group and increased dislike for the out-group.

The results of Experiment 2 show that participants that were excluded by their in-group engaged in higher fidelity imitation than those that were included by the in-group. There were no differences between conditions in the types of explanations provided for behavior and a marginal main effect of ostracism versus inclusion on sharing. There were no differences in liking for the in-group across conditions, whereas children in the ostracism by an in-group condition were more likely to say that they did not feel like they were a part of the out-group at all. These findings indicate that being excluded by an in-group has important implications for engagement in in-group ritualistic actions, as well as a slight effect on subsequent prosocial behavior.

Chapter 5 presents the general discussion of the findings of Experiments 1 and 2. The chapter begins with a brief summary of the main theoretical proposal of the ritual and instrumental stances and the affiliative motivations underlying the ritual stance. The implications of the findings of the current research are considered in relation to affiliative mimicry (Chartrand & Bargh, 1999; Lakin et al., 2008; Heyes, *in press*), Boyer and Lienard's (2006) model of ritualized behavior, ritual and social group dynamics (Bulbulia, 2004a; Cronk, 1994; Irons, 1996, 2001; Henrich, 2009; Sosis, 2000, 2003, 2005; Sosis & Alcorta, 2003; Sosis & Bressler, 2003), and cultural transmission and social learning (Tomasello, Kruger, & Ratner, 1993; Tomasello, Carpenter, Call, Behne, & Moll, 2005). Following this discussion, the limitations of the current research are elaborated. These limitations relate to various methodological issues, the competing findings of the explanation and sharing tasks in Experiments 1 and 2, and alternative interpretations of the affiliative basis of ritual action proposed in this thesis. The chapter concludes by highlighting directions for future research centered around examining how threat in association with ritual action may affect attention, exploring affiliative mimicry with children, the actual transmission of ritualistic behavior, increasing the ecological validity of the current research, and examining the ritual and instrumental stances across cultures.

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Chapter 1. Introduction

Rituals are a pervasive feature of human behavior and culture. The unique features of ritual action and its effect on social groups have been the focus of much anthropological and sociological research (Bell, 1992, 1997; Grimes, 1996; Rappaport, 1999). Ritual action is often defined by the absence of technical motivations, with the intentionality of action originating outside of the actor (Bloch, 1974, 2005; Humphrey & Laidlaw, 1994; Whitehouse, 2004). Staal (1975) contends that ritual action is different from other forms of action due to its prescriptive nature. For many rituals the purpose of the actions is carrying them out precisely. When this is the case, deviation from the ritual action is prohibited. Bell (1997) has further described ritual as separated from instrumental outcomes, in which the act itself is privileged over an immediate, material outcome. These features of ritual action create an emphasis on precise performance (Bell, 1997; Bloch, 1974; Staal, 1975) and deference to the authority of trusted others (Bloch, 1974, 2005). The formalization of behavior separates it from ‘everyday’ action and creates a situation in which the performance of specific actions is central, rather than the physical-causal links connecting actions. Therefore, a core feature of ritual action is physical-causal opacity. Ritual actions lack a physical-causal rationale, and in this way, ritual affords a search for meaning and intentionality that predates the actors currently engaging in the ritual action. These formalized behaviors are passed down from previous to subsequent generations. How do children interpret these kinds of formalized, ritualistic behaviors that are distinct from everyday action? Children are cultural novices who must navigate cultural learning opportunities as a means of becoming competent members of their group. Children learn to engage in ritual through the observation of these practices and deference to the knowledge and behaviors of adults and older children. Work from developmental psychology has

similarly found that children privilege information provided by trusted adults (Harris, 2007; Koenig & Harris, 2005; Koenig, Clement, & Harris, 2004; Corriveau, Pickard, & Harris, 2011). Willingness to reliably copy trusted others is fundamentally based in a motivation to form and maintain affiliation with group members and a desire to take part in social activities. Ritual also affords the regulation of behavior that serves as an indication of group identity (Whitehouse, in press). Social scientists have long argued that rituals play a crucial role in binding individuals together and creating social unity (Bloch, 1991; Durkheim, 1912; Gluckman, 1954; Turner, 1969; Whitehouse, 2004).

This thesis uses experimental methods to examine the cues children use to navigate social learning opportunities. The overarching goal of this thesis is to provide evidence of the affiliative basis of engagement in ritualistic behavior. Here, ritual is defined as conventional, causally opaque behavior. This broad definition of ritual covers a wide range of culturally transmitted behavior ranging from minor details of etiquette to elaborate religious ceremonies. In two experiments, I explore children's imitation of ritualistic action demonstrated by an adult. I propose that affiliative motivations influence children's imitation of ritual versus instrumental actions (Experiment 1) and imitation of an in-group versus an out-group's ritual (Experiment 2). To manipulate affiliative motivations, I use third-party priming (Experiment 1) or first-person experience (Experiment 2) of ostracism or inclusion. The research presented in this thesis extends previous psychological and anthropological research on children's social learning as well as research related to ritual and group cohesion. In the present section, I will first briefly discuss theories and research arising from Durkheimian perspectives on ritual and group cohesion to provide important insights into the nature of ritualistic behavior. I will next discuss how ritual action may be distinguished from 'everyday' action and briefly present anthropological perspectives

on this distinction. After introducing my central thesis that children's social learning of ritual action is influenced by causal opacity and affiliative motivations, I will outline the goals and structure of the thesis.

1.1. Durkheimian perspectives on ritual and group cohesion

Durkheim's (1915) seminal work on the 'elementary forms' or building blocks of religion emphasized the role of ritual in reaffirming social solidarity. Durkheim's (1915) well-known distinction between the 'sacred' and the 'profane' frames the social group as transcendent and continuous, whereas the life of any individual group member is impermanent and fleeting. Religion entrenches the individual in the transcendent order of the social group. Within this framework, ritual is seen as playing a key role in the conceptualization of the social order. Durkheim described the bonding provided by rituals as 'collective effervescence.'

Durkheim's insight, building on earlier work, that ritual binds together groups and reinforces the political order proved to be a fertile line of interpretation. Among many to be influenced by his thinking, Gluckman (1954) observed that rituals often give expression to structural tensions in the social order, that are then symbolically resolved through displays of collective unity. Gluckman (1954) argued that rituals have a cathartic effect that eases the discontent associated with social tensions. Through alleviation of social tensions, via collective rituals, social norms are recreated and affirmed and unity is achieved. Bell (1997) has noted that Turner (1969) expanded both Durkheim's and Gluckman's work by conceptualizing rituals as 'social dramas.' These social dramas allow participants to work out the tensions of social life through the recreation and reaffirmation of social unity.

Stemming from the work of Durkheim, Haidt and Graham (2009) argue that in modern, Western societies there has been a move away from the ‘traditional’ moral structures imposed by community and sacredness. This move towards individuality and autonomy from the group often leaves individuals feeling demoralized and uncertain. Haidt and Graham (2009) propose that humans naturally want to engage in shared communities, goals, meanings, and traditions. They further propose that the desire to be a member of a social group is innate and is a basic human need. Psychologists have similarly argued that humans have a ‘need to belong’ that influences social behavior and motivation (Baumeister & Leary, 1995). Haidt and Graham (2009) assert that the need to belong is not a product of social learning. On the contrary, this need influences social learning in meaningful and predictable ways.

Previous sociological and anthropological research has long emphasized a link between ritual and affiliation. To date, there has been a dearth of research aimed at examining the psychological mechanisms that support this link. Social cohesion is achieved through continual engagement in the practices, convention, norms, and values of one’s community in a broad sense. Examining how children learn by observing and engaging in cultural practices of both an instrumental and ritualistic nature holds the potential to shed light on how children approach ritualistic action. Whereas much research has examined the development of causal reasoning and how copying is used in learning instrumental skills, such as tool use (Call & Tomasello, 1995; Call, Carpenter, & Tomasello, 2005; Nagell, Olquin & Tomasello, 1993; Whiten, Custance, Gomez, Teixidor, & Bard, 1996; Gergely, Bekkering, & Kiraly, 2002; Want & Harris, 2002; Williamson, Meltzoff, & Markman, 2008), relatively little experimental research has examined the development of children’s engagement in socially stipulated behavior, such as ritual, as well as the underlying motivations associated with this engagement.

To explain the recurrence and compelling nature of ritual and ritual's role in group cohesion, it is necessary to investigate the cues affecting children's motivation to engage in ritualistic behaviors. This investigation involves examining the affiliative antecedents and consequences of engagement in ritualistic behavior. This entails examining how children imitate the actions of other, more knowledgeable, individuals, how ritual action is distinguished from other kinds of actions, and how engaging in ritual affects subsequent interpretations of behavior and prosocial actions.

1.2. The intersection of group cohesion and ritualistic action

Much theory and research has examined the unique features of ritual, asking the question: How do individuals distinguish ritualistic action from other kinds of actions? Further, what can account for ritual action's persistence and transmission over time? Bloch (1974, 2005) has commented that within anthropological research, when informants are asked what a ritual means or why it was carried out in a certain way, individuals are often powerless to provide a coherent answer, perhaps deferring to tradition, or stating 'this is just the way it is done.' These same individuals report that it is very important that ritual actions be performed in the correct way and that there is some deep meaning invested within the acts, even if they cannot articulate that meaning (Bloch, 1974, 2005). What is thought to be a fundamental feature of ritualized action involves a separation of intentionality and action (Bloch, 1974, 2005; Humphrey & Laidlaw, 1994). Humphrey and Laidlaw (1994) state, 'the form taken by ritualized actions is not only divorced from individuals' intentions and purposes but it is also separated from everyday functional action in time' (p. 12). Normal, 'everyday' intention in action is suspended within a ritual context. Within ritual, the acts being performed do not fully originate with the actor who is performing them; they are

stipulated in advance and typically inherited via inter-generational transmission (Bloch, 2005; Humphrey & Laidlaw, 1994).

Similarly, Whitehouse (2004) has argued that rituals are irreducible to technical motivation or the intentional states of the actors. In this way, normal Theory of Mind (ToM) processes are discouraged by ritual actions, and the search for intentional meaning may be thwarted or abandoned. ‘Ritual actions differ from non-ritual actions in ways that may have important ramifications for cognitive processing’ (Whitehouse, 2004, p. 166). When deference is involved, it is thought that one need not necessarily understand something in order to hold it to be true (Bloch, 2005). ‘The vagueness of ritual offers us a clue to the nature of much human social knowledge and of many learning processes’ (Bloch, 2005, p. 123). Children are cultural novices and, indeed, much of what children learn is through deference to the authority of others, typically adults (Harris, 2007).

Determining what social cues denote when action should be copied precisely and when imitation can be more flexible and open to innovation will shed light on how children navigate cultural learning opportunities. Because children are cultural novices, examining the manner in which children navigate contexts involving ritualistic versus instrumental behavior can help elucidate the mechanisms underlying cultural learning. Awareness of social categories that distinguish people based on group membership develops early in ontogeny (Killen & Rutland, 2011). The ability to distinguish social categories allows children to determine what behaviors they should engage in to operate within a group. To coordinate behavior effectively for cooperative efforts, children must learn and adhere to the norms and conventions of their group (whether it be in a familial, school, or play setting). Elucidating the psychological processes underlying the adoption of conventional, or ritualistic, behavior and its effects on

subsequent socially-oriented behavior will allow researchers to approach questions of how this unique form of behavior comes to bind individuals together and mark groups off from one another. As such, developing an understanding of how children learn and adopt the rituals of their cultural community is vitally important within the social sciences.

1.3. Causal opacity, social learning, and affiliative motivations

Children acquire much of their knowledge about the world through observation. A variety of learning processes, or strategies, have been proposed to allow children to acquire cultural knowledge from observing the actions of others. Imitation has been held as a key mechanism of cultural learning (Boyd & Richerson, 1985; Tomasello, Kruger, & Ratner, 1993; Tomasello, Carpenter, Call, Behne, & Moll, 2005). Imitation likely provides a means for a variety of functions throughout development. Meltzoff and Moore (1977) famously argued that neonates imitate certain facial gestures of adults. This finding has been interpreted as evidence that imitation promotes mother-infant social interaction (Bjorklund, 1987). Imitation also provides a means of communication in pre-verbal children. In terms of the focus of the current research, social learning, imitation has been primarily examined in relationship to learning instrumental skills and physical-causal knowledge acquisition. The distinctions drawn within the primary literature between proposed social learning strategies is extensively reviewed in Chapter 2. What emerges from the review is a picture of the child as continually and actively engaged in explicit physical-causal reasoning. As will be argued, this picture may not adequately capture the ways in which children acquire knowledge about the domain of social conventions and norms. While causal reasoning is an important aspect of children's imitation and is heavily involved in learning

instrumental actions, other learning processes are likely involved in the acquisition of conventional knowledge not grounded in physical-causal rationales. In this way, blind imitation of action, involving copying in the absence of physical-causal rationales, would allow for the acquisition of cultural knowledge not involving instrumentality, such as ritualistic behavior (Heyes, in press; Legare, Whitehouse, Herrmann, & Wen, under review).

Legare et al. (under review) have recently proposed that children are able to flexibly navigate social learning opportunities using social and physical cues that allow them to determine when they should approach action from an instrumental stance or a ritual stance (or somewhere in between). Much of human culture is causally opaque, and how children determine when action can be approached from a physical-causal understanding and when action can be approached from a social conventional understanding is based on cues that allow children to interpret this opacity. Their research has found that when a physical cue (identical start and end-states) signals that actions are based in social convention, children are more likely to imitate with high-fidelity than when a cue (differing start and end-states) signals an opportunity for instrumental learning, based on the inference of a potential physical causal structure.

Legare et al.'s (under review) proposal is that start- and end-state equivalency results in an interpretation that the observed actions are not understandable from a physical-causal perspective and are thus socially motivated. Because the actions are socially motivated, there is no other way or reason to perform them other than that demonstrated. When actions contain a distinct end-state, the actions, even if relatively causally opaque, are interpreted as containing a potentially knowable causal structure. In this case, the actions are understood as containing an instrumental purpose or goal that opens the actions up to deviation from the observed sequence. This is not to say

that start- and end-state distinctions are the only cue that children use in navigating between different functions of social learning. There are likely a variety of physical and social cues that allow children to interpret observed actions. Ongoing research has found that verbal cues allow children to interpret action from the ritual and instrumental stance (Clegg & Legare, in prep; Herrmann, Legare, Harris, & Whitehouse, under review) as well as cues to consensus (Herrmann et al., under review).

The ritual and instrumental stances are not conceptualized as dichotomous, but rather as constituting a continuum. Thus, particular physical and social cues can amplify or diminish which stance is, more or less, adopted. Many actions that children witness contain both instrumental and conventional elements. In this case, children may interpret action from a perspective somewhere in between the ritual and instrumental stances. It is also important to note that like most aspects of development, cultural inputs are likely to influence the cues that children use to determine when action is conventional and when it is instrumental, or is some combination of both. Gaskins and Paradise (2010) provided evidence that cultural inputs affect how children attend to their physical and social environments. Imitation is likely similarly tuned by cultural variation in attention styles, cultural priorities, and even local ecology. In this regard, there is likely no default that children adopt when interpreting action. Children's interpretation of action is going to therefore be dependent upon cues provided by the environment, aspects of the action sequence, and interactions with other group members.

Whereas the ritual stance can be amplified by physical cues to start and end-state equivalency (Legare et al., under review), the variety of social cues that are likely to amplify or diminish these stances have yet to be fully investigated. Because ritual

action is considered essential to creating social cohesion and coalition building (Bloch, 1991; Durkheim, 1915; Gluckman, 1954; Turner, 1969; Whitehouse, 2004), it is plausible that social motivations amplify the ritual stance, thereby increasing imitative fidelity. The current research will examine the proposal that blind imitation plays a prominent role in the adoption and transmission of conventional, ritualistic behavior through an, often, implicit motivation to affiliate with others.

Ritual displays also demonstrate commitment to in-group ideologies to other group members (Henrich, 2009). In Henrich's model of social learning, costly rituals act as credibility enhancing displays (CREDs) that provide important evidence of a model's commitment to in-group ideologies alongside verbal report. The ritual has to impose some cost on the individual who is performing it to act as a truthful signal of commitment. In this way, cultural learners are using demonstration of costly rituals or behaviors as a means of acquiring knowledge of what behaviors are culturally relevant and important. Recent research has examined the ways in which rituals contribute to prosociality towards in-group members and how engagement in costly rituals can act as an honest display of commitment to one's group (Bulbulia, 2004a; Cronk, 1994; Irons, 1996, 2001; Sosis, 2000, 2003, 2005; Sosis & Alcorta, 2003; Sosis & Bressler, 2003). Although this research has examined the relationship between ritual and cooperation, the process by which rituals influence attitudes towards in- and out-group members has been understudied from a developmental perspective.

The development of ritualistic behavior has important implications for understanding social group dynamics in childhood as well as informing our understanding of the general human tendency to prefer in-group members to out-group members (Brewer, 2007; Caporael, 1997; Kurzban & Neuberg, 2005; Richerson & Boyd, 2005). The current research examines the implications of children's learning of

social conventions for social group behavior. Because learning cultural conventions is essential not only for participation in group behavior but also for signaling group membership, I propose that ritualistic/conventional learning is motivated by affiliative goals. This is not to say that any action will signal group membership and add to group cohesion, but that actions which are particular to one's in-group, typically cultural conventions, are uniquely suited to contribute to group identity and cohesion (Whitehouse, in press).

Heyes (in press) argues that blind imitation allows for the production of hard-to-fake signals of group identity. These hard to fake-signals involve subtle behavioral styles, such as walking in a certain way, using facial expressions in subtle ways, etc. that are reliable indicators of in-group membership. Arguably, these signals are internalized by children early in ontogeny and, most of the time, may not even be accessible to conscious awareness and are therefore difficult to articulate. Like language, there may even be a developmental window in which children must learn these group specific behaviors. Otherwise, any attempt at replication of these mannerisms later in life may come across as fake. As Heyes (in press) notes, learning these subtle behaviors is related to the amount of time spent with a group, which acts as a good indicator of authentic group membership. As described above, overt ritualistic/conventional sequences also act as group markers and promote in-group cooperation, if hard enough to fake. To date, however, there has been no exploration of children's sensitivity to hard-to-fake conventions as opposed to more easily faked behaviors as signals of group membership. There is likely a continuity of function between simple gestural imitation and overt imitation. Action sequences that possess elements that are similar to, or incorporate, the simpler gestural indicators of group

membership may act as salient indicators of social stipulation. Thus, causally opaque behaviors are uniquely suited to serve as in-group markers.

Blind imitation, driven by implicit affiliation goals, may play a prominent role in the acquisition and transmission of conventional cultural knowledge. The motivation to affiliate can be enhanced via cues related to the threat of social exclusion. Threat cues may activate “mental security systems” (Boyer & Lienard, 2006; Szechtman & Woody, 2004) that result in security related behaviors as a means of coping with negative stress. Boyer and Lienard (2006) propose a neurocognitive model of ritualized behavior that may account for the common or “obvious,” following Rappaport (1979), features of ritual, such as the disconnection between actions and empirical goals, compulsion, rigidity in performance, repetition, order, and boundaries (Lienard & Boyer, 2006). When activated by inferred threats, the Hazard-Precaution System (HPS) induces behaviors aimed at alleviating anxiety and addressing the potential threat. One of the most salient threats for humans is the threat of social exclusion. Often, individuals who do not participate in social group conventions face the threat of ostracism (Caporael, 1997).

Williams (2007) has proposed the ostracism-detection system, aimed at addressing threats to inclusion within the group and found that, typically, the first response to the threat of social exclusion are attempts at reinclusion. I propose, similarly to Over and Carpenter (2009), that the threat of social exclusion heightens affiliative goals. Affiliative motivations result in the high-fidelity imitation of ritualistic action sequences. This motivation is proposed to especially impact the imitation of action sequences that are not reducible to physical-causal rationales. Via the ritual stance, deployed when learning actions that are not based in physical-causal rationales, threat and ambiguity ‘disinhibit’ imitative motivations as an affiliative response that

will result in improved imitative fidelity. This improved imitative fidelity contributes to the rigidity of ritualistic behavior and the subsequent interpretation of actions as specific rules of behavior in normative or conventional terms.

1.4. Goals of the thesis

This thesis has two overarching goals: The first is to provide a comprehensive review of previous literature on children's social learning that will provide an in-depth perspective on the mechanisms that may support children's imitative performance as well as their interpretation of and engagement in ritualistic behavior and to situate the current research within the larger body of literature. This endeavor is taken up within Chapter 2, in which I will first lay out the findings and theories on social learning in relation to intention-reading and physical-causal goal attribution. I will argue that the focus on instrumental learning via physical-causal reasoning has neglected an important aspect of cultural learning, normative and conventional learning that does not rely on physical-causal reasoning, or even intention attribution. Thus, imitation allows for the acquisition of socially stipulated behavior as well as for instrumental, technical behavior from observing others interact within the social and physical environment. Importantly, these two functions of imitation are not mutually exclusive and likely overlap in interesting and predictable ways. Based on prior research, I will argue that these two functions of imitation rely on the same underlying mechanisms of matching observed action to motor output. I will then describe theories and research related to the social motivations underlying imitation. The difference between imitation as a means of instrumental skill acquisition and imitation as a means of social skill acquisition rests on differences in how physical and social cues affect motivations underlying imitative performance.

Chapters 3 and 4 present the second goal of experimentally examining the cues children use to determine when action is ritualistic and conventional and the underlying affiliative motivation to engage in ritualistic action. Experiment 1 uses the experience of ostracism to examine the affiliative basis of the ritual stance. Specifically, this research is designed to examine children's imitation of ritualistic behavior and how the enhancement of implicit affiliation goals, via cues to the threat of ostracism, affect overt imitation of instrumental and ritualistic action sequences and pro-social behavior. I hypothesize that priming with ostracism will enhance affiliation goals thereby increasing imitative fidelity. I predict that, due to the proposed connection between ritual and affiliation, enhanced affiliation goals will result in increased imitative fidelity especially of a ritualistic action sequence. To test these predictions I used a between-subjects design with four conditions. To provide converging evidence of the effect of ostracism on imitative fidelity of ritualistic action children were also asked about their imitation of the action sequence as well as given the opportunity to share a resource with the person they saw demonstrate the action sequence. I predict that children will provide more social explanations for their behavior, as well as share more of their resource following priming with ostracism and viewing the ritual action sequence.

Experiment 2 explores the effects of a direct experience of ostracism or inclusion by in- or out-group members on imitative fidelity of a ritualistic action sequence, in-group and out-group attitudes, and pro-social behavior. I predict that being ostracized by one's in-group and then being given the opportunity to imitate a ritual action sequence of the in-group will result in increased imitative fidelity over being included by one's in-group, or being excluded or included by an out-group. To test these predictions I again used a between-subjects design with four conditions. To provide converging evidence of the affiliative nature of imitating ritual action, children

were also asked about their imitative behavior and provided the opportunity to share a resource with members of the group that included or excluded them. Experiment 2 is the first of its kind to experimentally examine the effects of ostracism and group membership on children's imitation of ritualistic behavior. This work provides novel insight into children's developing awareness of social convention and group membership, how children flexibly navigate social learning opportunities, and the affiliative basis of ritual action. The thesis concludes with the General Discussion in Chapter 5 that presents implications, limitations, and directions for future research.

Chapter 2. Literature Review

2.1. The instrumental stance: Imitation via intentions toward a physical-causal goal

Research on children's social learning has primarily come from comparative programs focusing on how children, and other species (primarily apes and monkeys) learn from others to acquire problem-solving, instrumental skills. Much of the previous literature has examined the physical-causal information required to allow children, and other animals, to accurately copy an instrumental action sequence. The focus on the role of physical-causal reasoning in social learning led to attempts to define social learning mechanisms based on what features of an action sequence children, and other animals, accurately replicate. Much of this literature has ascribed a central role to children's ability to read a demonstrator's intentions toward a physical-causal end-goal. To provide a background of the focus and direction literature on children's social learning has taken, this section will describe work that has focused on children's copying of instrumental actions and the definitions of social learning mechanisms coming out of this work. Much of this work can be seen as providing evidence for selective imitation or over-imitation, both of which require children to copy an adult's actions based on an assessment of intentions, goals, and physical constraints. At the end of the section, I will describe how the focus on instrumental learning has neglected examining how children learn conventional behavior, such as rituals, that are not based in physical-causal reasoning before moving on to a description of work that has attempted to address convention learning and the mechanisms supporting this learning.

2.1.1. Selective imitation

Studies by Meltzoff and Moore (1977, 1997) have found that neonates imitate facial and body movements. Whereas many of these findings have been called into question (Anisfeld, 1991, 1996; Heyes, 2001; Ray & Heyes, 2010), these studies and others like them sparked an interest in exploring the cognitive underpinnings of imitation and mechanisms of social cognition, and cultural learning more generally. Subsequent studies have examined the factors affecting the facilitation or inhibition of imitation in infants and young children. From the findings of these studies, many authors have proposed that imitation is dependent on inferring the intentions and goals of an agent. Based on the neonatal studies (Meltzoff & Moore, 1977, 1997), and other studies of social learning, many authors propose that children and even infants are capable of inferring the intentions of others and using this inference to guide their imitative behavior. It is easy to understand the basis of this contention. Much of human thought and behavior is influenced and guided by the inference of other individuals' mental states, such as intentions, beliefs and desires. Meltzoff and colleagues (Meltzoff, 1995, 2002; Meltzoff & Moore, 1997) were early proponents of this 'mentalist' view of the imitative behavior of infants and children.

Meltzoff and colleagues (Meltzoff, 1995, 2002; Meltzoff & Moore, 1997) have proposed the active intermodal matching (AIM) model. This theory proposes a supramodal representation system that directly matches input from the visual system to motor output. This is constituted of a matching-to-target process in which the infant's movements will come to more closely approximate the model's through specifications of "organ relations" provided by supramodal representations (Meltzoff, 2002). Subsequently, Meltzoff (2007) has expanded this line of thinking to suggest that a

fundamental understanding of “self-other equivalences” is the locus of social cognition from which imitation is said to arise.

Similar to Meltzoff, Tomasello and colleagues (Tomasello, 1995; Tomasello et al., 2005; Tomasello et al., 1993) propose that social cognition, including imitation along with other forms of learning (such as instructed and collaborative learning) are dependent upon taking the perspective of another individual and representing others’ intentions (and later their desires and beliefs). In Tomasello et al.’s (1993) account of cultural learning it is held that ‘learners do not just direct their attention to the location of another individual’s activity; rather, they actually attempt to see a situation the way the other sees it – from inside the other’s perspective, as it were’ (p. 496). Tomasello (1999) contends that infants show their understanding of others as intentional agents around nine months of age. At this age, infants are said to engage in joint attention with another person in a triadic nature in reference to an object, indicated by gaze following, pointing etc. Within this paradigm, imitative behavior in infancy and early childhood is fundamentally characterized as being dependent upon the child understanding the perceptual and intentional state underlying the behavior of a model. Without the understanding of the intentions and goals of a model, the child can only be said to be ‘mimicking’ behaviors (Tomasello et al., 1993, p. 497).

Tomasello (1990, 1996, 1998) also made a distinction between social learning via imitation and social learning via emulation based upon what an observer is proposed to be attending to when replicating behaviors: The behavior of another (imitation) or the changes in the environment caused by the behavior of another (emulation). For Tomasello (1996, 1998), emulation learning involves an observer learning affordances of objects and events due to the changes of state in the environment caused by another individual. Importantly, Tomasello (1996, 1998)

contends that this type of learning does not involve the observer attending to the goal, or the specific means used to attain the goal, of another in that the observer is not learning about behavior, just the end *result* of behavior in the environment.

An individual who is emulating will tend to seek to reproduce the same change in the environment with no attempt to copy the actual behaviors or behavioral strategy of the model. In this way, the observer may be said to be learning something about the causal effect of another's actions, which they then may seek to reproduce using their own strategy (Tomasello, 1990, 1996). Tomasello (1996) also considers learning about the affordances of objects as involved in emulation learning and states, 'The individual observing and learning some affordances or changes of state in the inanimate world as the result of the behavior of another animal, and then using what it has learned in devising its own behavioral strategy, is what I have called emulation learning' (p. 321).

Imitation involves attention to the behavior of the model and a separation of behavior into means and end-goal that is reliant on an understanding of the intentions of a model towards attaining a goal, as well as what behaviors are relevant to re-enact in order to attain the goal. This understanding of intentionality relates to an understanding of 'how the behavior is designed to bring about the goal' (Tomasello, 1996, p. 324). In this way, imitation is seen as involving an understanding of goal-directedness, as an aspect of intentionality, including attention to and replication of the model's actions used in attaining the goal. This intention understanding also distinguishes imitation from mimicry in which reproduction of body movements is said to occur at the sensory-motor level and not to involve cognitive processes of intention attribution. From this, imitation, involving an understanding of another's goal and the actions used to attain the goal, can be employed as an efficient learning strategy even when causation is not apparent. Meltzoff has similarly focused on an individual's

understanding of intentionality, specifically goal-directedness, of imitation in which an individual imitates by relating self to other and attempts to ‘imitate’ the goal of a model whether the model achieved the goal or not (Meltzoff, 1995). Meltzoff considers an individual’s ‘re-enactment’ of the model’s intended goal, even when the model failed to achieve the goal, as imitation.

Researchers who hold that imitation is based on an understanding of goal-directed behavior and the attribution of intentions to a model most often cite Meltzoff’s (1995) “failed attempts” study. The critical question in this study was if children would more often re-enact the unconsummated intention of the actor pulling an end off of a toy (failed attempt). Further, would children in the full demonstration and children in the failed attempt condition differ in terms of the reproduction of the ‘target act’ of pulling the end off of the toy? Children re-enacted the target act (e.g. pulling the end off of the dumbbell shaped toy) significantly more in the full demonstration and failed attempt conditions than in the control conditions. Further, children in the full demonstration and failed attempt conditions did not differ in terms of the likelihood of reproduction of target acts (Meltzoff, 1995). These results were taken to show that young children are capable of going beyond surface behavior re-enactment and are able to re-enact actions based on an understanding of the goal and intention of a model, even when the goal is not achieved (Meltzoff, 1995). In a replication of Meltzoff’s (1995) study, Bellagamba and Tomasello (1999) found a similar pattern of results. To test whether or not emulation learning may be responsible for children’s re-enactment, participants were presented with the result of an action only (e.g. presented only with the dumbbell toy already separated into its two parts). Within this ‘end-state only’ condition, children were not likely to reproduce the action of separating the two pieces when given the toy. The authors interpret these findings as further strong support that

young children perceive others' actions as intentional and goal-directed and their tendency to reproduce the actions of others is based in this understanding (Bellagamba & Tomasello, 1999).

Whereas the findings of these two studies are compelling and seem to strongly support the idea that imitation is reliant on an understanding of intentions toward a goal, there are other explanations for the findings that warrant caution in interpreting these results. Within these experiments, other forms of social learning have not been adequately ruled out. Specifically, young children's performance in the behavioral re-enactment procedure, involving the production of the intended acts in failed attempt conditions, could be the result of non-imitative forms of social learning, such as emulation, affordance learning, and stimulus enhancement, not reliant on the attribution of intentions, or even goals (Huang, Heyes, & Charman, 2002).

In a replication and expansion of Bellagamba and Tomasello (1999), Huang et al. (2002) added an 'emulation' condition similar to that used in the previous study in that only the end result of the actions was presented. In contrast to Bellagamba and Tomasello (1999), children in the emulation condition were also presented with the initial, starting state of the object. Similar to the findings of Meltzoff (1995) and Bellagamba and Tomasello (1999), children in the full demonstration and failed attempt conditions produced roughly the same number of target acts with the objects. Interestingly, children in the emulation condition also produced roughly the same number of target acts as in the full demonstration and failed attempt conditions (Huang et al., 2002). Further, in a second experiment, Huang et al. (2002) found that children were also just as likely to produce the target acts in a spatial contiguity condition in which the relevant aspects of the objects were brought together, but no target act was demonstrated or attempted. These results indicate that in the failed attempt conditions

of Meltzoff (1995) and Bellagamba and Tomasello (1999) the possibility that children were performing the target acts due to learning about the affordances of the objects, and their causal effects, from the demonstrations cannot be ruled out. Therefore, it is difficult to say that these studies effectively demonstrate that children are basing their behavioral re-enactment on an understanding of a model's intention toward a goal.

Carpenter, Akhtar and Tomasello (1998) had children observe an actor carry out a two-part action sequence that was either marked verbally as an accident or an intention, by saying 'woops!' or 'there!' after the action was completed. Infants were twice as likely to imitate the intentional actions as compared to the accidental actions (Carpenter et al., 1998). These results are taken as further evidence that when young children imitate, their understanding goes beyond object affordances and surface behaviors of the actors in that actions are interpreted as intentional and goal-driven. It is intuitive to suppose that when children see and hear an action marked as accidental, they are interpreting this as unintended on the part of the model. When interpreting the results of this study, however, the same question applies as in the previously described studies: Could some process, other than intention attribution, account for these findings? It is apparent, and assumed, that young children have learned an association between the word 'woops' and unintended actions and the word 'there' and intended actions.

It is possible that, through associative learning, children of this age associate actions marked with 'woops' with a negative outcome, thus inhibiting their tendency to subsequently copy such actions themselves (Heyes & Ray, 2002). This process would not necessarily involve the attribution of intentions to an actor. This learning could be associated with an understanding of goal-directedness, which in this case would be distinct from an understanding of intentionality. Indeed, Gergely and Csibra's (2003)

concept of the teleological stance, in which young children explain and predict goal-directed actions based on relevant aspects of the perceived current situation without attributing an intentional state to the model, could help frame an account of the findings of this study. Children of this age may understand that animate beings persist towards a goal in a rational manner. Through associative learning, children may learn that actions marked with ‘woops’ result in the model having to continue towards a goal and actions marked with ‘there’ result in the cessation of goal pursuit. It seems equally likely that if children can form an association between a word and an intention, as assumed by the authors of this study, they could form an association between a word and an outcome.

Gergely and Csibra (2003) have found evidence that imitation involves a process in which aspects of an action sequence are selectively reproduced based upon a rational assessment of the physical-causal information available. This assessment is based on the ‘teleological stance,’ in which the outcome of observed behavior is interpreted and attributed as the goal of the action ‘whenever considerations of efficiency justify the action as the most optimal means available to achieve the goal within the particular physical constraints of the situation’ (Gergely & Csibra, 2006, p. 232). Gergely, Bekkering and Kiraly (2002) replicated a study by Meltzoff (1988) in which infants copied a model in turning on a light panel using their forehead. To ascertain why, if children are operating from the teleological stance, they would engage in this less rational, less efficient means of achieving the goal, the authors (Gergely et al., 2002) added a condition in which the model’s hands were constrained by a blanket wrapped around their torso. In the hands-occupied condition children were predicted to be less likely to copy the model’s action of turning on the light panel with their forehead, and more likely to use their hands, because they assessed the constraints on the model as a rational reason for not using their hands to achieve the goal (Gergely et

al., 2002). This is indeed what they found: In the ‘hands-free condition’ (in which it seemed the model freely chose to use a less efficient means to the goal), 69% of 14-month-olds repeated the head action, while in the ‘hands-occupied’ condition, only 21% did so (Gergely et al., 2002).

The authors conclude that in the hands-occupied condition, the children assessed the situation from the teleological stance and emulated the model. From this, Gergely and Csibra (2006) describe the behavior of the children in the hands-occupied condition as ‘teleological emulation’ that is based on an understanding of the means-ends relations in which the observer attempts to achieve the goal of an observed action sequence using the most efficient means possible, not necessarily the same means as the model, in contexts in which physical causal relationships are transparent (when a concrete goal is apparent and visible) (Gergely & Csibra, 2006). Recent research has demonstrated, however, that the effect in the hands occupied condition may not be related to a rational assessment of constraints and may be more related to the blanket used to wrap up the model in this condition. Beisert, Zmyj, Liepelt, Jung, Prinz, and Daum (2012) have shown that the distracting nature of a blanket wrapped around the model accounts for the differences observed between conditions. Children were simply distracted by the blanket and therefore were less likely to copy the demonstrated action.

Tomasello and colleagues (Carpenter, Call & Tomasello, 2005) have described imitation as involving both the imitation of a model’s end-goal and imitation of actions, the utilization of which depends on the context of the task and what aspects of an action sequence are made salient. This idea of imitation requires a separation and understanding of the means, goals and sub-goals in a hierarchical manner. Specifically, if end-states or ‘final goals’ are present, these become the most salient aspects to be copied. When end-goals are not apparent or salient, however, an observer will copy the

action styles, seemingly because they view the action styles as the only goal within this context.

Carpenter et al. (2005) found that when 12- and 18-month olds were shown a toy mouse either hopping or sliding into a toy house the infants tended to ignore the action and place the mouse in the house when it is their turn. Yet, when there was no house present the infants tended to imitate the action, either hopping or sliding, more reliably (Carpenter et al., 2005). These findings seem to point to the conclusion that children may tend to copy a goal when an end-goal is discernible, and copy actions when they cannot. Further, Carpenter et al. (2005) conclude that it is likely that children will tend to copy an adult's irrelevant actions when they perceive those actions as the goal, or part of the goal. As such, when there is no obvious, object-related goal, children will interpret the surface behavior, or action style, as the only goal. In their discussion of the results of this study, the authors concede that there are some other interpretations of their findings that do not involve the infants' understanding of goals and intentional action. Two alternatives seem especially likely, stimulus enhancement and emulation.

First, in the 'house' condition, the infants may have preferentially placed the mouse in the same house as the demonstrator, ignoring specific actions, because it was made salient to them by the demonstrator. This could mean that the infants' preference for simply putting the mouse in the house in this condition could be due to stimulus enhancement. Second, infants in the 'house' condition could have been emulating, in that they focused on the end result of the actions without any knowledge of the demonstrator's goal 'to put the mouse in the house.' In this way, the infants would be learning that the mouse can go in the house and used their own strategy to attain this end result.

Similarly, Bekkering, Wohschlager, and Gattis (2000) found that 3- to 6-year-old children differentially copied an adult's specific actions based upon the presence or absence of an end-goal. Specifically, in a condition in which children were shown a model reaching and covering a dot on a table with their contralateral hand, children tended to cover the dot, but with their ipsilateral hand. In a condition in which there was no dot on the table, children tended to copy the actions with greater fidelity and use their contralateral hand, like the model. These findings were taken to show that when an end-goal is present (the dot on the table), children tend to view the specific actions used as irrelevant as long as the goal is achieved, the goal being most salient in these conditions. When there is no clear end-goal present, children will interpret the actions as the only goal and copy the actions more reliably. Bekkering et al. (2000) contend that children imitate based on a hierarchy of goals. This entails that some goal information is more dominant and more likely to be imitated. Byrne and Russon (1998) proposed a similar process in which attention to goal hierarchies delineates program level from action level imitation. Similarly, Williamson and Markman (2006) found that 3-year-old children base their imitation of an action sequence on their interpretation of purpose of the actions. When an action sequence has no clear purpose, children are more likely to copy what they have seen precisely. The authors propose that high fidelity imitation is useful when the reason for carrying out an action sequence is unclear because they have a greater chance of copying the intended actions.

Whereas these studies demonstrate that children can copy based on goal hierarchies, as Gergely and colleagues (Csibra & Gergely, 2009; Gergely & Csibra, 2006; Gergely, Egyed, & Kiraly, 2007) note, much of human culture consists of cognitively opaque practices, tools, etc. Therefore, there must also be a mechanism that allows for imitation that is not reliant on the identification of goals based on an

inference of intentions. Gergely, Csibra and colleagues (Csibra & Gergely, 2009; Gergely & Csibra, 2003; Gergely et al., 2007) have proposed the model of “natural pedagogy” as an alternative to “mindreading,” or “mentalist,” accounts (Csibra & Gergely, 2009). These authors have previously proposed that infants likely do not yet utilize “the complex metarepresentational structures needed to represent intentional mind states” (Gergely & Csibra, 2003). Rather, infants operate from a “teleological stance” in which a reality-based action interpretation system is employed to explain and predict goal-oriented actions. From studies relating to imitation, joint attention and violation-of-expectation looking time, they conclude that infants can determine actions to be goal-directed, can evaluate constraints on the means of reaching the goal and also expect agents to use the most effective or rational means to reach the goal (Gergely & Csibra, 2003). Essentially, Gergely and Csibra (2003) are proposing that the teleological stance, being reliant on a principle of rational action, could be the precursor to the ability to represent others’ mental states, and propose that infants ‘apply the same inferential principle of rational action that drives everyday mentalistic reasoning about intentional actions in adults, even though they may not yet be able to represent and attribute intentional mental states to other minds’ (p. 291).

From this, Gergely et al. (2007) have proposed that in order to transfer cultural knowledge, there must be a ‘human-specific social learning system’ (p. 139), which they term ‘natural pedagogy.’ This theory contends that, basically, infants and young children are alerted to learning contexts by ostensive cues that include eye contact, specifically addressing the child, contingent reactivity, motherese, etc. (Gergely et al., 2007). This cuing alerts children that some relevant and generalizable knowledge is going to be imparted to them. Csibra and Gergely (2009) state that ‘whenever [children] are directly targeted by ostensive demonstrations, their pattern of learning

changes fundamentally' (p. 148). This paradigm suggests that children will imitate only when they are ostensibly cued to do so, otherwise, they will emulate and use the most efficient means to reach a goal. Gergely and colleagues (Csibra & Gergely, 2009; Gergely & Csibra, 2006; Gergely et al., 2007) propose that imitation is sensitive to the communicative intent of a model, in that an observer is ready to receive relevant and generalizable information when cued to a learning context.

Children seek relevance in others' communication and, in this way, an observer determines which actions to selectively imitate based on what is cued as new and relevant within a specific context. This hypothesis is based on the cognitive principle of relevance, as proposed by Sperber and Wilson (1986), in which humans selectively attend to information that provides the most cognitive effects using the least amount of processing resources. If children expect to receive new and relevant information from a communicative context and this in some way determines what behaviors they choose to copy, it stands to reason that if they are given prior information regarding aspects of an action sequence, they should be less likely to copy those aspects they are made aware of and more likely to copy aspects that are new, and therefore relevant to them. To determine if pedagogic cues indicate a pedagogic, communicative intent to present new and relevant information affects the selective imitation of young children, Southgate, Chevallier and Csibra (2009) used the same paradigm as Carpenter et al. (2005) (in which it was hypothesized that children's selective imitation was based on goal identification, i.e. when an end-goal is present children will copy the goal and ignore the actions and when there is no end-goal children will interpret the action style as the only goal).

Southgate et al. (2009) included three conditions to test their hypothesis. In the 'ostensive prior information' condition, children were shown one of the toy animals

and then told and shown that the toy animal could go into the house. After this information was imparted, the children were then told that they were going to see what the animal does and then shown the animal either sliding or hopping into the house. In the ‘no prior information’ condition, the demonstrator brought out the toy and talked about it, but did not place it in the house. Then, the demonstrator announced she was going to show what the animal does and either showed the mouse hopping or sliding into the house. The child was then given their turn. Southgate et al. (2009) also included a condition in which the child was allowed to discover on their own that the toy animal could go into the house, the “non-ostensive prior information” condition. This condition was included to determine if children’s relevance seeking was due to the communicative intent of the demonstrator or to the cognitive effects of new information (Southgate et al., 2009).

Children in the ostensive prior information condition were much more likely to match the style of the action (hopping or sliding) than children in the no prior information condition. In the no prior information condition, the results of Carpenter et al. (2005) were replicated in that children preferentially placed the toy in the house and failed to copy the action style used to do so. As Southgate et al. (2009) note, when there is no communication telling a child to do otherwise, children will copy action at the hierarchically highest level. Further, the performance of the children in the non-ostensive prior information condition was comparable to that of children in the no prior information condition, indicating that ostensive communication is important in modulating what elements of an action sequence children will copy (Southgate et al., 2009). Interestingly, it was found that action style and outcome were equally copied by children in the ostensive prior information condition, suggesting that the outcome of an action sequence is still salient to children in choosing what to copy. Some combination

of sensitivity to communicative intent and sensitivity to outcomes likely play a significant role in the selective imitation of young children. Southgate et al. (2009) note that the expectation of relevance could explain the results of studies documenting the phenomenon of over-imitation (Horner & Whiten, 2005; Lyons, Young, & Keil, 2007) in that the unknown and unexpected aspects of these studies would make this information maximally relevant to children. In the following subsection I will discuss findings related to over-imitation in children's instrumental learning.

2.1.2. Over-imitation

Whiten and colleagues (Whiten & Ham, 1992; Whiten, Horner, Litchfield, & Marshall-Pescini, 2004) have termed the phenomenon of copying the end-state, or goal at the top of the hierarchy, 'goal emulation.' Goal emulation involves an observer seeking to replicate a model's goal, while not necessarily using the same means to attain the goal. These authors contend that imitation, end-state emulation (including both result and goal emulation), and object movement re-enactment (OMR) constitute forms of copying the behaviors of others. Imitation is defined as copying the form of an action. Object movement re-enactment involves an observer attending to and copying what an object does, or what is done with an object. End-state emulation includes emulation of results and goals. In regard to the difference between emulating results and emulating goals, for Whiten et al. (2004) 'the question is whether the emulator is interpreting the end-state as a goal or, otherwise, just as an observable outcome of interest' (p. 41). Whiten et al. (2004) view various social mechanisms as constituting a continuum of copying behaviors that may be employed depending on the demands and context of a task or situation with varying degrees of fidelity being produced depending on which strategy is used.

Horner and Whiten (2005) contend that when an observer emulates they must understand and work out the causal links involved in a behavioral sequence in order to attain the same results as the model using individual means. When using an imitative strategy, however, the observer need only reproduce the model's actions closely enough to replicate the results, without needing to fully appreciate the causal links involved. This would be a good strategy to employ when the causal links of an action sequence are difficult to discern, and possibly when there is no apparent end-goal, or result, to achieve. This led Horner and Whiten (2005) to carry out a series of experiments in which the availability of causal knowledge was manipulated across conditions to assess the strategies children and chimpanzees use in re-enacting demonstrated actions. Children and chimpanzees were shown a demonstration of how to use a tool to retrieve a reward from a puzzle-box. The action sequence demonstrated both causally relevant and irrelevant actions in retrieving a reward from inside the box. In one condition, the subjects were shown the demonstration on a transparent puzzle-box, in which it was clearly visible which actions were relevant and which were irrelevant in retrieving the reward. In the second condition, the subjects were shown the same actions on an opaque puzzle-box, in which it was not clear which actions were necessary to retrieve the reward (Horner & Whiten, 2005). It was found that chimpanzees were more likely to discard the irrelevant action in the clear condition and were more likely to use the irrelevant actions in the opaque condition. The authors concluded that chimpanzees are likely to employ an emulative strategy when causal knowledge is available and an imitative strategy when causal knowledge is absent or ambiguous.

Importantly, children were found to reproduce both causally relevant and irrelevant actions with a high degree of fidelity in both the transparent and opaque

conditions (Horner & Whiten, 2005), demonstrating what has come to be termed ‘over-imitation’ (McGuigan, Whiten, Flynn & Horner, 2007; Lyons et al., 2007), or ‘over-copying’ (Whiten, McGuigan, Marshall-Pescini, & Hopper, 2009). The authors interpret these findings as indicating that children are likely to imitate regardless of their knowledge of the causal relations involved in a problem-solving task. Further, the authors conclude that the results may be due to children’s selective attention to the actions, and therefore intentions and goals, of the demonstrator (Horner & Whiten, 2005).

Essentially, the children may have carried out all of the demonstrator’s actions, even if they were aware that some of the actions were causally irrelevant, because they viewed the demonstrator’s actions as purposeful (Horner & Whiten, 2005). The findings of this study highlight critical questions for research on the social learning mechanisms employed by young children: What factors influence whether or not children will copy the actions of a model with a high degree of fidelity? Under what circumstances will children be more selective in their behavioral re-enactment? For example, seemingly ignoring accidental actions in the Carpenter et al. (1998) study. Further, what cues do children use to determine when to faithfully copy? The current research suggests that knowledge of the causal relationships involved in a problem-solving task does not detract from the fidelity of copying in young children’s matching behavior. It may well be that 3- to 4-year old children are developing an understanding of intentionality and basing their re-enactment upon this understanding. It would have enriched the study to ask the children if they had noticed the irrelevant actions as irrelevant, and if so, why they had re-enacted them if they knew they were not necessary to retrieve the reward.

In a follow-up study, McGuigan et al. (2007) found that after live demonstrations, three- and five-year-old children imitated irrelevant actions in reaching a goal regardless of the availability of causal information. Interestingly, when information was degraded in a video presentation (only hands were visible), three-year-olds, but not five-year-olds employed a more emulative approach and omitted the irrelevant actions. Further, it was found that the five-year-olds copied even the irrelevant actions with the highest level of fidelity, suggesting that imitateness increases with age (a finding similar to Lyons et al. (2007) study of over-imitation, to be subsequently discussed). As the authors note, it could be argued that as children get older and are more aware of causal relationships they may view the obviously irrelevant actions of a model as intentional, and replicate accordingly. The authors claim, however, that the video presentation probably rules this explanation out, in that even though the children only viewed hand manipulations, they still copied with a high degree of fidelity. McGuigan et al. (2007) suggest that imitation may ‘be such an adaptive human strategy that it may often be employed at the expense of task efficiency’ (p. 353).

Subsequently, Lyons et al. (2007) asserted that the domain of tools and cultural artifacts presents humans with the unique challenge of learning about causally opaque systems. They hypothesized that when an individual is presented with a causally opaque task/artifact, the individual will over-imitate and persistently reproduce a model’s obviously irrelevant actions due to automatic causal encoding of all of the model’s actions as causally meaningful. This ‘automatic causal encoding’ is based upon an understanding that a model is intentional and purposeful in their actions.

Lyons et al. (2007) tested the automatic causal encoding hypothesis with 3- to 5-year old children who were first given an initial training phase in which they viewed

a demonstrator acting on objects using relevant and irrelevant actions to retrieve a toy from inside the objects. The children were then asked to identify which actions were necessary, and which were unnecessary, in retrieving the toy. If the children correctly identified which actions were necessary and which unnecessary, they were praised, and corrected if they answered incorrectly (Lyons et al., 2007). This training phase was used to make the distinction between relevant and irrelevant actions highly salient to the children. After the training phase, children were shown a demonstration of how to operate novel, transparent ‘puzzle objects’ to retrieve a toy (Lyons et al., 2007). The demonstrations included both relevant and irrelevant actions to open the puzzle objects. Despite the countervailing task demands presented by the training phase, children over-imitated to a large degree (Lyons et al., 2007).

The authors conclude that ‘children are frequently unable to avoid reproducing the adult’s irrelevant actions because they have already incorporated them into their representation of the target object’s causal structure’ (Lyons et al., 2007, p. 19756). Further, children tended to imitate at the level of physical state transformations, which included irrelevant actions, but would still show ‘localized imitative selectivity’ in that they tended to ‘optimize the means’ by which the transformations were achieved (Lyons et al., 2007). For example, in one instance, removing a bolt was causally irrelevant to opening the object. In this case, children copied the transformation of removing the bolt, but tended to pull it out rather than push it out, regardless of the style of the removal observed (push or pull) because it was an easier method of removal. From this, Lyons et al. (2007) contend that ‘insofar as participants are demonstrably imitating in a rational framework (i.e., omitting unnecessary stylistic components of the display), we can have greater confidence that the actions that they *are* copying are construed as causally significant’ (p. 19753).

The findings of Lyons et al. (2007) make a strong case that children may be learning, through imitation, about physical causality and perhaps automatically encoding adults' actions on objects as causally meaningful. The finding that children may be encoding actions at the level of state transformations is interesting and seems to support the idea that encoding and re-enacting object movement is an important aspect of imitative learning, perhaps more so than bodily movements when objects are present (Huang & Charman, 2005; Whiten et al., 2004). Whiten et al. (2009) note that under some authors' definitions, what Lyons et al. (2007) documented was actually 'over-emulation.' While the findings of Lyons et al. (2007) are compelling, it remains difficult to assert with confidence that the only reason children are over-imitating is because they are automatically encoding the model's actions as causally relevant. First, the objects used in the training phase were strikingly different from the objects used in the test phases. The objects used in the training phase were objects children may come into contact with in the daily lives, including a mason jar and a feather. This may have made it very easy for children to determine which actions were causally irrelevant and which were not. In the test phases, however, children were presented with fairly complex, completely novel puzzle objects. In this case, children were likely much less familiar with the causal properties of these complex objects. This may have made it more difficult for children to determine which actions were causally relevant and which were necessary in achieving the goal.

These findings could also be argued to support the role of goal hierarchies in imitation. The irrelevant actions may have caused children to attend to and copy sub-goals along with the final goal of retrieving the toy. These results could also be interpreted as demonstrating that children will copy previously unknown and unexpected aspects of these studies because this information is maximally relevant to

children. It is also important to consider the role that normative learning may play in over-imitation. Children of this age are adept at learning arbitrary rules in the context of games (Rakoczy, Warneken, & Tomasello, 2008, 2009). Children as young as 2 years of age also display functional fixedness in which, after learning how a novel object operates, only use that object in that way and expect others to do the same (Casler & Keleman, 2005). It could be that in the Lyons et al. (2007) studies, after viewing an adult demonstrate how to operate the novel puzzle objects, children encoded the actions as the ‘right,’ or ‘proper,’ way of using them regardless of the objects’ causal properties.

Subsequently, Lyons (2009) proposed that over-imitation is actually a ‘rational’ strategy to engage in when causal knowledge is not available. Over-imitation is said to lie at one end of a rational continuum of imitation with ‘selective’ imitation at the other end (Lyons 2009). Based on previous findings (Carpenter et al., 1998; Carpenter et al., 2005; Gergely et al., 2002; Meltzoff, 1995), Lyons (2009) contends that selective imitation is characterized by an observer utilizing social and physical cues to determine when, in an observed action hierarchy, to switch from an imitative strategy to an emulative strategy by making a rational appraisal of which actions should be faithfully copied and which can be ignored. Similar to Bekkering et al. (2000), Lyons’s (2009) description involves an observer attending to a behavior hierarchy in which a variety of sub-goals exist. Based upon prior knowledge and an understanding of the intentions of and constraints on a model, an observer decides what actions, sub-goals, and/or end-goal should be imitated and effectively ignores idiosyncrasies and behaviors that are not causally related to the perceived intentions of the model.

Lyons (2009) claims that over-imitation is employed in tasks where the causal opacity of actions makes it difficult to discern which actions are effective in bringing

about a result, such as recursive tool use involving lack of knowledge of the model's ultimate goal (Lyons et al. 2007), making it difficult to ascertain where to 'switch' to an emulative strategy. From this, Lyons (2009) proposes that over-imitation is likely confined to the domain of tools and artifacts and is a means of learning how to use novel objects. Similar to other authors, Lyons (2009) also views copying another's behavior as a cognitively sophisticated process involving intention-reading and complex evaluations of context and task demands. In this way both over-imitation and selective imitation involves an assessment not just of what the model was attempting to accomplish, but also constraints on the model's behavior, as well as the observer's prior knowledge and the presence or absence of physical-causal end goals.

2.1.3. Limitations of the literature on social learning

The previous arguments relating to over-imitation, and the nature of over-imitation, contrasted with 'selective' imitation, present the reader with a picture of social learning that is driven by the acquisition of instrumental skills and the search for causal connections that may or may not be motivated by social expectations. This view of children's social learning has a number of drawbacks and disregard for the fundamentally *social* nature of copying another's actions, other domains in which over-imitation is likely a useful learning strategy, and the likely automaticity involved. Based on the review of research on children's social learning, it is clear that there has been an emphasis on how children engage causal reasoning when copying. This is understandable because how children understand causal relationships is integral to understanding how children learn instrumental skills involving problem-solving and tool use. This focus on causal reasoning, however, has led to a neglect of how copying supports learning purely social behaviors.

The focus on instrumental learning in the social learning literature can be seen in the type of stimuli these studies use - puzzle boxes. Due to their overtly mechanistic structure, puzzle boxes may prime a search for physical-causal rationales underlying an action sequence and an instrumental interpretation of the actions. Even researchers who emphasize the normative and social basis of over-imitation (Kenward, Karlsson, & Persson, 2011; Over & Carpenter, 2012) utilize instrumental tasks within their research. This leaves out a class of actions – social conventions involving ritualistic behavior - that are not based in physical-causal rationales. Legare et al. (under review) have recently argued that much cultural learning in human societies is motivated by affiliative goals that guide the acquisition of conventional, ritualistic behavior rather than instrumental behavior. Many of the rituals children need to learn to become competent members of their cultural community are irretrievably physically-causally opaque, involving the replication of behavior for which physical causal rationales are never provided and never sought.

To become culturally competent members of their communities, children must learn a variety of actions, rules, stipulations, etc. that often have very little to do with physical-causal reasoning. How children learn these crucial behaviors has mostly been studied from a more anthropological perspective. Rogoff (2003) has presented a view of child development that emphasizes the influence of participation in socio-cultural contexts. Importantly, this participation can take place both within and outside of explicit pedagogy and sometimes without even the conscious intention to learn. Rogoff (2003) presents the concept of ‘guided participation’ as a process in which children learn the practices and customs of their community both through instruction and through ‘distal arrangements’ in which there is no explicit instruction or even interaction (p. 284). Rogoff (2003) also sometimes refers to this as learning through

‘osmosis,’ in which a child picks up the behaviors and values of their community simply by being exposed to them on a daily basis. Gaskins and Paradise (2010) echo this point and contend that learning often occurs when there is no intention to teach and also when there is no intention to learn (p. 87). Strauss (1984) has similarly made a distinction between intentional and incidental learning.

In Western contexts, formal schooling is highly prized due to its function in preparing children for their roles within Western society. This is not the only, or even the most typical, form of preparation for adult life. In many cultures, children learn through observation of older peers and adults outside of explicitly pedagogical contexts (Rogoff, 2003). Indeed, children in Western contexts also engage in learning outside of pedagogical contexts through participation in everyday social activities. Observation of on-going adult activities clearly plays a central role in children’s learning of culturally relevant material, whether it be tool use or religious rituals. Rogoff (2003) contends that this is an active process of guided participation, but notes that often children learn simply by observing behavior and interaction. Arguably, this kind of learning is acquired more implicitly through a tendency to affiliate with one’s group.

Gaskins and Paradise (2010) propose that children learn culture via an open attentional stance involving an intrinsic motivation to learn through observation. This intrinsic motivation is primarily based in a desire to contribute to the activities of the community. The open attentional stance is promoted to differing extents depending on cultural context. The main point is that this attentional stance allows children to observe and process aspects of cultural activities without necessarily understanding, or needing to understand, exactly why something is done the way it is done (Gaskins & Paradise, 2010). This could be fundamental for children’s cultural learning because ‘the content to be learned is far broader than just physical skills and specific tasks; in fact all

kinds of knowledge can be acquired through observation, including language, social interaction behaviors, expressions of emotion, situational scripts, and even spiritual beliefs and other abstract knowledge' (Gaskins & Paradise, 2010, p. 107). Observation and copying are crucial for learning basic socially stipulated behavior. Young children often implicitly engage in the gestural, postural, and overt (yet opaque) actions of older children and adults. As Toren (2001) notes, children as young as 4-years-old can often be seen engaging in a culturally relevant 'politeness posture' from observing adults and linking the posture with particular situations and contexts.

Research coming from a primarily anthropological perspective has provided substantial documentation of children's abilities in acquiring the behaviors, conventions, attitudes, mannerisms, etc. of their culture. There has been little experimental research examining the psychological processes underpinning this acquisition. The following section examines literature that addresses how children acquire cultural conventions, as well as theoretical approaches that emphasize the normative and social motivations underlying copying. The following section will also present a novel theoretical perspective that develops a means of examining how children navigate social learning by proposing that children use physical, situational, and social cues to determine when actions are based in physical-causal reasoning and when actions are based in conventionality and social stipulation. These cues allow children to adopt a more or less instrumental stance or ritual stance which affects what children copy and the motivation underlying imitation. The following section will also present a view of imitation that is not necessarily reliant on intention reading and goal attribution, but is accomplished via more implicit processes of attention and motivation. These, often automatic, processes allow for imitation of actions without attempting a 'rational' assessment and are amplified by affiliative motivations.

2.2. The ritual stance: Learning convention via implicit social motivations and blind imitation

In this section I will first provide a reconfiguration of the mentalizing and goal attribution theories of imitation provided in the previous section. This account is proposed to allow for the imitation of action that is not based in reading intentions or even attributing goals. This kind of ‘blind’ imitation is thought to occur when children adopt a ritual stance resulting in high fidelity copying of action. This section details a plausible set of mechanisms to account for imitation before describing work related to the motivations underlying imitative performance. The current section goes on to detail the results of work designed to cue the ritual stance using physical cues (Legare et al., under review). The question that presents itself from this work regards the motivations underlying children’s high fidelity imitation of conventional, ritualistic behavior. This section proposes that the imitation of ritualistic behavior is grounded in affiliative motivations and goes on to describe work examining the affiliative nature of imitation in general. The section concludes with a proposal of how affiliative motivations influence learning conventional, ritualistic behavior and how this proposal differs from previous accounts of social learning.

Previous studies (Bekkering et al., 2000; Carpenter et al., 2005; Southgate et al., 2009; Williamson & Markman, 2006) have found that the presence or absence of a ‘goal’ in an action sequence affects what children imitate from the observed sequence. These studies view understanding goals as interpreting what a model was intending to achieve, which may or may not coincide with the actual end-result of a performed action sequence. Carpenter et al. (2005) contend that in the absence of an object-related goal, children will interpret the action style of the model as the only goal, increasing

copying fidelity over tasks that include an object-related goal, in which children are likely to ignore the action style and copy the underlying goal of the action sequence. This hypothesis is based on the idea of hierarchical processing of action, presented in the previous section, in which the goal of a sequence becomes most salient. This is echoed in the work of Williamson and Markman (2006), holding that if children know the reasoning behind actions they are less likely to replicate specific actions used than if they were given no explanation for an action sequence. Williamson and Markman (2006) frame their hypothesis in a potentially useful manner, suggesting that when children do not understand the function of actions they are more likely to replicate a model's actions precisely. Studies such as the ones described above, however, assume a constant and active search for causal meaning and goals inferred from intentions.

Most theories of children's imitation of instrumental actions (Horner & Whiten, 2005; Lyons, 2009; Tomasello et al., 2005) propose that imitation is accomplished via complex psychological processes involving things such as intention-reading, perspective-taking, and symbolic recoding. These processes involve recoding visual inputs into abstract representations that are then used to produce motor output (Heyes, *in press*). Whereas this research has demonstrated that intention reading likely plays a part in determining why an individual may imitate in a given situation, there is evidence that there is not a special relationship between imitation and intention reading (Leighton et al., 2007). The Associative Sequence Learning (ASL) model (Heyes, 2001, 2005, *in press*; Heyes & Ray, 2000) proposes that there is a direct connection between a visual and a motor representation of any given action (Heyes, *in press*). These connections constitute 'matching vertical associations' that do not involve the recoding of visual input into abstract representations before matching motor output can be generated. In this way, the ASL model allows for imitation that is often not

deliberate or ‘rational.’ For imitation of novel action sequences, there must also be ‘horizontal’ processes that encode the serial order of the sequence. These horizontal processes activate the matching vertical associations in the order that was observed (Heyes, in press).

2.2.1. Blind imitation associated with the ritual stance

The ASL model provides a plausible and parsimonious account of the mechanism of imitation that would support both mimicry of actions already in the behavioral repertoire and copying of novel action sequences, instrumental or conventional. The processes described in the ASL model ‘can occur without consciousness or an intention to learn, and doesn’t help the novice to make rational choices about what they should and should not imitate’ (Heyes, in press, p. 21). In this way, imitation is often ‘blind’ or ‘dumb’, which will often result in over-imitation. This kind of processing may be especially useful for the acquisition of behavior that is not based in a search for intentions toward a physical goal, such as socially stipulated, conventional behavior. The proposed concept of blind imitation does not require an understanding, or inference, of a model’s goal, and can support learning ways of behaving outside of instrumentality through implicit social motivations. As such, over-imitation is not confined to the domain of learning about novel artifacts and tools, as suggested by Lyons (2009), and is likely to support the learning of social conventions and norms, as well as practices involving predominantly communicative/gestural elements (Heyes, in press). Further, this concept of blind over-imitation ‘is especially likely to allow culturally accumulated wisdom to be propagated across generations of learners’ (Heyes, in press, p. 22).

Heyes and colleagues (Huang et al., 2002) have offered an alternative account of what has been called ‘intention-reading’ (Leighton, Bird, & Heyes, 2010) and ‘intention-sensitive imitation’ (Heyes & Ray, 2002) accounts of Meltzoff (1995) and Bellagamba and Tomasello (1999), demonstrating that the results of these studies could just as likely be due to affordance learning, or possibly stimulus enhancement. Heyes (2001) holds that researchers who propose a dichotomy between mimicry and imitation, such as Tomasello (1990, 1996, 1998) conflate a model’s intention and the observable outcome of the model’s actions as goals. Heyes and colleagues (Bird, Brindley, Leighton, & Heyes, 2007; Leighton et al., 2010) have presented evidence in support of the argument that copying is not reliant on the coding of goals, either as physical end-states (Bird et al., 2007) or as mental states or intentions (Leighton et al., 2010).

In response to studies that have found evidence supporting a goal-centered hypothesis of copying performance using the pen and cups task (Aviakenen, Wohlschlager, Liuhanen, Hanninen, & Hari, 2003; Wohlschlager & Bekkering, 2002), Bird et al. (2007) postulated that perhaps the end-state (pen in cup) was the most accurately copied aspect due to the ease of discriminability afforded by differentially colored cups. Therefore, Bird et al. (2007) conducted experiments in which different aspects of the action sequence were differentially colored, the cups or the hands. The colored component was always the most reliably copied regardless of where it appeared in the sequence (color minimum error pattern) (Bird et al., 2007). Some authors may argue that due to the differential coloring of the different features of the action sequence, different elements of the action hierarchy were coded as goals based on the intention behind what the model was demonstrating.

Leighton et al. (2010) addressed this interpretation of goals as mental states based on an inference of intention by employing the pen-and-cups test in a naturalistic version, akin to that used in Bird et al. (2007), and a geometric version in which participants viewed geometric shapes carrying out the same form of actions. There were two conditions in each version, one demonstration with cups differentially colored and one with hands differentially colored. If participants are inferring intentions and goals, the color minimum error pattern should be found in the naturalistic condition, but not in the geometric condition. The results of this experiment show that the color minimum error pattern emerges in both the naturalistic and geometric conditions (Leighton et al., 2010). The authors note that moving geometric shapes may still afford the attribution of intentions. So, in a second experiment, static geometric shapes were used as well as a condition using verbal responses. A color minimum error pattern was found in both conditions (Leighton et al., 2010). Based on these findings, it is hard to say that an understanding of intentions, goals (as mental states, or physical end-states) mediate the replication of behavior. The authors note that this is not to say that imitation is not influenced by an understanding of intentions and goals, possibly especially in learning novel actions, simply that copying the behavior of another is not based in and defined by this understanding. As Leighton et al. (2010) state, there is little evidence for a ‘special relationship’ between goals and imitation (p. 432).

Heyes (2001) distinguishes ‘imitation’ from ‘emulation’ as involving the copying of body movements and copying of object movements, respectively. Heyes (2001) describes emulation as involving the copying of object movements, similar to Whiten et al.’s (2004) description of OMR. In contrast to Whiten et al.’s (2004) contention that OMR may be involved in both imitation and emulation, Heyes (2001) has stated that the attention to object movements versus attention to body movements

may delineate emulation from imitation. On the surface, this seems similar to Tomasello's distinction between imitation and emulation learning in which an observer attends to the behavior of another when imitating, and changes of state and object affordances when emulating. As Whiten et al. (2009) note, under Tomasello's definitions, imitation is also essentially classified as 'bodily imitation' (p. 2418). Whiten et al. (2009) contend that defining imitation as based on body movements is restrictive and assert that it is as yet unclear what individuals are attending to when copying actions involving an object. The utility of distinguishing imitation as based on body movements and emulation as based on object movements is made apparent when considering 'what' is copied as distinct from 'how much' is copied (Heyes, in press).

Heyes (in press) argues that distinctions between 'what' is copied and 'how much' is copied are often confounded, resulting in the term imitation referring to an individual copying body movements, including an end-state, and emulation as copying the end-state of a sequence of object movements. When the 'what' and 'how much' of an action sequence is copied are teased apart, four possibilities emerge: 'endpoint imitation – copying the endpoint of a sequence of body movements; endpoint emulation – copying the endpoint of a sequence of object movements; sequence imitation – copying a sequence of body movements; and sequence emulation – copying a sequence of object movements' (Heyes, in press, p. 18). McGuigan and Whiten (2009) have recently proposed a similar distinction, viewing copying performance as a continuum containing end-state emulation, moving to object movement reenactment (akin to the proposal of sequence emulation), with the extreme end of the continuum involving copying body movements. The main argument in the majority of the social learning literature is that imitation affords the highest level of copying fidelity, which is required for the transmission of instrumental behavior and cultural evolution. What is

required for high fidelity transmission of behavior, however, is sequence copying, over end-state copying and a combination of sequence imitation and sequence emulation is likely to result in the highest copying fidelity (Heyes, in press). What may be most essential for high fidelity copying, however, is what Heyes (in press) calls ‘dumb,’ or what this text terms ‘blind,’ imitation that does not necessarily require a representation of intentions toward a physical-causal goal.

The concept of ‘blind imitation’ presented here differs from that of Want and Harris’s (2002) distinction between ‘blind’ imitation and ‘insightful’ imitation. Want and Harris (2002) defined ‘blind imitation’ as copying the form and goal of a behavioral sequence while not understanding or learning the affordances of objects used or the causal connections between actions and the goal of the sequence. When an observer can be said to understand this connection between actions and goals, and the affordances of objects, insightful imitation may be occurring. Even if children understand the causal relations of an action sequence, it does not necessarily mean that they are not learning something, similar to what Over & Carpenter (2012) have recently proposed, children may be learning how to behave in a given situation/task, or social conventions. Much of what children need to learn is not based in physical-causal rationales. It does not always matter if children understand physical-causal relations because this is not necessarily the pinnacle of social learning. Blind copying that does not necessarily involve knowledge of an actor’s goal supports the acquisition of fundamentally social knowledge. Children likely acquire this knowledge in a relatively automatic way, outside ‘rational’ calculation. Copying need not be a complex process involving reading intentions and calculating efficiency as Lyons (2009) has suggested, even though these processes may be involved in some instances. In this text, blind imitation is used to refer to copying that involves attention to the outcome of an action

sequence, if one is present, but not necessarily the intended goal of a model. Blind imitation of this kind is especially likely to support the transmission of behavior not grounded in physical-causal reasoning that often involves no clear, discernible end-state. In this way, when a child is in a context where physical-causal connections are absent and instrumental learning is not cued, the child may interpret actions from a different stance, the ritual stance.

Legare et al. (under review) have recently provided evidence that, when children are presented with an action sequence that has no clear end-state (end-state as opposed to end-goal, as children may not be interpreting end-states as a model's intentional goal), or physical causal rationale, copying rigidity is increased. Children were either presented with a video demonstration of an action sequence that contains a distinct end-state that is different from the start-state (instrumental condition), or a video demonstration of an action sequence in which the start and end-states are equivalent (ritual condition). Both of the action sequences used in the study were causally opaque. The presence of an end-state that was different from the start-state in the instrumental condition, however, cued the children to the possibility of a potentially knowable causal structure (instrumental stance). In the instrumental condition, while imitative fidelity was still high, there was more behavioral variability and innovative actions. The start- and end-state equivalency of the ritual condition biased the children's interpretation of the action sequence towards viewing the sequence as irretrievably causally opaque (ritual stance). Within the ritual condition, imitative fidelity was significantly higher than in the instrumental condition ($p < .05$) and behavioral variability and innovation was significantly decreased ($p < .05$).

Legare et al. (under review) propose that children use cues, such as the presence or absence of end-states, to navigate cultural learning and the determination of when

something is based in instrumentality and physical causal reasoning, and when something is based in affiliation and social convention. Therefore, ‘over-imitation’ may not even be an appropriate term for imitation of social convention, in which strict adherence is typically expected and observed. When in a context in which physical-causal goals are absent, children may be more likely to interpret actions as socially stipulated behavior. Children may adopt a ritual stance, based more in social rather than physical-causal outcomes and engage in imitation in a more automatic manner. This is not to say that children do not seek and base their copying on both social and physical-causal cues, simply that in some contexts one may take more precedence than the other. The question then becomes: If copying another’s actions is not solely reliant on understanding intentions toward a physical-causal goal and can often be accomplished in a ‘blind’ manner, what cues *motivate* children to engage in copying behavior in these contexts?

2.2.2. Social motivations underlying high fidelity imitation

Horner and Whiten (2005) have suggested that imitation may be such an adaptive strategy for humans that it is employed at the expense of efficiency in achieving an instrumental goal (Horner & Whiten, 2005; Whiten et al., 1996), a proposition echoed in subsequent work (McGuigan et al., 2007; McGuigan & Whiten, 2009; Whiten et al., 2009). This means that children are in some way reading the underlying social and task demands associated with the contexts of imitation. Essentially, because children infer that the model’s actions were intentional, they assume that they are supposed to be reproduced. Whiten and colleagues (Horner & Whiten, 2005; McGuigan et al., 2007; McGuigan & Whiten, 2009; Whiten, Horner, & Marshall-Pescini, 2005; Whiten et al., 1996; Whiten et al., 2009) propose a ‘copy all,

refine later strategy in which it is most beneficial for a child to copy all of the purposeful elements of an observed action sequence and then, over subsequent experiences with the behavior, to weed out any irrelevant elements. They propose that because human children have such a long childhood, as compared to other primates, there are plenty of learning opportunities that allow for the refining process. Other theorists have also suggested that imitation is socially driven in that children wish to engage in social interaction with the model (Nielsen, 2006; Over & Carpenter, 2012; Uzgiris, 1981). More than 30 years ago, Uzgiris (1981) proposed that imitation served two functions: (1) it allows children to learn tasks, and (2) it provides a means of shared mutuality. Nielsen (2006) similarly argues that imitation serves dual functions, for learning and for social interaction. Nielsen (2006) proposes that children younger than 2 years likely imitate as a means of learning about events, but that after 2 years, children engage in imitation as means of generating shared experiences.

Authors who criticize the view of imitation as socially driven (Lyons, 2009; Lyons et al., 2007; Want & Harris, 2002) contend that there is a distinction between imitation as a learning mechanism and imitation as a means of interaction with another person. Want and Harris (2002) state that ‘what we might have witnessed in reviewing the literature on social learning is a confound between imitation as a learning mechanism and imitation as a means of socially engaging with another person’ (p. 10). The authors posit that children may imitate actions for which they already have an understanding of their effectiveness due to a desire to engage with the model, in which case they are not imitatively learning. Want and Harris (2002) term this ‘social’ imitation and contrast it with their conception of ‘genuine’ or ‘blind’ imitation, in which children have not previously understood why the observed actions are effective. Similarly, Lyons et al. (2007) and Lyons (2009) hold that other explanations of over-

imitative behavior, such as over-imitation as a means of engaging with a demonstrator (Nielsen, 2006; Tomasello, Carpenter, Call, Behne & Moll, 2005; Uzgiris, 1981), or that children infer from a situation that they are supposed to imitate (Horner & Whiten, 2005), or that children imitate out of habit (McGuigan et al., 2007), are not sufficient to explain the phenomenon of over-imitation and that theories that propose social motivations for over-imitation regard the phenomenon as theoretically insignificant or a byproduct of the utility of copying for humans (e.g. McGuigan et al., 2007; Whiten et al., 2009; Lyons, 2009; Lyons et al., 2007).

Over and Carpenter (2012) have recently proposed that the findings with regard to selective versus over-imitation are due to a disregard for the fundamentally social nature of imitation. These authors propose that social pressures within an imitative context, children's identification with the model, and the child's own learning goals all influence flexible engagement in imitation. Over and Carpenter (2012) highlight the importance of imitation for learning not only about the physical world, but also about the social world, similar to the work presented in this thesis. A proposal of this thesis is that children can engage in imitation both as a means of learning and as a means of social engagement within the same context. Whereas social motivations likely play a role in children's imitation of instrumental skills, socially motivated imitation may be essential to learning the social conventions of one's group. Many of the proposed 'social' motivations for high fidelity imitation, such as 'habit,' in which imitation is viewed as so highly adaptive for humans it is sometimes employed at the expense of efficiency (Horner & Whiten, 2005; McGuigan, et al., 2007; McGuigan & Whiten, 2009; Whiten et al., 1996), or that children infer from the purposeful and intentional nature of a model's demonstration that they are supposed to copy (Horner & Whiten, 2005) are underspecified and cannot account on their own for why children engage in

high fidelity imitation as they get older much less how imitation may contribute to the transmission of cultural material, instrumental or conventional.

High fidelity imitation is plausibly driven by social motivations, more specifically a propensity to engage in affiliative interaction with group members. Humans have relied on group living for survival throughout evolutionary history (Brewer, 2007; Buss & Kenrick, 1998) and engage in unique forms of collaborative interactions that require a motivation to maintain affiliation and good standing within a group. This idea is distinct from other theories regarding the motivation involved in imitating another's behavior in that it can be achieved in a rather automatic way, often without deriving inferences from intentions, although intention reading likely plays a role in many contexts. As previously suggested, this kind of imitation is likely employed in regards to actions that are not based in physical-causal rationales, as in many forms of conventional, ritualistic behavior. An example of one of the non-conscious, more automatic, means through which humans foster and maintain affiliative interactions is motor mimicry. The need to be included within one's group has favored individuals who engage in affiliative behaviors, such as motor mimicry, as a means of promoting inclusiveness (Chartrand & Bargh, 1999; Lakin & Chartrand, 2003; Lakin, Chartrand, & Arkin, 2008), these findings will be discussed in the subsequent subsection.

2.2.2.1. Affiliative mimicry

It has long been suggested, and much research has shown, that people unintentionally mimic the actions of others (see Lakin, Jefferis, Cheng, & Chartrand, 2003 for a review), sometimes termed behavioral matching. Experimental evidence has shown that individuals will mimic complete strangers. Chartrand and Bargh (1999)

assigned participants to one of two conditions; both involving interaction with two partners (actually confederates). In one condition, participants first interacted with a person who shook their foot and then a person who rubbed their face, in a systematic yet non-obvious manner. This order was reversed for the other condition. It was found that participants increased their foot-shaking when interacting with a person who was doing so, and increased face-rubbing when interacting with a person who rubbed their face. When subsequently asked, participants reported that they did not notice the actions of their interaction partners, demonstrating that the behavioral mimicry occurred automatically and was un-intentional and non-conscious (Chartrand & Bargh, 1999). The authors termed this phenomenon the ‘chameleon effect’ and proposed that the mechanism underlying the effect is a direct perception-behavior link, holding that simply viewing another’s behavior makes it more likely that one will carry out the same behavior oneself (Chartrand & Bargh, 1999).

Chartrand and Bargh (1999) further explored the possible adaptive value of the chameleon effect and found that behavioral mimicry increased liking between interaction partners. Specifically, participants who had been mimicked by a confederate, as compared to those in a control condition, reported liking their interaction partner more and perceived the interaction to have gone more smoothly (Chartrand & Bargh, 1999). Also, when given the conscious or non-conscious goal to affiliate, participants displayed increased automatic behavioral mimicry (Lakin et al., 2003). The researchers assigned participants to one of three conditions, including a conscious goal to affiliate, a non-conscious goal to affiliate, and no affiliation goal. In the non-conscious affiliation goal condition, participants were primed with affiliation related words such as, ‘friend’ and ‘together.’ The participants in the conscious affiliation goal and no affiliation goal were primed with neutral words. Following the

priming, participants were told that they were going to complete a task in which they should remember the behaviors of an individual they viewed in a video carrying out clerical tasks. Participants in the conscious affiliation goal condition were then told that they would be interacting with the individual in the video in a cooperative task in which it was very important to work well together. Participants in the non-conscious and conscious affiliation goal conditions touched their faces significantly more than those in the no affiliation goal condition. The two affiliation goal conditions did not differ significantly from each other in terms of automatic behavioral mimicry. This research demonstrates that the activation of an affiliative goal can increase automatic behavioral mimicry as a means of addressing this goal and that both can occur non-consciously. Recent (Fawcett & Liskowski, 2012) research has found that infants as young as 18-months-old are more likely to invite an adult to play after they had been mimicked as well as after the infants had mimicked an adult. The authors found that the effect of mimicry was specific to interactions involving play and suggest that, similar to findings with adults, infants use mimicry to connect to others socially (Fawcett & Liskowski, 2012). These findings demonstrate that the social basis of copying another's actions develops early in ontogeny.

From the findings reviewed above, and similar findings, Lakin et al. (2003) asked: What purpose does automatic behavioral mimicry serve? Automatic mimicry has clear adaptive value, most obviously for coordination and communication purposes (Lakin et al., 2003). As group living became increasingly important for survival and reproduction, social abilities such as coordinating action and communication developed. Automatic mimicry would facilitate these social abilities by allowing vital information to be transmitted between group members. Lakin et al. (2003) state, 'selection pressure on "social survival" was therefore likely to have intensified over the

course of evolution, and automatic mimicry may now serve to help us survive in our social world' (pp. 149-150). These processes could contribute to the need to belong and affiliate with others. Automatic mimicry has come to promote bonding and may serve as 'social glue' (Lakin et al., 2003).

2.2.3. Concluding remarks about the ritual stance and affiliative motivations

Similar to the above findings and arguments, Heyes (in press) holds that automatic mimicry's promotion of affiliation, and vice versa, results in a 'virtuous circle' of automatic mimicry and prosocial attitudes that contributes to cooperation among group members. Heyes (in press) posits that contingency detection and disinhibition could plausibly account for the relationship between automatic mimicry and affiliation. Contingency detection allows for the ability to detect when another's movement co-varies with one's own. Heyes (in press) proposes that motivation to affiliate promotes mimicry by 'switching off' complex inhibitory processes and disinhibition allows for the activation of motor representations via matching vertical associations. 'When we are cooperatively motivated, imitative tendencies, which are normally suppressed, are allowed to "get out" and influence observable behavior' (Heyes, in press, p. 16).

Following Heyes (in press), automatic mimicry and overt, controlled copying, are likely reliant on the same processes and under some circumstances and cues, automatic mimicry, as an affiliative response, may in some way facilitate overt copying of action sequences. Through the generation of an affiliative response, processes of automatic mimicry are disinhibited and when this occurs in the context of observation of a novel sequence of actions, subsequent copying of the observed actions is aided by

automatic mimicry. Said another way, because novel action sequences are composed of more ‘primitive’ motions already in the behavioral repertoire (Heyes, 2005), an individual learning through copying may be aided by the disinhibition of automatic mimicry. Further, automatic mimicry, involving copying mannerisms (body movements) when combined with actions on objects, if included, may result in greater attention to, or recall of, body movements in relation to object movements, which may afford an especially high level of imitative fidelity.

This presents a different picture of the transmission of cultural behavior than has previously been proposed. Tomasello et al. (2005) have proposed that beyond reading the intentions of a model towards achieving a goal there must also exist a desire to share the psychological states of others for human forms of cultural cognition and evolution to exist. The authors further propose that cultural norms and conventions arise out of ‘dialogic cognitive representations’ of social interactions that support collaborative activities. Such relatively complex processes like intention-reading and dialogic representations of social engagement are likely not necessary for learning and internalizing social norms and conventions. Whereas a desire to share psychological states could contribute to the unique nature of human social cognition, a more parsimonious account may involve a basic motivation to affiliate associated with the evolutionary benefits of group living for humans. A motivation to affiliate is not necessarily reliant on interpreting the intentions of others, although intention reading certainly plays a role in accomplishing more complex affiliation goals. Essentially, what is being proposed is that children learn conventional actions just from seeing them done, often repeatedly, from family members and other members of the community through copying that is likely supported by mechanisms as proposed in Heyes’ (2005, in press) ASL model.

The present argument is also distinct from the theory ‘of natural pedagogy’ (Csibra & Gergely, 2009; Gergely & Csibra, 2006; Gergely et al., 2007) in that the type of knowledge acquired via observational learning often occurs outside of pedagogical contexts involving ostensive cues such as, eye contact, being directly addressed, motherese, etc. Further, actions that have no clear end-state are possibly more likely to be replicated in a more rigid fashion, becoming specific to the objects and context in which the actions are observed, and in this way do not adhere to the idea that ‘any kind of learning implies generalization of the originally acquired information: to new occasions, new locations, new objects, new contexts, etc.’ (Csibra & Gergely, 2009, p.148). It can be argued that some types of learning do not involve generalization and learning often involves acquiring knowledge and behavior that is highly specific to certain objects and contexts. Imitation triggered by the ritual stance, deployed in contexts in which no end-state is easily discernible, may be likely to result in rigidity of performance of observed actions that may become specific to the objects used, or the general context.

2.3. Summary

In terms of how social learning allows for the transmission of cultural knowledge, copying the sequence of actions over the end-state of actions is likely going to afford the best means of transmitting causally opaque cultural knowledge (‘rituals’). In this chapter, it has been argued that copying body movements already in one’s behavioral repertoire and copying novel action sequences are reliant on the same psychological mechanism that allows sensory input to be turned into matching motor output, via vertical associations, with the addition of horizontal processes for re-enacting novel behavioral sequences (Heyes, 2005, in press). This proposal construes imitation as the copying of body movements, whereas the term emulation refers to

copying object movements. The fidelity of copying, however, is most likely going to be related to how much of an action sequence is copied. It could be that if no objects are involved in an action sequence, sequence imitation may result in the highest copying fidelity; if objects are involved in instrumental skill acquisition, sequence emulation may play an especially important role in copying fidelity, where the means can still be optimized while state transformations are reliably reproduced; and if objects are involved in action sequences that do not involve instrumentality, a combination of sequence imitation and sequence emulation likely affords the highest level copying fidelity, conditions in which rigid copying of actions is likely to be observed.

Conditions in which no end-state is easily discernible may be especially likely to result in rigid over-imitation of actions due to the deployment of the ritual stance that often occurs in the absence of causal reasoning or discernment of a model's intentions toward a goal (Legare et al., under review). When confronted with an action sequence that contains a clear end-state children may be likely to adopt an 'instrumental' stance that could be based in causal reasoning, in which emulation (as originally conceived), sequence emulation, or end-state emulation, or some combination is employed. Much prior work has focused on the child as continually and actively engaged in causal reasoning. Further, most studies of social learning utilized instrumental tasks that contain clear end-states and often rewards. This focus on causal reasoning and instrumentality has neglected the utility of social learning in allowing for the transmission and acquisition of fundamentally social knowledge, such as norms and conventions.

The motivation to engage in blind copying of actions that are not grounded in causal reasoning is proposed to be implicitly driven by affiliation associated with group bonding, promoting acceptance of norms and conventions, and in this way differs from

theories proposing shared intentionality as a complex process of dialogic cognitive representations (Tomasello et al., 2005), or a natural inclination to engage in pedagogical exchange (Csibra & Gergely, 2009). As has been noted (Heyes, in press), blind copying of the nature described above is especially likely to result in high fidelity, rigid reproduction and transmission of behavior across generations. It is likely that other factors and cues modulate blind copying of conventional action via the ritual stance. Instances in which a child observes, or is told of, the consequences for breaking or not engaging in conventional action, involving the threat of social exclusion become highly salient and likely influence subsequent action significantly. These cues are often implicit and not directed specifically to the child, but come from observation of family and other community members.

Chapter 3. Experiment 1

Implicit cues modulating copying behavior: Mental security systems and ostracism

How do children navigate the complexities of cultural learning? How do children determine when actions are based in instrumentality and when they are based in social convention and normativity? The recent study by Legare et al. (under review) showed that children are able to utilize subtle cues, such as the presence or absence of a clear end-state, to determine how to copy actions. When children interpret action as conventional, triggering the ritual stance, copying fidelity is increased and behavioral variability is decreased. The ritual stance is triggered in relation to action sequences in which physical causal reasoning is diminished (i.e. when there is no clear end-state). As such, the ritual stance is based in primarily social concerns and is plausibly driven by an implicit motivation to affiliate with others. Cultural conventions such as rituals are universal features of human behavior (Boyer & Lienard, 2006; Horner & Whiten, 2005; Whitehouse, 2004). Social scientists have long argued that rituals promote interpersonal bonding (Bloch, 1991; Durkheim, 1912; Turner, 1969) and shared beliefs (Geertz, 1973). Therefore, it is plausible that following ostracism priming and engagement in a ritualistic action sequence, children will be socially motivated. The current study uses a between-subjects design to examine the implications of children's instrumental and conventional learning for social group behavior. Given that instrumental learning facilitates skill acquisition and conventional learning facilitates ritual acquisition, in Experiment 1 (3-, 4-, 5-, and 6-year-olds, four conditions, $N = 96$) I hypothesize that instrumental and conventional actions differentially influence imitative fidelity following priming with affiliation or ostracism. I further hypothesize that children will interpret their actions as socially based when primed with ostracism

and the ritual stance and will be more motivated to act prosocially. In this section I will first discuss ‘mental security systems’ that are activated by implied threats. These systems are likely activated when threats to group membership are detected. I will then review research related to reactions to the experience of ostracism. Based on the review of prior theories, I will argue that threats to group membership increase affiliative motivations that result in attempts at reinclusion with a group. These affiliative motivations are hypothesized to increase copying fidelity, especially of ritualistic action sequences, and pro-social behavior.

3.1. Mental security systems

If children’s acquisition of behaviors outside of physical-causal reasoning, such as ritualized actions, is driven by an implicit motivation to affiliate, it stands to reason that certain social cues, such as the threat of social exclusion, may modulate motivation to affiliate and therefore also copying behavior involved in learning ritualistic action. As Bandura (1977) has suggested, conditions of uncertainty, in which the costs of making wrong decisions are high, are likely to result in an increased reliance on social learning. Similarly, Bloch (2005) has stated that, ‘When one is in trouble and one does not know what to do, one allows oneself to be taken over by the knowledge and authority of others’ (pp. 135-136). Further, inferred threats may create a focus on performing actions correctly. Addressing or averting danger is also a common theme to many individual and collective rituals (Boyer & Lienard, 2006). Early on, Malinowski (1948) contended that in times of uncertainty, stress and anxiety, as triggered by dangerous situations and times, people are likely to turn to magical rituals as a means of coping with the stress and enacting some measure of control over the uncertainty associated with such situations. In an effort to advance research aimed at filling gaps in

the understanding of questions related to why people utilize magical ritual in times of uncertainty and stress, and deem these actions efficacious, Sosis (2007, 2008) examined the effect of psalm recitation on Israeli women's ability to cope with the stress of war. Sosis (2007, 2008) found that psalm recitation was successful in helping Israeli women cope with stress during the Second Intifada. In a subsequent study, Sosis and Handwerker (2011) found that psalm recitation reduced the anxiety of women who did not relocate during the 2006 Lebanon war, and suggest that 'psalm recitation is likely to have emerged as an expected cultural norm during times of crises within Israeli communities because of its ability to buffer against the stress of uncontrollable conditions' (p. 50). In this way, psalm recitation may serve as a form of palliative coping with stressful, uncertain and uncontrollable conditions (Sosis & Handwerker, 2011). The authors also commented that a sense of 'power and community' associated with psalm recitation was often more important than the particular psalm they recited (Sosis & Handwerker, 2011). As the authors note, this work, as an updated version of Malinowski's theory of magical ritual can be readily integrated with models of the mechanisms of ritualized behavior, such as that of Boyer and Lienard (2006).

Boyer and Lienard (2006) have proposed the Hazard Precaution System (HPS) that is geared to dealing with inferred threats, as opposed to manifest threats, to fitness, with anxiety levels affecting the Action Parsing System focusing attention on low-level units of behavior and diversion of focus from goal-related aspects of an action flow (goal demotion). Other research, reviewed by Friedman and Forster (2010), has found that implicit danger cues (cues to threatening situations), that do not necessarily involve conscious emotional arousal, narrow perceptual and conceptual focus to local aspects of visual stimuli and inhibit free associations and global processing. Mehta and Zhu (2009) have found that the color red, thought to implicitly signal danger, has analogous

effects and also creates a concern with not making mistakes within a task. These processes of attentional tuning represent a plausible mechanism by which goal demotion and fine-level action parsing is achieved when the HPS is activated.

Inferred threats, such as social exclusion, clues to the presence of predators or threatening conspecifics, and contamination are thought to activate mental ‘security systems’ (Boyer & Lienard, 2006; Szechtman & Woody, 2004) that likely result in security-related behavior and coping strategies. The authors argue that cultural rituals mimic the system’s normal inputs thereby making them attention-grabbing and compelling (Boyer & Lienard, 2006). As noted, many, but obviously not all, collective rituals involve attention to potential danger and prescriptive, rigid behavioral patterns for averting the perceived danger and in this way resemble ritualized behaviors in OCD and childhood. As the authors note, ‘In collective rituals, people’s insistence on the potential danger of not following the rules – expressed as moral reprimand (moral threat), as possible exposure to gossip or ridicule (threat of social exclusion), or as worry about misfortune – is very likely to activate the hazard-precaution system’ (Lienard & Boyer, 2006).

Anxiety induced by the activation of mental security systems is likely to focus attention to fine details of an action sequence, resulting in goal demotion. The anxiety created by implied danger/ threats is also likely to motivate security related behavior. Hinds, Woody, Drandic, Schmidt, Ameringen, Coroneos and Szechtman (2010) have found that when mental security systems are activated, individuals display a physiological response, related to measures of anxiety that seems to remain relatively unabated until some form of security-related behavior occurs. With the ritual stance plausibly driven by an implicit goal to affiliate, it is reasonable to suggest that cues relating to implied threats to group membership will enhance affiliative behavior, as a

security-related measure, and this will be evidenced in copying behavior, making individuals more likely to reliably copy an action sequence, especially in relation to action sequences that are opaque, in which end-states are not easily discerned. In this way, motivation to engage in ritualistic behavior, or motivation involved in learning to engage in ritualistic behavior, may be enhanced by the strengthening of an implicit goal to affiliate as a reaction to implied threats to group membership.

As Navarette and Fessler (2005) and Navarette, Kurzban, Fessler and Kirkpatrick (2004) have demonstrated, situations implying threat to fitness are likely to result in stronger adherence to in-group normative ideologies as a means of affiliation with group members. Navarette et al. (2004) state, ‘natural selection can be expected to have shaped human psychology such that, when confronted with emergency situations that can be remedied through coalitional support, individuals will exhibit a strongly pro-normative orientation in order to enhance the maintenance and formation of alliances’ (p. 373). Navarette and Fessler (2005) contend that when presented with threats “within the category of adaptive challenges” coalitional thinking will be primed and people will tend to endorse a stricter adherence to in-group ideologies through ‘manifestations of normative mental representations emanating from psychological systems designed to enhance coordination and membership in social groups’ (Navarette & Fessler, 2005, p. 297). It could be that an affiliative/cooperative response as engendered by danger cues may relate to the generation of normative representations in children, possibly through some of the processes proposed above. Cues that relate to implied threats to fitness may be an especially strong factor that mediates the learning and transmission of behavior through enhancing associations between actions and normative representations. These normative representations may result from the fostering of “spurious associations” between reproduced actions and anxiety relief

associated with affiliative, security related behavior, in response to threat cues. Fessler (response to Boyer & Lienard, 2006, p. 618) has said that, “spurious associations are likely to be acquired during problem-solving under conditions of ambiguity and danger, and are often a consequence of imitative social learning.” Also, normative representations may further contribute to the highly specified, rigid reproduction associated with ritualized behavior.

Navarette and Fessler (2005) hold that anything that is a potential threat to the fitness of an individual is likely to result in coalitional thinking and the implicit goal to foster alliances, due to the utility of conspecific aid in times of need. Due to the great importance of group membership to humans’ survival throughout evolutionary history, threat of social exclusion, or ostracism, may be especially likely to result in increased affiliative efforts. The negative effects of ostracism on psychological well-being have been amply documented and demonstrated by a number of studies (see Williams, 2007 and Williams & Nida, 2011 for reviews) and will be explored in relation to theories of how motor mimicry may be employed as a means of generating rapport and liking when faced with the threat of ostracism. Due to the affiliative nature of the ritual stance as well as ritual’s promotion of group bonding, threats of ostracism are likely to enhance copying performance of ritualized behavior. This may be aided through a process, as described in the previous section, in which matching motor responses are disinhibited by enhanced affiliative motivations.

3.2. Ostracism and attempts at reinclusion

In an influential review, drawn from literature in the social and health sciences, Baumeister and Leary (1995) put forth the hypothesis that people have a fundamental need to belong and threats to an individual’s sense of belonging have dramatic and

negative consequences on a person's psychological and physical well-being. The need to belong can be seen in people's, often extreme, conformity to the majority, as substantial social psychological research has shown. Young children are also sensitive to majority opinion, often conforming even when it is clear that the majority is incorrect (Corriveau & Harris, 2010). Evolutionary perspectives on ostracism propose that ostracizing deviant, overly-aggressive group members is adaptive in that it allowed groups to become more cohesive (Gruter & Masters, 1986). Throughout evolutionary history, group membership has been essential to survival and reproduction (Brewer, 2007; Buss & Kenrick, 1998). Individuals that had mechanisms that allowed them to anticipate and address the threat of ostracism plausibly had an advantage over those that did not possess such mechanisms. Researchers (Kerr & Levine, 2008; Spoor & Williams, 2006) have proposed such an ostracism-detection system, postulating that this system is geared to over-detection, because misperceiving the threat of ostracism when it is not present is much less costly than not perceiving it when it is actually there (see Haselton & Buss, 2000; Spoor & Williams, 2006).

Sociometer theory contends that human psychology contains a social monitoring system that perceives levels of belongingness. This system is geared to notice when belongingness is threatened and to activate mental and behavioral resources aimed at addressing this threat (Gardner, Pickett, & Knowles, 2005; Pickett & Gardner, 2005; Pickett, Gardner, & Knowles, 2004; Williams, 2007). Gardner, Pickett, and Brewer (2000) demonstrated that following an experience of social exclusion, participants displayed improved recall of social information. From this, it is expected that 'we have evolved to detect ostracism in such a way that it would signal an alarm that would serve to direct attention toward determining if ostracism was in

fact occurring, and if so, would direct resources toward coping with it' (Williams, 2007). This signal is proposed to be associated with pain, specifically social pain.

Williams, Cheung, and Choi (2000) developed a computerized interaction known as *Cyberball* in order to manipulate ostracism in the lab and via the Internet. Within this paradigm, participants engage in a virtual ball-tossing game with two or three other individuals. Participants are told that they are connected to the other players via the Internet. In the ostracism condition, participants are initially thrown the ball a couple of times after which the other two players exclusively toss the ball between them for the remainder of the game. Even with this minimal exposure to ostracism, usually lasting only a couple of minutes, there is an immediate and reflexive effect of ostracism, as gauged via self-report measures. Ostracized participants report strong negative feelings following the game, especially sadness and anger (Williams, 2007). Interestingly, in an experiment by Eisenberger, Lieberman, and Williams (2003) showed that experiencing ostracism activated the dorsal anterior cortex, the same region of the brain activated when experiencing physical pain. Ostracism hurts even when the participant gains a financial benefit (van Beest & Williams, 2006), the ball being tossed is a “bomb” and could result in the virtual death of the player in the game (van Beest, Williams, & Van Dijk, 2011), and even when one is ostracized by a hated out-group (Gonsalkorale & Williams, 2007).

The immediate stress induced by ostracism has also been reliably shown to not vary according to individual or situational factors (Williams, 2007; Williams & Nida, 2011). Whereas individual differences may determine the type of response to and coping with social exclusion, Williams (2007) notes that previous research has found that the *experience* of social exclusion is not moderated by individualism/collectivism (Fiske & Yamamoto, 2005), social anxiety (Zadro, Boland, & Richardson, 2006), or

need to belong (Gardner et al., 2009). Further, even just observing another individual experience ostracism also activates the ostracism-detection system, inducing the same stress that occurs when experiencing ostracism (Wesselman, Bagg, & Williams, 2009). Williams and Nida (2011) propose that, following the distress created by ostracism, individuals seek to cope with the threat in a number of ways, most often including: ‘Attempting to re-secure his or her place in the group, trying to regain control that has been lost, or striking back by lashing out in some way’ (p. 72). If re-inclusion is deemed possible, this is usually attempted first (Williams & Nida, 2011). Attempts at re-inclusion often occur automatically by paying closer attention to social information, as has been found to occur following ostracism threat (Gardner et al., 2000; Pickett et al., 2004). Increased attention to social information following social exclusion is likely related to implicit affiliation goals that are heightened when ostracism, or the threat of ostracism, occurs.

Section 2 reviewed evidence of affiliative mimicry, in which individuals unconsciously mimic the actions of an interaction partner and suggested that engendering a non-conscious goal to affiliate is also likely to facilitate overt copying behavior. A recent study by Lakin et al. (2008) found that automatic mimicry functions as an affiliative response to the threat of social exclusion. Specifically, the authors hypothesized that excluded individuals would increase automatic behavioral mimicry, as compared to included individuals, in an effort to increase affiliation and re-establish connections. Because automatic behavioral mimicry is non-conscious, the authors propose that that it will be deployed as an automatic response to the threat of social exclusion and is likely a ‘low-risk, low-cost’ affiliation strategy (Lakin et al., 2008, p. 817). In Study 1, social exclusion was manipulated using the *Cyberball* game paradigm. After playing the game, participants engaged in a task with a confederate

who moved her foot throughout the interaction. Participants were measured for the amount of foot moving they engaged in based on condition. It was found that participants in the exclusion conditions mimicked the confederate significantly more than participants in the inclusion condition (Lakin et al., 2008). It was also found that social exclusion did not affect mood in this study and therefore mood could not be responsible for the increase in automatic mimicry. The authors suggest that after exclusion, when cognitive resources may already be taxed, engaging in ‘automatic affiliative behaviors’ is likely an especially important strategy in gaining re-inclusion (Lakin et al., 2008). Further, Study 2 found that automatic mimicry was further increased when the exclusion threat came from a group the participant felt they belonged to (an in-group) (Lakin et al., 2008). Other studies have found that individuals tend to mimic members of an in-group more than members of an out-group (Likowski, Muhlberger, Seibt, Paul, & Weyers, 2008). The evidence to date strongly supports the affiliative nature of automatic mimicry. From this and other findings cited, it could be that an affiliative response via automatic mimicry may act as a “security related behavior” in response to negative stress engendered by the threat of social exclusion.

Over and Carpenter (2009) found that when 5-year-olds were primed with third-party ostracism, they subsequently displayed higher fidelity imitation of relevant and irrelevant actions to obtain a goal on a puzzle box. The researchers primed participants with a minimal display of ostracism involving videos depicting shapes “ostracizing” another shape (ostracism condition) or with control videos depicting shapes moving in a similar, yet more randomized, manner. Following the video primes the children observed an adult demonstrate how to activate a light within a puzzle box. The demonstration included actions that were relevant to turning on the light and actions

that were obviously irrelevant in achieving the end-state. It was found that children who had been primed with ostracism copied the specific actions of the demonstrator more closely than children in the control condition. Not only did this study demonstrate that young children are sensitive to threats of ostracism, but they also likely utilize ‘affiliative imitation’ as a behavioral strategy employed to cope with the negative effects of social exclusion (Over & Carpenter, 2009).

The authors suggest that the affiliative imitation displayed in the overt imitation task suggests ‘an important continuity of function between affiliative imitation in children and non-conscious mimicry in adults’ (Over & Carpenter, 2009, p. F2). As the authors note, there is little evidence that young children non-consciously mimic the behavior of others. The authors found support for this in a pilot study in which children had a conversation with an adult who repeatedly touched her face. It was found that children’s face touching did not increase over baseline levels (Over & Carpenter, 2009). It would be interesting to investigate if creating a non-conscious goal to affiliate would affect automatic mimicry in young children. If the authors had first primed children with ostracism and then measured levels of face-touching, they may have found some evidence of automatic mimicry in young children. The authors propose two, non-mutually exclusive, means by which ostracism primes may lead to higher fidelity copying of actions: It could be that, similar to Lakin et al.’s (2008) proposal, children increased their copying performance as a strategic means of ingratiating themselves to the model, in this way showing their similarity as a means of affiliation. It could also be that, as mentioned previously, the ostracism prime changed the way in which visual input was processed, creating a focus on social information (Gardner et al., 2000). It could further be that the ostracism (threat) prime created a focus on finer detail of action as proposed by Friedman and Forster (2010) and Boyer and Lienard

(2006). The Over and Carpenter (2009) study provides strong support for the relationship between overt imitation in childhood and automatic mimicry in adulthood, related to the fundamentally social function of affiliation. As previously discussed, these two forms of copying behavior are likely reliant on the same general mechanisms (Heyes, in press) and the continuity between them displayed in the Over and Carpenter (2009) study strongly supports this hypothesis.

3.3. Hypotheses and predictions

Experiment 1 aimed to assess the relationship between the ritual stance and implicit affiliative motives by priming the threat of ostracism. I hypothesized that priming the threat of ostracism will heighten affiliative motivations. If there is a special relationship between the ritual stance and affiliation, the ostracism prime should lead children to significantly increase their copying fidelity. Of course, learning instrumental skills is also often based on social cues. The study by Over and Carpenter (2009) found that children increased copying fidelity following third-party ostracism priming on an instrumental task (turning on a light in a puzzle box) that included causally irrelevant actions. I propose that when learning fundamentally social information, however, such as convention/ ritual, priming ostracism will have a greater impact than it would when learning instrumentally oriented behavior.

The current research uses the paradigm developed by Legare et al. (under review) in which participants are presented with action sequences (one video per condition – instrumental and ritual) with either a distinct end-state (instrumental) or an end-state that is the same as the start-state (ritual). Modified versions of the minimal priming stimuli developed by Over and Carpenter (2009) were used to prime ostracism on the one hand and affiliation on the other. The affiliation prime matches the

movements of the shapes in the ostracism prime, but conveys no sense of social exclusion. Instead, the shapes move across the screen together. Whereas this prime is called ‘affiliation’, it was used to act as a control for the ostracism prime (see the Method section). There were four between-subjects conditions to which participants were randomly assigned, ostracism:instrumental, ostracism:ritual, affiliation:instrumental, and affiliation:ritual. Children were predicted to display the highest copying fidelity under conditions in which there is no clear end-state in combination with the ostracism prime, the ostracism:ritual condition. I further predicted that children in the affiliation:instrumental condition will display the lowest copying fidelity, with the affiliation:ritual and the ostracism:instrumental conditions falling somewhere in between. Copying fidelity, as the dependent variable, was assessed by examining reproduction of individual elements of the modeled action sequence as well as through the use of a copying fidelity summary score. I also expected that older children (5-6-year-olds) would have higher copying fidelity summary scores in the ostracism:ritual condition than younger children (3-4-year-olds) due to their increasing awareness of convention and normativity.

To further assess the social nature of the ritual stance and the possible affiliative consequences of engaging in imitation of a ritual action sequence, children will be asked questions within an “explanation task” and will be coded for social, agentic or non-explanatory answers. I predicted that children will overall give more socially based explanations for their behavior within the ostracism:ritual condition and the most agentic explanations within the affiliation:instrumental condition. Children were asked about their liking for the model in the video demonstration. Children within the ostracism:ritual condition were predicted to express increased liking for the model over children in the other conditions. Finally, as a measure of prosocial behavior, children

engaged in a sharing task. I predicted that children within the ostracism:ritual condition would share more than children in the other conditions as a means of affiliation.

Twenge, Baumeister, De Wall, Ciarocco, and Bartels (2007) found that prosocial behavior in adults actually decreased following an experience of social exclusion. As Williams (2007) points out, this finding may be an artifact of the experimental manipulation. Participants' sense of a meaningful existence was manipulated by telling them that based on a test they took, it looked as if they would never have any meaningful, lasting relationships in their lives. It may be that when people have no hope for regaining inclusion, prosocial behavior will decrease. If provided an opportunity to attempt a potentially successful affiliation with group members, however, individuals may engage in increased prosocial behavior as an attempt at reinclusion.

3.4 Method

3.4.1. Participants

Forty-eight 3- and 4-year-olds (M age 3.61; range 3,0 to 4,11) and forty-eight 5- and 6-year-olds (M age 5.54; range 5,0 to 6,11), were recruited from Austin, Texas (N = 96, 45 female). Overall, the data from 21 participants were excluded, 5 due to experimenter error, 1 due to parental interference, and 15 due to no interaction with the stimuli set (these participants are not included in the total number of participants noted above). Participants were primarily Euro-American and from middle-class families.

3.4.2. Materials

Video Primes. Video primes were created using animation tools within PowerPoint software. The priming stimuli consisted of short videos depicting geometric shapes moving on the screen, with no audio. The videos were designed to

depict ostracism and affiliation (see Figure 3). Piloting demonstrated that it is difficult to design a series of movements, even using geometric shapes, that does not prime anything.¹ To ensure that the priming manipulation was effective, a group of adult participants, blind to the hypothesis of the study, rated the videos in terms of what they were meant to depict.

Object Set for Video Demonstration and Object Manipulation Task. Following Legare et al. (under review), a set of novel objects was utilized in order to demonstrate object manipulation in a videotaped novel action sequence. In the ritual condition, the stimuli included a blue cube, orange ball, purple piece, wooden peg-board (with three wooden pegs, colored yellow, red, and green), and silver box. The stimuli in the instrumental condition were identical to the ritual condition except for the addition of a red pipe (see Figure 1).

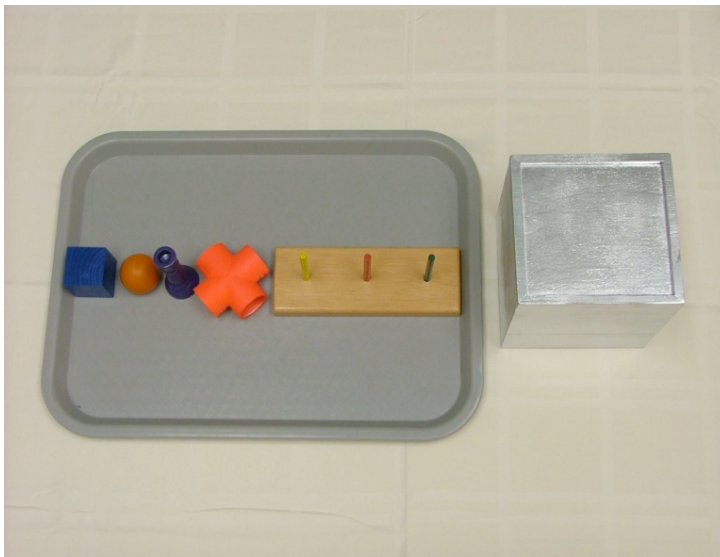


Figure 1. Object set (in the ritual conditions, the red pipe was not presented to participants).

Video Demonstration of Novel Action Sequence. Object manipulation demonstrations were filmed for the ritual and instrumental conditions for continuity in presentation to participants. Each video was 40 seconds in length.

¹ A prime using random movements across the screen was discarded because participants became preoccupied with discerning what the geometric shapes were doing, and therefore did not serve as a

Sharing Task. Children were given five of the same stickers depicting a smiling sun on a blue background (see Figure 2).

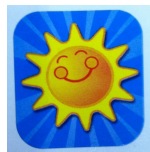


Figure 2. Stickers used in sharing task.

3.4.3. Design and procedure

Following the video primes, there were four phases to the experiment: The object manipulation task, the explanation task, the affiliation task, and the sharing task. The objective of these tasks was to examine how priming ostracism or affiliation affects children's copying of behavior that contains a salient and distinct start- and end-state (instrumental) versus behavior in which the start- and end-states are equivalent (ritual), children's explanations for their behavior, affiliation with the demonstrator, and pro-social behavior. Participants were randomly assigned to one of four between-subjects conditions. Depending on condition, children initially viewed a video prime depicting ostracism, or affiliation. In the ostracism prime, three blue pentagons enter the screen and appear to interact as a group. Subsequently, a fourth pentagon enters and approaches the group. The group moves away from the fourth pentagon four times in a manner suggesting exclusion. The fourth shape then "gives up", moves away from the group and stops at the bottom left corner of the screen (Over & Carpenter, 2009). In the affiliation prime, four blue pentagons enter the screen together and appear to interact as a group. The four pentagons move to different areas of the screen as a group four times. Finally, two pentagons split off and move to the lower left corner, while the other two move to the upper right corner of the screen (see Figure 3). The primes were matched for direction and speed of movement.

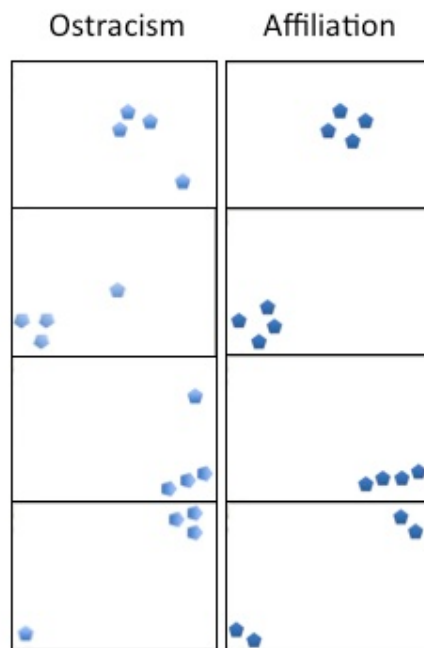


Figure 3. Screenshot examples of the priming stimuli.

Following the video prime, the experimenter told each participant, “This is Brooke. She has something interesting she wants to show you, so let’s watch very carefully.” After which participants viewed either a “ritual,” or “instrumental” novel action sequence that included actions with the object set and gesture (see Materials).²

Each participant watched a video demonstration of a novel action sequence in which the presence or absence of an end-state varied. The instrumental demonstration contained a clear end-state, the “ritual” demonstration contained an end-state that was the same as the start-state. Across demonstration conditions, the video began with a female demonstrator seated and looking straight ahead with a neutral facial expression. Her hands were placed flat on the table and the camera zoomed in to focus on her hands and a configuration of objects arranged in a linear order from left to right (i.e., the blue cube, orange ball, purple piece, wooden peg-board, and silver box). First, the

² Legare et al. (under review) did not find that children, when presented with the object set prior to viewing the demonstration, spontaneously engaged in the novel actions modeled in the video action sequence, and no differences were found between conditions in the kind of play children engaged in. Therefore, participants were not given the object set prior to the experimental manipulation.

demonstrator picked up the blue cube with her left hand and moved it above the green peg on the pegboard. She tapped the blue cube on the green peg twice and then placed the blue cube back in its original position on the table. Then she placed her hands flat on the table. Next she engaged in a novel gesture: she lifted her hands and pressed her fists together before placing her hands flat on the table. She then picked up the orange ball with her left hand and moved it above the red peg on the pegboard. She tapped the red peg with the orange ball twice and then placed the orange ball back in its original position on the table. She then repeated the novel gesture by placing her hands back on the table, pressing her fists together, and placing her hands flat on the table. At this point in the action sequence each condition differed in the kind of end-state modeled.

In the *ritual condition*, the demonstrator picked up the purple piece with her left hand and used it to slide the box lid open. She then closed the box with her right hand. She placed the purple piece back in its original position on the table (see Figure 4 and Table 1).

Ritual

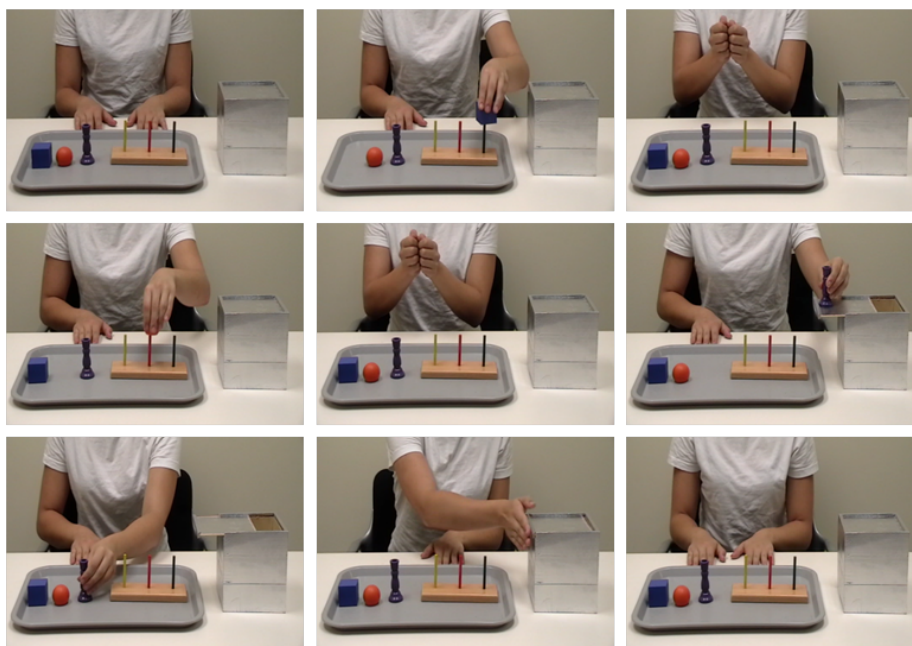


Figure 4. Screenshots of the video demonstration in the ritual condition.

In the *instrumental condition*, the action sequence was identical to the ritual condition except that instead of opening the object with the purple piece, a new (and previously occluded) red pipe was moved into view and used to slide open the box. The red pipe was then placed inside with the left hand, and as in the other conditions, the box was closed with the right hand (see Figure 5 and Table 1).

Instrumental

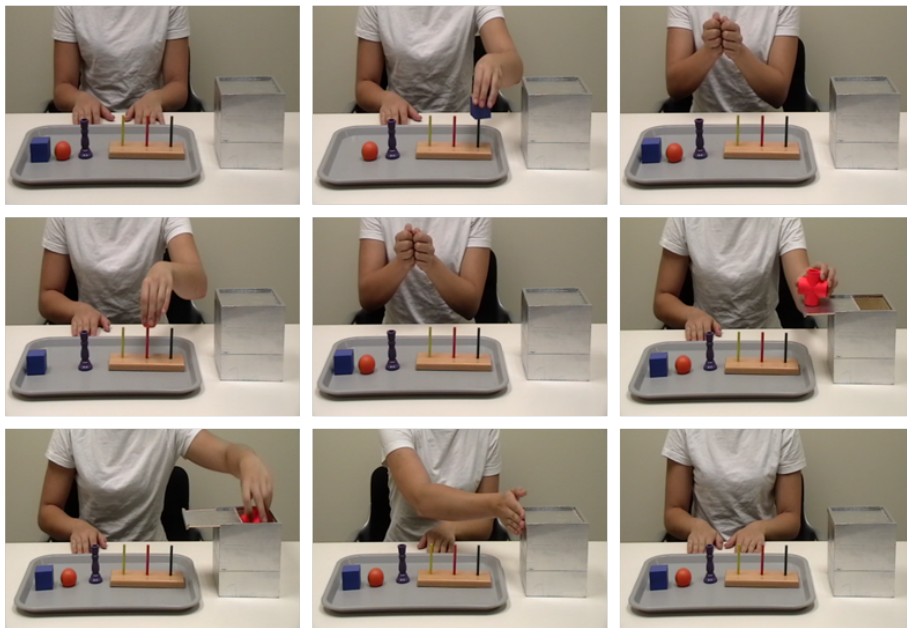


Figure 5. Screenshots of the video demonstration in the instrumental condition.

In order to create discontinuity between the object used at the end of the action sequence from the objects used at the beginning of the action sequence, the red pipe was only included in the instrumental condition. Using a previously occluded object to open and place inside the silver box clearly differentiates the arbitrary elements from the instrumental elements of the action sequence. This provides a strong cue to the instrumental nature of the action sequence. In both conditions, the video ended with the demonstrator's hands flat on the table (see Figures 4 and 5 and Table 1). Whereas most of the behavior demonstrated in each condition may be described as causally opaque, only in the ritual condition were the end-state and start-state identical. As such, I would

not anticipate that children in this condition would attribute a goal to the task. By contrast, because end-states and start-states differed in the instrumental condition, the procedure had a discernible and distinct outcome that could be interpreted as a goal.

Table 1. Description of actions in the ritual and instrumental video demonstrations

Ritual	Instrumental
1. Both hands flat on table behind tray.	1. Both hands flat on table behind tray.
2. LH picks up blue cube.	2. LH picks up blue cube.
3. LH taps blue cube on green peg (2 times).	3. LH taps blue cube on green peg (2 times).
4. LH puts blue cube back on tray.	4. LH puts blue cube back on tray.
5. Both hands flat on table.	5. Both hands flat on table.
6. Hand motion: two closed fists together.	6. Hand motion: two closed fists together.
7. Both hands flat on table.	7. Both hands flat on table.
8. LH picks up orange sphere.	8. LH picks up orange sphere.
9. LH taps orange sphere on red peg (2 times).	9. LH taps orange sphere on red peg (2 times).
10. LH puts orange sphere back on tray.	10. LH puts orange sphere back on tray.
11. Both hands flat on table.	11. Both hands flat on table.
12. Hand motion: two closed fists together.	12. Hand motion: two closed fists together.
13. Both hands flat on table.	13. Both hands flat on table.
14. LH picks up purple piece.	14. LH picks up red pipe from behind box.
15. LH slides box lid open with purple piece.	15. LH slides box lid open with red pipe.
16. LH puts purple piece back on tray.	16. LH puts red pipe inside box.
17. Both hands flat on table.	17. Both hands flat on table.
18. RH closes box lid.	18. RH closes box lid.
19. Both hands flat on table.	19. Both hands flat on table.

Object Manipulation Task. At the conclusion of the demonstration video, the screen was turned off and the objects that the child had seen in the video were placed into view of the child, arranged in the same configuration from the child's perspective. The experimenter told the child, "See these objects here? Now it's your turn." The

objects were then placed within reach of the child and the participant was told, “Here you go.” Participants were not given any explicit instruction to copy the actions seen in the video. The child was given 120 seconds to interact with the objects before the objects were moved from within reach of the child but kept within view.

Copying fidelity coding. Copying behavior was coded for a number of actions. For example, engagement in tapping action, engagement in double tapping action, and producing the modeled gesture were coded. If children produced the target behaviors listed above they were given a score of 1, if not, they were given a score of 0. Action-object pairings correctly imitated (the number of times the correct object was tapped on the correct peg the correct number of times) were also coded. There were two possible action-object pairings to imitate (i.e., blue cube tapped twice on green peg (0 or 1), orange ball tapped twice on red peg (0 or 1)).

A copying fidelity summary score was calculated based on the core elements of the action sequence (eight criteria). These elements were decided in advance based upon the core features of the action sequence. Pairing the blue cube with the green peg was either given a 1 (performed), or 0 (not performed) (see Table 2). Pairing the orange sphere with the red peg was scored 1 (performed), or 0 (not performed). Performing the double tapping motion with an object on the pegs was given a score of 1 (performed), or 0 (not performed). Opening the silver box with an object was coded 1 (performed), 0 (not performed). Inserting an object into the box was coded differentially by condition: If the child inserted an object into the silver box in the ritual condition, they were coded as 0 (incorrect); if they did not insert an object in the ritual condition they were coded as 1 (correct). For the instrumental condition, children were given a 1 (correct) for inserting the red pipe and a 0 (incorrect) for not inserting the red pipe or inserting objects other than the red pipe. Actions were scored for engagement with the box at the

end of the sequence only, as modeled in the video. If the participant engaged with the box at the end of the sequence only they received a 1, and a 0 if they engaged with the box at any other point in the action sequence. Actions were coded for the correct sequencing (blue cube, orange sphere, purple piece, or red pipe). If children engaged in the correct sequencing they received a score of 1 (correct), 0 (incorrect) for engaging in any deviations of sequencing. Finally, performing the novel gesture was scored as 1 (correct), or 0 (incorrect).

Table 2. Copying fidelity summary score elements

Element	Demonstration	Criteria for correct response
1. Blue cube to green peg	Taps blue cube on the green peg twice.	Using the blue cube on the green peg in any way.
2. Orange sphere to red peg	Taps the orange sphere on the red peg twice.	Using the orange sphere on the red peg in any way.
3. Double tapping action	The demonstrator taps the blue cube on the green peg twice and the orange sphere on the red peg twice.	Using any object from the set to tap on any of the pegs twice.
4. Opening box with object	Uses the purple piece (ritual condition), or the red pipe (instrumental condition) to slide the lid of the silver box open.	Using any object to slide the lid of the silver box open.
5. Correct insertion	Places the red pipe in the silver box (instrumental condition), or does not place any object into the box (ritual condition).	Places any object in the silver box (instrumental condition), does not place any object inside the silver box (ritual condition).
6. Engage box at end only	Opens the silver box at the end of the action sequence.	Engaging with the silver box at the end of the sequence only.
7. Correct Sequencing	Uses the blue cube first, then the orange sphere, then the purple piece (ritual), or the red pipe (instrumental).	Using the blue cube first, then the red peg, then the purple piece (ritual), or the red pipe (instrumental).

8. Gesture	Presses fists together at three points within the action sequence	Engages in any gesture having to do with pressing the hands together.
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Explanation Task. Following the social learning task, the experimenter asked the child four questions about her engagement with the objects, beginning with, “Why did you do it that way?” A follow-up question was also asked, “Can you tell me more about that?” These questions were included as a converging measure of the social affiliative basis of the ritual stance and as a measure of how imitating a ritualistic action sequence affects children’s interpretation of their own imitative behavior.

Coding. Explanations for why the participant had engaged with the objects in a particular way were coded for content. *Social explanations* referred to a socially prescribed behavior (e.g., “Because I have to do what she does”). *Agentive explanations* referred to the child’s desire and independent initiative (e.g., “Because I can do it anyway I want to”). Descriptions of concrete actions (e.g., “I put the purple object there”), reflections on the capacity to implement those actions (e.g., “It was hard to close the box”), or descriptions of uncertainty (i.e., unknown responses), were coded as *non-explanatory responses*. Responses to the questions (i.e., “Why did you do it that way?”) were coded as 0 for agentive responses, 1 for non-explanatory responses, and 2 for social responses.

Affiliation Task (counterbalanced with the sharing task). Following the explanation task (or sharing task), children were asked how they felt about the model in the video. This task was incorporated as a measure of affiliation following imitation. It was hypothesized that if children had increased affiliative motivations they would be more likely to say that they liked the model and/or would like to meet her. Beginning with, “Do you think you would like to meet Brooke?” If the child answered yes, the

experimenter followed up with, “Why do you think you would like to meet her?” If the child answered “no,” they were asked, “Why don’t you think you would like to meet her?” The next question asked was, “Do you think you would like Brooke?” If the child answered yes, and “why do you think you would like her?” And “Why don’t you think you would like her?” if the child answers “no.”

Coding. Children’s answers to the affiliation questions were coded based upon their interest in meeting the model, and their liking for the model. Responses to the questions were coded 1 for wanting to meet the model or liking the model, and 0 for not. If the child answered that they would like to meet or did like the model, they were then coded for their response to how much they would like to meet her and how much they would like her, a little (0), or a lot (1). Finally, answers to why they would like to meet the model, and why they would like the model, were coded for content. Model-centered explanations referred to characteristics of the model (e.g. “Because she looks nice”). Egocentric explanations referred to characteristics of the child (e.g. “Because I am shy”).

Sharing Task. In an effort to measure prosocial behavior in relation to affiliative goals, children were given five stickers and told that these were their stickers, but they were also the model’s (from the video) favorite stickers (in a tone that did not carry emotional weight). The children were then asked if they would like to share any of their stickers. If the child replied affirmatively, they were asked to indicate how many stickers they would like to share. If the child indicated that they wanted to give the model the stickers themselves, the experimenter then let the child know that she would give the stickers to the model for them.

Coding. Children’s answers were coded 1, for sharing, 0 for not sharing. How many stickers were shared, if any, was also coded, 0-5.

3.5. Results

Differences in copying fidelity across conditions and age groups were analyzed using a two-way ANOVA. Conditional differences in summary scores were also examined using planned comparisons. Differences between conditions in terms of engagement in behaviors related to copying fidelity will be analyzed using Chi-square Test of Association and Fisher's Exact Tests.

Conditional differences in answers to the explanation questions are analyzed using ANOVA and the affiliation questions are analyzed using chi-squares and Fisher's Exact Tests. Finally, conditional differences in the sharing task will be explored using a ANOVA.

3.5.1. Inter-rater Reliability

A second coder, who was blind to the hypothesis of the study, recoded the data from twenty-four children, representing 25% of the total sample. Inter-rater reliability was high for both the copying fidelity summary score (Cohen's Kappa = 0.83) and the innovation/ behavioral variability summary score (Cohen's Kappa = 1.00). Inter-rater reliability was also high for the explanation data. Reliability was calculated for the type of explanation provided (average = 93.3% agreement). All of the Kappas for this coding fall within good to perfect levels (Cohen's Kappa = 0.48 - 95.8). Reliability for the affiliation questions (average = 91% agreement) and sharing task was also high (100%) (Landis & Koch, 1977).

3.5.2. Copying Fidelity Summary Score

An ANOVA with prime (2: ostracism, affiliation), task (2: instrumental, ritual), and age (2: 3-4-year-olds, 5-6-year-olds) as between-subjects variables and the 0-8 copying fidelity summary score as the dependent measure revealed a main effect of prime, $F(1, 96) = 3.84, p < .05, \eta_p^2 = .040$. Children in the ostracism conditions had higher copying fidelity scores ($M = 4.77, SD = 1.95$) than children in the affiliation conditions ($M = 4.06, SD = 1.94$). There was also a main effect of task, $F(1, 96) = 19.19, p < .0001, \eta_p^2 = .174$. Children in the ritual conditions had higher copying fidelity scores ($M = 5.21, SD = 1.49$) than children in the instrumental conditions ($M = 3.63, SD = 2.08$). There was a marginally significant main effect of age, $F(1, 96) = 2.99, p = .09, \eta_p^2 = .032$, and no interaction between prime and task, $F(1, 96) = .120, p = .73$ (See Figure 6). Because a central hypothesis of the current study centers around the effects of priming ostracism on the ritual stance, planned comparisons were conducted, using Bonferroni correction, to explore the main effect of prime within the instrumental and ritual conditions. The comparisons revealed that the difference between ostracism and affiliation is only statistically reliable within the ritual condition $t(46) = 2.03, p < .05$, not the instrumental $t(46) = 0.10, p = .32$.

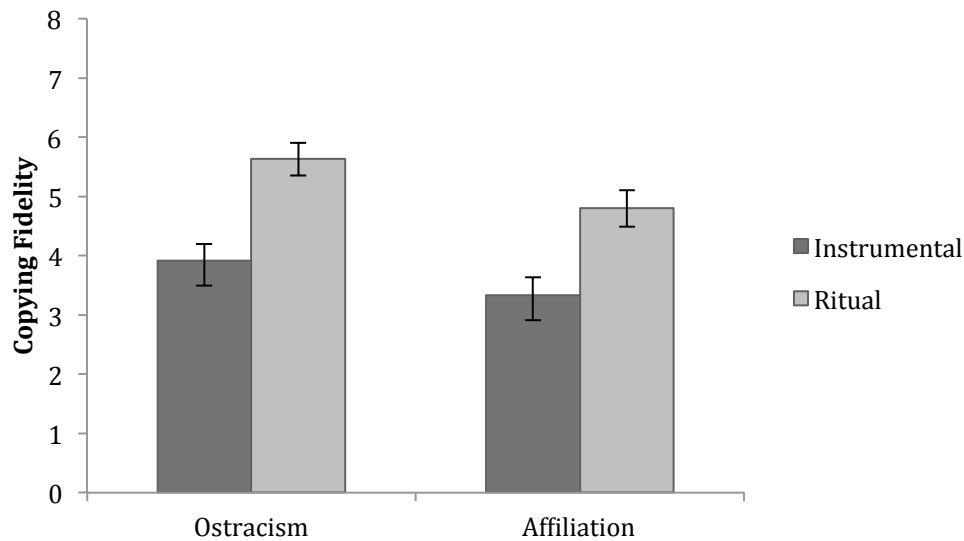


Figure 6. Mean accuracy in copying fidelity summary score for prime and task, collapsed across age groups. Error bars represent SE.

Although there was no main effect of age, planned comparisons grouping younger (3- and 4-year-olds) and older (5- and 6-year-olds) children revealed that older children had significantly higher copying fidelity scores ($M = 5.63$, $SD = 1.38$) than younger children ($M = 4.80$, $SD = 1.50$) only within the ritual conditions, $t(46) = 2.03$, $p < .05$, this difference was not observed in the instrumental conditions, $t(46) = 0.28$, $p = .83$ (see Figure 7).

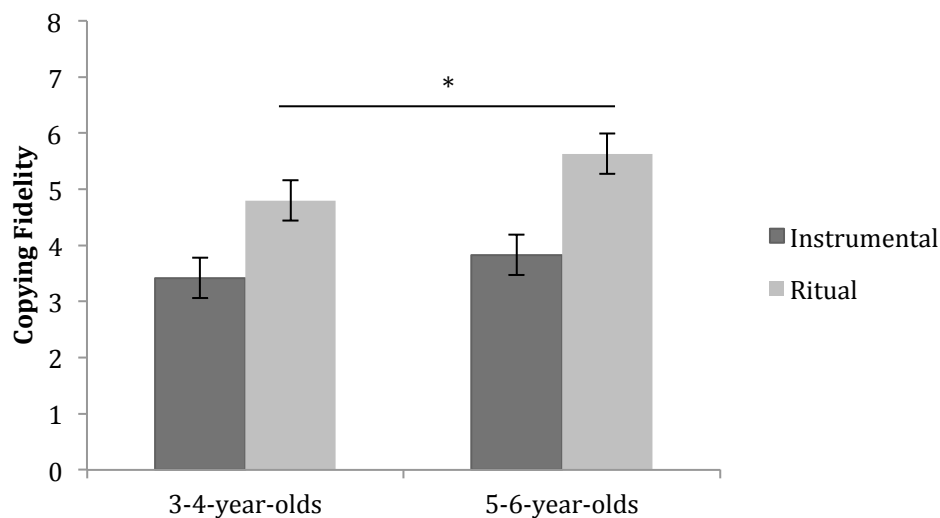


Figure 7. Mean accuracy in copying fidelity for 3-4-year-olds ($n = 48$) and 5-6-year-olds ($n = 48$). Error bars represent SE, $*p < .05$.

3.5.3. Individual components of the copying fidelity summary score.

To provide a more in-depth examination of children's copying fidelity, Chi-square analyses were performed on the individual elements of the copying fidelity summary score to determine if observed counts of performance of individual actions across conditions were significantly different than expected (using the Holm-Bonferroni adjustment). As can be seen in Table 3 the elements of the summary score that were most likely to be performed in the ostracism:ritual condition were opening the box with an object (as opposed to with a hand), engaging with the box at the end of the sequence, and engaging in the correct sequencing.

Table 3. Means and Standard Deviations for the Elements of the Copying Fidelity Summary Score

	Blue cube on green peg	Orange sphere on red peg	Double tap	Open the box with object***	Correct insertion	Engage box at the end**	Correct sequence **	Gesture
Ost:Rit	.71 (.46)	.67 (.48)	.50 (.51)	.92 (.28)	1.00 (.00)	.92 (.28)	.88 (.34)	.21 (.41)
Aff:Rit	.63 (.49)	.54 (.51)	.42 (.50)	.71 (.46)	.96 (.20)	.71 (.46)	.79 (.41)	.04 (.20)
Ost:Inst	.58 (.50)	.50 (.51)	.50 (.51)	.21 (.41)	.83 (.38)	.63 (.49)	.63 (.41)	.13 (.34)
Aff:Inst	.38 (.49)	.42 (.50)	.42 (.50)	.29 (.46)	.83 (.38)	.46 (.51)	.49 (.51)	.08 (.28)

Note. $n = 24$ (per condition), $N = 96$, ***= $p < .001$, **= $p < .01$

Blue cube on the green peg

Table 4. Crosstabulation of Condition and Using the Blue Cube on the Green Peg

Blue cube on green peg	Condition				χ^2	Φ
	<u>Ost:Inst</u>	Ost:Rit	Aff:Inst	Aff:Rit		
Yes	14 (0.10)	17 (1.50)	9 (-2.3)	15 (0.06)	5.92	.24
No	10 (-0.10)	7 (-1.50)	15 (2.3)	9 (-0.06)		

Note. n = 24 (per condition), N = 96, adjusted standardized residuals appear in parentheses below group frequencies.

There was no difference in using the blue cube on the green peg, across conditions, $\chi^2 = 5.92$, (3, N=96), $p = .12$. Overall, 71% of the participants in the ostracism:ritual condition used the blue cube on the green peg, 63% in the affiliation:ritual condition, 58% in the ostracism:instrumental condition, and 38% in the affiliation:instrumental condition. The adjusted residuals, however, indicate that the observed frequency of using the blue cube on the green peg in the affiliation:instrumental condition was significantly lower than the frequency that is expected if there were no association between the use of the blue cube on the green peg and condition (see Table 4).

Orange sphere on the red peg

Table 5. Crosstabulation of Condition and Using the Orange Sphere on the Red Peg

Orange sphere on red peg	Condition				χ^2	Φ
	<u>Ost:Inst</u>	Ost:Rit	Aff:Inst	Aff:Rit		
Yes	12 (-0.40)	16 (1.50)	10 (-1.30)	13 (0.10)	3.14	.18
No	12 (0.40)	8 (-1.50)	14 (1.30)	11 (-0.10)		

Note. $n = 24$ (per condition), $N = 96$, adjusted standardized residuals appear in parentheses below group frequencies.

There was no difference in using the orange sphere on the red peg across conditions, $\chi^2 = 3.14$, (3, $N=96$), $p=.37$. Overall, 67% of the participants in the ostracism:ritual condition used the orange sphere on the red peg, 54% in the affiliation:ritual condition, 50% in the ostracism:instrumental condition, and 42% in the affiliation:instrumental condition (see Table 5).

Engaging in the double tapping action

Table 6. Crosstabulation of Condition and Double Tapping Action

Double Tapping Action	Condition				χ^2	Φ
	<u>Ost:Inst</u>	Ost:Rit	Aff:Inst	Aff:Rit		
Yes	12 (0.50)	12 (0.50)	10 (-0.50)	10 (-0.50)	0.67	.08
No	12 (-0.50)	12 (-0.50)	14 (0.50)	14 (0.50)		

Note. $n = 24$ (per condition), $N = 96$, adjusted standardized residuals appear in parentheses below group frequencies.

There was no difference in engaging in the double tapping action across conditions, $\chi^2 = 0.67$, (3, $N=96$), $p=.88$. Overall, 50% of the participants in the ostracism:ritual condition engaged in the double-tapping action, 42% in the affiliation:ritual condition, 50% in the ostracism:instrumental condition, and 42% in the affiliation:instrumental condition (see Table 6).

Opening the silver box with an object

Table 7. Crosstabulation of Condition and Opening the Box with an Object

Open with Object	Condition				χ^2	Φ
	<u>Ost:Inst</u>	Ost:Rit	Aff:Inst	Aff:Rit		
Yes	5 (-3.70)	22 (4.40)	7 (-2.70)	17 (2.00)	32.92***	.59
No	19 (3.70)	2 (-4.40)	17 (2.70)	7 (-2.00)		

Note. n = 24 (per condition), N = 96, *** = $p < .001$. Adjusted standardized residuals appear in parentheses below group frequencies.

There was a significant difference in opening the silver box with an object (as modeled in the video), across age group and condition, $\chi^2 = 32.92$, (3, $N = 96$), $p < .001$. Adjusted residuals indicate that more children with the ostracism:ritual and affiliation:ritual conditions opened the box with the object than children in the ostracism:instrumental and affiliation:instrumental conditions. Overall, 92% of the participants in the ostracism:ritual condition opened the box with an object, 71% in the affiliation:ritual condition, 29% in the affiliation:instrumental condition, and 21% in the ostracism:instrumental condition (see Table 7).

Correctly inserting an object in the box (Instrumental) vs. Not inserting an object in the box (Ritual)

Table 8. Crosstabulation of Condition and Correct Insertion

Correct Insertion	Condition				P_A	P_B
	<u>Ost:Inst</u>	Ost:Rit	Aff:Inst	Aff:Rit		
Yes	20	24	20	23	0.10	0.07
No	4	0	4	1		

Note. n = 24 (per condition), N = 96, Fisher's Exact Test was performed because less than 80% of cells had an expected frequency of 5 or greater.

There was no difference in correctly inserting (including non-insertion in the ritual condition), across age group and condition, $p=0.10$. Overall, 100% of the participants in the ostracism:ritual condition *correctly* inserted the object (instrumental), or did not insert an object (ritual), 96% in the affiliation:ritual condition, 83% in the affiliation:instrumental condition, and 83% in the ostracism:instrumental condition (see Table 8).

Engaging with the silver box at the end of the sequence only.

Table 9. Crosstabulation of Condition and Engaging with the Box at the End of the Sequence

Engaging box at end of sequence	Condition				χ^2	Φ
	<u>Ost:Inst</u>	Ost:Rit	Aff:Inst	Aff:Rit		
Yes	15 (-0.60)	22 (2.90)	11 (-2.60)	17 (0.40)	11.96**	.35
No	9 (0.60)	2 (-2.90)	13 (2.60)	7 (-0.40)		

Note. $n = 24$ (per condition), $N = 96$, ** = $p < 0.01$. Adjusted standardized residuals appear in parentheses below group frequencies.

There was a significant difference in engaging with the silver box at the end of the sequence only across age group and condition, $\chi^2 = 11.96$, (3, $N=96$), $p<.01$). Adjusted residuals indicate that more children in the ostracism ritual engaged with the box at the end of the sequence only than children in the other conditions. Overall, 92% of the participants in the ostracism:ritual condition engaged with the box at the end of the sequence only, 71% in the affiliation:ritual condition, 63% in the ostracism:instrumental condition, and 46% in the affiliation:instrumental condition (see Table 9).

**Correct sequencing by condition (ritual = blue cube, orange sphere, purple piece;
instrumental = blue cube, orange sphere, red pipe)**

Table 10. Crosstabulation of Condition and Correct Sequencing

Correct Sequencing	Condition				χ^2	Φ
	<u>Ost:Inst</u>	Ost:Rit	Aff:Inst	Aff:Rit		
Yes	15 (-0.80)	21 (2.30)	11 (-2.80)	19 (1.30)	11.44**	.35
No	9 (0.80)	3 (-2.30)	13 (2.80)	5 (-1.30)		

Note. n = 24 (per condition), N = 96, ** = $p < .01$. Adjusted standardized residuals appear in parentheses below group frequencies.

There was a significant difference in engaging with the objects in the correct sequence across conditions, $\chi^2 = 11.44$, (3, $N=96$), $p < .01$). Overall, 88% of the participants in the ostracism:ritual condition engaged with the objects in the correct sequence, 79% in the affiliation:ritual condition, 63% in the ostracism:instrumental condition and 49% in the affiliation:instrumental condition. The adjusted residuals indicate that children in the ostracism:ritual engaged in the correct sequencing more than children in the other conditions and that children in the affiliation:instrumental conditions engaged in the correct sequencing less than children in the other conditions (see Table 10).

Gesture

Table 11. Crosstabulation of Condition and Gesture

Gesture	Condition				P_A	P_B
	<u>Ost:Inst</u>	Ost:Rit	Aff:Inst	Aff:Rit		
Yes	3	5	2	1	0.39	0.28
No	21	19	22	23		

Note. n = 24 (per condition), N = 96, Fisher's Exact Test was performed because less than 80% of cells had an expected frequency of 5 or greater.

Whereas there were trends in the predicted directions, there was no difference in reproduction of the novel gesture across age group and condition, $p=.39$. Overall 21% of the participants in the ostracism:ritual condition reproduced the gesture, 13% in the ostracism:instrumental condition, 8% in the affiliation:instrumental condition, and 4% in the affiliation:ritual condition (see Table 11).

3.5.4. Explanation Task

“Why did you do it that way?” Children’s responses to the question “Why did you do it that way?”, asked following the object manipulation task, were coded as agentive (0), non-explanatory (1), or social (2). An ANOVA with prime (2: ostracism, affiliation), task (2: instrumental, ritual), and age (2: 3-4-year olds, 5-6-year-olds) as between-subjects variables, and the 0-2 content scale as the dependent measure revealed a main effect of prime $F(1, 96) = 3.96, p<.05, \eta_p^2 = .041$. There was a marginal main effect of task $F(1, 96) = 2.98, p<.09$. Pairwise comparisons found that more social responses were provided following the ostracism prime ($M = 1.21, SD = .77$) than following the affiliation prime ($M = .90, SD = .78$), $p<.05$, using the Bonferroni adjustment (see Figure 8).

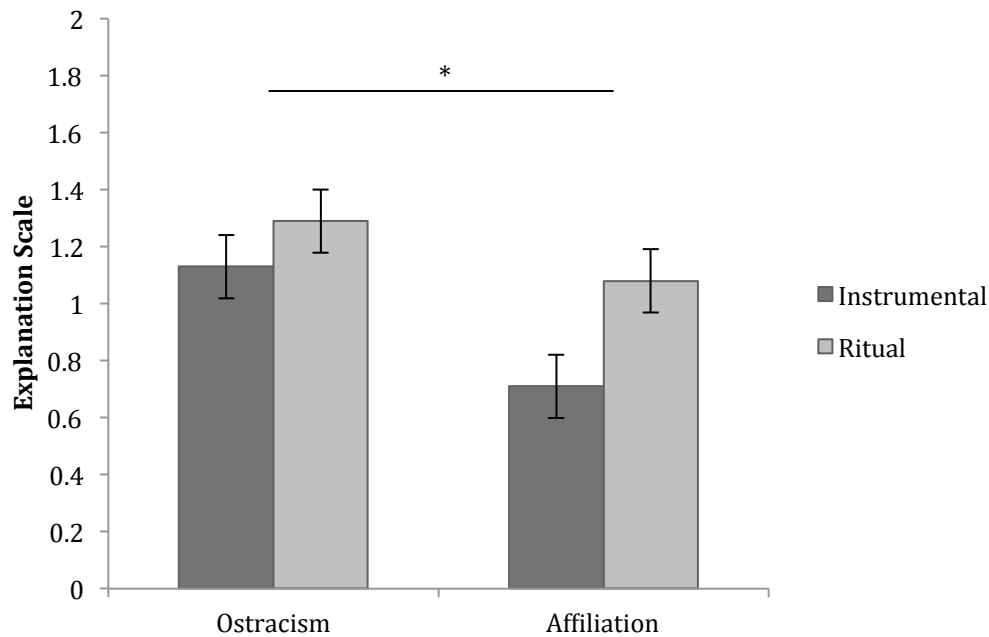


Figure 8. Children's explanation type after each prime and task, collapsed across age groups. Error bars represent SE, * = $p < .05$.

Significantly more participants in the ostracism:ritual condition gave social answers, $\chi^2 = 7.88$, $df = 3$, $p < .05$, $\Phi = .29$. Overall, 54% of participants in the ostracism:ritual condition gave social answers, 33% of participants in the affiliation:ritual gave social answers, 29% of participants in the ostracism:instrumental gave social answers, and 17% of participants in the affiliation:instrumental condition gave social answers. There was not a significant difference in the number of children giving agentic explanations for their behavior by condition, $\chi^2 = 5.51$, $df = 3$, $p = .14$, $\Phi = .24$. Participants in the affiliation:instrumental condition, however, tended to provide more agentic answers than children in the other conditions. Forty-six % of participants gave agentic answers in the affiliation:instrumental condition, 25% gave agentic explanations in the affiliation:ritual condition, 25% of participants gave agentic explanations in the ostracism:ritual condition, and 17% gave agentic explanations in the ostracism:instrumental condition. Finally, there was no significant

difference in the number of children giving non-explanatory answers for their behavior, $\chi^2 = 5.76$, $df = 3$, $p = .12$, $\Phi = .25$. Overall, 54% of participants in the ostracism:instrumental condition gave non-explanatory answers, 42% of participants in the affiliation:ritual gave non-explanatory answers, 38% of participants in the affiliation:instrumental gave non-explanatory answers, and 21% of participants in the ostracism:ritual gave non-explanatory answers.

Also, older children ($M = .43/1$, $SD = .50$) were more likely to give social explanations overall than younger children ($M = .25/1$, $SD = .44$), ($p < .05$, Fisher's Exact Test). Also, younger children ($M = .48/1$, $SD = .51$) were more likely to give non-explanatory answers than older children ($M = .30/1$, $SD = .46$), ($p < .05$, Fisher's Exact Test).

3.5.5. Affiliation questions

“Do you think you would like to meet Brooke?” Depending on counterbalancing, following the explanations, the participants were asked, “Do you think you would like to meet Brooke?” as a measure of their desire to affiliate with the demonstrator in the video. Chi-square analysis revealed that there were no differences by condition as to whether or not the child answered that they would or would not like to meet the demonstrator, $\chi^2 = 2.12$, (3, $N=96$), $p = .55$. Overall the majority of children said they would like to meet the model: 88% in the ostracism:ritual condition ($M = .88/1$, $SD = .33$), 78% in the affiliation:ritual condition ($M = .78/1$, $SD = .44$), 76% in the affiliation:instrumental condition ($M = .76/1$, $SD = .44$), and 68% in the ostracism:instrumental condition ($M = .68/1$, $SD = .48$).

“Do you think you would like Brooke?” Participants were asked, “Do you think you would like Brooke?” as a measure of their liking of the demonstrator in the

video. Chi-square analysis revealed that there were no differences by condition as to whether or not the child answered that they would or would not like Brooke, $\chi^2 = 0.51$ (3, $N=96$), $p=.92$). Overall, the majority of children said they would like the demonstrator: 94% in the affiliation:ritual condition ($M = .94/1$, $SD = .24$), 88% in the affiliation:instrumental condition ($M = .88/1$, $SD = .31$), 82% in the ostracism:ritual condition ($M = .82/1$, $SD = .39$), and 75% in the ostracism:instrumental condition ($M = .73/1$, $SD = .46$).

3.5.6. Sharing task

There were no order effects related to the presentation of the sharing or the affiliation questions. An ANOVA with prime (2: ostracism, affiliation), task (2: instrumental, ritual), and age (2: 3-4-year-olds, 5-6-year-olds) as between subjects variables and the proportion of stickers shared as the dependent measure revealed no effect of prime on children's sharing behavior, $F(1, 96) = .008$, $p=.93$. There was also no effect of task on children's sharing behavior, $F(1, 96) = .007$, $p=.35$, and no main effect of age, $F(1, 96) = .000$, $p=.99$. The model further revealed that there was no interaction between prime and task, $F(1, 96) = 1.96$, $p=.17$.

3.6. Discussion

The results of Experiment 1 replicate the findings of Legare et al. (under review). Children in the ritual conditions (equivalent start- and end-state) had much higher copying fidelity summary scores than children in the instrumental conditions (distinct start- and end-state). As Legare et al. (under review) note, start- end-state equivalency acts as a significant cue guiding children's interpretation and reproduction of modeled behavior. When children interpret action as based in convention they are much more likely to copy actions precisely and ignore obvious affordances of objects

(such as placing an object inside of an open box). Priming ostracism seems to increase copying fidelity of both instrumental and ritualistic action sequences, although this effect was slightly more pronounced in the ritual condition. This finding replicated the findings of Over and Carpenter (2009), with some additional evidence of a differential effect of priming ostracism on copying fidelity of instrumental and ritualistic action sequences. The significant result of the t-test examining the effect of ostracism on the ritual action sequence, however, may reflect a Type 1 error resulting from multiple testing, and the null result of the t-test of ostracism on the instrumental action sequence may reflect a Type II error, or failure to replicate. Further, within the ritual conditions, older children (5-6-year-olds) had significantly higher copying fidelity scores than younger children (3-4-year-olds). This difference was not observed in the instrumental conditions (although, again, this could be due to a Type I and Type II error, respectively). Legare et al. (under review) similarly found that older children had higher copying fidelity scores within the ritual condition. Findings from the literature on over-imitation (Lyons et al., 2007; McGuigan et al., 2007; Whiten et al., 2009) have also found that over-imitation increases with age. This may be due to increasing attention to social convention with age.

Examination of the individual elements of the copying fidelity summary score reveals some interesting findings. First, children in the ostracism:ritual and affiliation:ritual were more likely to reproduce opening the silver box with an object than children in the ostracism:instrumental and affiliation:instrumental conditions. Being in the ritual conditions seems to increase the likelihood of the reproduction of this element of the action sequence. Second, children in the ostracism:ritual condition were more likely to reproduce the correct sequencing than children in the other conditions and children in the affiliation:instrumental condition were much less likely

to reproduce this element. Third, children were much more likely to engage with the silver box at the end of the sequence only in the ostracism:ritual condition than children in the other conditions whereas children in the affiliation:instrumental condition were much less likely to engage with the silver box at the end of the sequence only. Finally, whereas there were no significant differences in reproduction of the novel gesture, there were trends indicating that children in the ostracism:ritual condition were more likely to reproduce this element of the action sequence than children in the other conditions.

The finding that children were much more likely to only engage with the silver box at the end of the sequence (as modeled) is interesting because it speaks to previous findings related to the distinction between imitation and emulation. Ninety-two % of participants in the ostracism:ritual condition engaged with the box at the end of the sequence only, 71% in the affiliation:ritual, 63% in the ostracism:instrumental, and only 46% in the affiliation:instrumental. This means that in the affiliation:instrumental condition and the ostracism:instrumental condition, and the affiliation:ritual condition to a lesser extent, children were more likely to engage with the silver box earlier on in the sequence than children in the ostracism:ritual condition. For example, many children in the affiliation:instrumental condition went straight to opening the silver box and placing the red pipe inside. This could be argued as evidence that children in the affiliation:instrumental condition were more likely to engage in end-state emulation. When start- end-states are equivalent (ritual), and when primed with ostracism, children reproduced more of the entire action sequence, waiting until the end to engage with the silver box. This behavior could be argued as evidence of, at a minimum, sequence emulation. The results of this study cannot speak to the distinction between sequence emulation and sequence imitation (as conceived by Heyes, in press). Although, the trends in reproduction of the novel gesture hint at the possibility that affiliative

motivations underlying the ritual stance may make children more likely to engage in sequence imitation. It could be that when objects are included in an action sequence, attention to these objects takes precedence over attention to novel, gestural body movements.

Whereas the findings of Experiment 1 provide some evidence of the affiliative basis of the ritual stance, it may have been that because both action sequences were causally opaque, priming ostracism had an impact on both action sequences. From examination of the findings of Over & Carpenter (2009), the elements of their clearly instrumental action sequence that were most reliably copied following ostracism priming were the more ritualistic, causally opaque elements. For example, children in the ostracism and control conditions were equally likely to reproduce the angle of the tool used in achieving an instrumental goal, whereas children in the ostracism condition were much more likely to reproduce the more ritualistic action of rolling the tool between one's hands (Over & Carpenter, 2009). The findings of Experiment 1 provide evidence that learning unique social conventions, such as ritual, from the observation of others is likely motivated by implicit affiliation goals that can be modulated by threats to affiliation, such as ostracism. The explanation data provide further evidence of the affiliative basis of the ritual stance. Children primed with ostracism were more likely to provide a social explanation for their behavior than children in the other conditions. Chi-square analysis revealed that children were more likely to give social explanations in the ostracism:ritual condition overall. There were no differences in the amount of stickers children shared with the model. Children in the USA are typically taught from a very young age to share with others. This could account for some of the null findings in the sharing task. Also, the primes were quite minimal and might not have created enough impetus to boost sharing in the ostracism conditions. Data from the affiliation

questions, however, provided no significant differences between conditions. Overall, the majority of children said that they would like the model and that they would like to meet the model. It could be that all children responded the same to these questions because they had no reason not to like or want to meet the model, however, in light of these null findings alternative interpretations of the findings of Experiment 1 must be considered. From the results of Experiment 1 it is difficult to conclude that affiliative motivations associated with imitation of ritualistic action result in affiliative consequences, including endorsement of increased affiliation or sharing a resource. Further, there are possible alternative interpretations for the explanation data, related to similarity enhancement and norm adherence. These limitations are considered in the General Discussion (Chapter 5). Future research is required to disentangle these interpretations and more accurately map the possible connection between affiliation, similarity enhancement, norm adherence, and how children learn cultural conventions.

The lack of instrumental motivations in combination with affiliation goals result in adherence to ritualistic action sequences not grounded in physical-causal rationales. Individuals are motivated to demonstrate affiliation, similarity and deference to the group and this may contribute to the scriptedness and rigidity of ritualized behavior as well as its cohesive properties. In the case of the current experiment, the ‘group’ is ambiguous and could be thought of in this instance as loosely bound. The experimental set up assumed that children perceive individuals, such as the experimenter, who speak the same language and are from the same city as constituting part of their ‘group.’ Experiment 2, however, examines how ostracism from a symbolically marked in-group affects copying fidelity. Along with findings of Legare et al. (under review), Experiment 1 provides a departure from, and expansion of, the social learning literature that has heavily emphasized causal reasoning and the acquisition of instrumental

knowledge, further demonstrating that ‘over-imitation’ is not always geared toward causal reasoning but can occur in an automatic way geared at maintaining affiliation with group members.

If high fidelity copying within the ritual stance is promoted by a motivation to foster or maintain affiliation with group members, then children’s copying fidelity should be impacted by whether an in-group or out-group member is socially excluding them. Using a direct experience of ostracism, Experiment 2 explores how being ostracized or included by in- or out-group members affects copying fidelity of a ritualistic action sequence. Ostracism is predicted to activate psychological security systems aimed at maintaining affiliation with group members. Therefore, a direct experience of ostracism is predicted to amplify an affiliative behavioral response thereby increasing copying fidelity of a group ritual.

Chapter 4. Experiment 2

Group membership, ritual, and ostracism

All groups have unique characteristics, such as beliefs, norms, and social systems that contribute to a shared understanding and affiliation (Sherif, 1936). Thus, to maintain group coordination and solidarity, children must learn the behaviors of their group as well as their ideologies. The development of ritualistic behavior has important implications for understanding social group dynamics in childhood as well as informing our understanding of the tendency to prefer in-group members to out-group members (Brewer, 2007; Caporael, 1997; Kurzban & Neuberg, 2005; Richerson & Boyd, 2005). In Experiment 2 (5-6-year-olds, four conditions, $N = 104$) I hypothesized that an experience of inclusion or exclusion affects subsequent imitation of an in- or an out-group's ritualistic action sequence. Further, the minimal primes used in Experiment 1 may not have provided enough impetus to increase prosocial behavior, as measured by sharing. For this reason, a sharing task is incorporated within the current experiment. I hypothesize that being excluded by one's in-group will create the greatest impetus to share a resource with other group members.

Because Experiment 2 explores how a direct experience of exclusion from an in- or out-group affects copying fidelity of a ritualistic action sequence, this section begins with an overview of children's understanding of group membership and social convention that leads into a discussion of findings related to how ritual promotes in-group cohesion, cooperation, and pro-sociality. I then describe previous research on how ostracism and group membership affects well-being and belonging. Very little research has examined the development of children's engagement in ritual action in relation to group membership and identity. Thus, the research presented in this section is designed to examine how categorization (using the minimal group paradigm) within

a group, and subsequent ostracism or inclusion by that group, or an out-group, affects copying of a novel, ritualistic action sequence performed by either an in- or an out-group member. I will also assess group attitudes and pro-social behavior. I propose that ostracism is likely to increase copying fidelity as an affiliative response. I further propose that ostracism by an in-group will create the greatest impetus to copy an in-group member as an attempt at reinclusion. Research with adults has shown that ostracism has negative effects on well-being and a sense of belongingness regardless of group membership. Whereas the immediate impacts of ostracism on well-being by an in- or out-group have been repeatedly shown, less research has examined performance as a means of demonstration of adherence to in-group conventions to attempt reinclusion with the group.

4.1. Children's understanding of group membership and social convention

Group membership is vitally important to individual survival and reproduction (Buss & Kenrick, 1997). As such, it is in an individual's best interest to maintain a strong affiliation and rapport with other group members. How do individuals create and maintain this affiliation? Group members must adhere to the ways of their group to demonstrate their compliance and commitment. Adherence to group norms and conventions fosters trust and affiliation that facilitates continued cooperation (McElreath, Boyd, & Richerson, 2003). Ruffle and Sosis (2003) have shown that individuals preferentially cooperate with anonymous members of their in-group as opposed to an out-group. Individuals' preference for and conformity to their own group over other groups is one of the well-documented phenomena in the social sciences (Brewer, 2007). Studies utilizing the minimal group paradigm (Tajfel, 1970; Tajfel,

Billig, Bundy, & Flament, 1971) have shown that simply placing individuals into arbitrary groups can create an in-group preference.

Awareness of social categories that distinguish people based on group membership develops early in ontogeny (Killen & Rutland, 2011). This awareness may derive from early emerging tendencies to view category members, even members of social categories, as having a stable, unchanging essence (psychological essentialism) that underlies their category distinction (Gelman, 2009; Gelman, Heyman, & Legare, 2007). The ability to distinguish social categories allows children to determine what behaviors they should engage in to effectively operate within a group. To coordinate behavior for cooperative efforts, children must learn and adhere to the norms and conventions of their group (whether it be in a familial, school, or play setting). This entails being able to identify with one's group and preferring one's in-group.

Social Identity Theory (Tajfel & Turner, 1979) posits that individuals come to identify with their group and this identification comes to form part of their self-concept. To maintain a positive self-concept, and thus a positive group concept, individuals are inclined to view their group's attributes positively and to derogate the attributes of out-groups (Killen & Rutland, 2011). This in-group preference and out-group derogation is thought to form the basis for prejudice. Recent developmental research has found that children with strong in-group identification demonstrate in-group preference. Interestingly, children with strong in-group preference have also been shown to have greater regard for children within their group who show loyalty (Abrams & Rutland, 2008; Killen & Rutland, 2011).

Other research has found that children need not identify with their group to demonstrate in-group preference. Bennett, Lyons, Sani, and Barrett (1998) tested children who reported that they were not aware of being, or did not categorize

themselves as members of their national group (either Scottish Or English). The authors predicted that even though these children did not categorize themselves as national group members, they would still show in-group preferences due to the exposure to positive expressions towards one group as opposed to negative expressions towards another group. The authors found that this was indeed the case. The findings of this study cast doubt on Social Identity Theory's claim that in-group preference comes through self-identification with the group. It seems that children can acquire an in-group preference in the same way as acquiring social conventions, via copying the behaviors and attitudes of adult group members. Although, it could be that this preference comes through identification with the members of one's group, not necessarily a label of national identity. Indeed, identification with a group has been shown to occur in "minimal groups" involving arbitrary assignment of group membership.

Studies utilizing the minimal group paradigm have shown that group biases exist without prior prejudice or stereotypes. In-group favoritism can be created through simply placing individuals into two arbitrary groups (Tajfel, 1970; Tajfel et al., 1971; Diehl, 1990). Self-categorization into a group alone may be enough to foster in-group preference. Studies using versions of the minimal group paradigm with children to examine intergroup attitudes have found similar results (Bigler, Jones, & Lobliner, 1997; Patterson & Bigler, 2006). Children in an 'experimental classroom' were placed into arbitrary groups by the assignment to wear yellow or blue shirts. The teachers in the experimental classroom were instructed to segregate group activities based on behavior and use verbal cues to delineate between individuals based on group membership. The control classroom involved wearing differentially colored shirts but no engagement in any group related behavior or verbal discrimination based on shirt

color. Children in the experimental classroom demonstrated increased awareness of variability between groups compared to children in a control condition classroom.

Children in the experimental classroom also endorsed more positive attributes for their in-group as opposed to the other group. Children in the control classroom did not show this pattern (Bigler et al., 1997). Children placed within groups seem to have a rather automatic expectation of standards for group behavior, involving moral and conventional prescriptions (see Kalish, 2005).

Research evaluating the Social Domain model (Smetana, 2006; Turiel, 1998) has found consistent evidence that ‘rules with a moral basis, such as those involving harm and unfairness, are treated differently from rules with a conventional basis, such as those involving customs, traditions and etiquette (Killen & Rutland, 2011, p. 26). Both moral and conventional behavior is used to define the types of activities a group should engage in. These activities come to constitute the shared group identity and come to mediate group status and inclusion. How do children come to understand the demarcation of groups as based on shared norms and conventions?

Kalish (2005) contends that very young children are unlikely to understand the conventional, or constructed nature of social prescriptions. Babies are unlikely to understand convention at all. The units of focus are the intermediary stages between no understanding of conventional aspects of life and understanding the socially constructed nature of convention. Kalish (2005) makes the point that ‘status implications are distinct from physically-causal properties and from preference/utility-based decisions’ (p. 248). Using Searle’s (1995) analysis of ‘social reality,’ status is ‘counting as’ something, an abstract representation of assignment of prescriptions and or properties. Status assignments provide rules of engagement with the cultural world. Young children tacitly accept status assignments, rules, and prescriptions and expect

others to do the same. Kalish (2005) contends that identity within a category may be an assigned status. When children make social group categorizations they are making a judgment of how these groups should be treated and how individuals within groups should behave. How children learn these assignments, rules and prescriptions is likely via observation of the social realm into which they are born as well as increasing engagement in imitative activities.

Studies using imitation as an index of children's understanding of conventionality have found that after seeing a demonstration of how to use an object, young children will tend to use that object only in the manner demonstrated and expect others to do the same, a phenomenon termed functional fixedness (Casler & Keleman, 2005). This suggests that young children may grasp that objects have particular functions and that this generalizes to all subsequent use and users of the object, a convention. Other studies have also found that children expect others to use the same labels for objects (Baldwin & Tomasello, 1998). To determine if children understand the normative aspects of a game, or how things *should* be, Rakoczy et al. (2008) evaluated the amount of normative protest evinced when a third party made a mistake in a game as opposed to when they played correctly. It was found that more normative protest was generated in the mistake condition even among the youngest participants (2 years), although at a lower rate than the 3-year-olds (Rakoczy et al., 2008). These findings suggest that young children even understood the context of the game and differentially protested based upon this knowledge. These findings suggest that young children's ability to understand the normative structure of objects and situations displays the beginnings of the ability to act collectively, a capacity that is essential and unique to humans and that underlies much of human culture (Rakoczy et al., 2008).

Subsequently, Schmidt, Racokzy, and Tomasello (2011) found that children as young as 3-years-old enforce norms without explicitly normative language or pedagogical cues. The authors suggest that children use cues related to intentionality, specifically marking an action as familiar and well known, to guide their normative expectations. In contrast to this intentionality account, Kenward et al. (2011) has recently provided evidence that children will engage in automatic normative encoding of an action sequence. Kenward et al. (2011) asserts that children may be unconsciously encoding actions as normative in that they often cannot give a good reason for why they carried out actions that were clearly causally unnecessary in achieving a goal. Importantly, children are able to encode actions as normative without knowledge of what makes the actions normative or the reasons for this normativity. This echoes Bloch's (2005) description of ritual participants' responses to questions of why they are performing specific ritual actions. Individuals may unconsciously encode actions as the prescribed, or proper way of behaving in a particular context. The combination of affiliative motivations, automatic mimicry, and unconscious normative encoding may play a role in ritual's effects on group commitment and cohesion.

4.2. Ritual participation and group cohesion

Recently, Swann, Jetten, Gomez, Whitehouse, and Bastian (2012) have proposed a theory of how individuals align with their group via identity fusion. The theory of identity fusion offers an alternative perspective to social identity theory (Tajfel & Turner, 1979), proposing that if people are highly fused with their group, the boundaries between social self and individual self are more permeable. This means that highly fused individuals can experience a feeling of 'oneness' with the group that promotes acting for the group the same as one would act for one's self (Swann et al.,

2012). This theory has important implications for the effects of ritual on group cohesion. Because rituals involve shared experiences among group members involving causally opaque behavior, and, often, frightening ordeals (Atkinson & Whitehouse, 2011; Whitehouse, 1995, 2000, 2004), rituals are likely to contribute to identity fusion and increased social cohesion. In this way, ritual also acts as a salient group identity marker. Because the elements of ritual are causally opaque, lacking salient physical-causal rationales, and in many cases containing arbitrary actions, they are especially suited as markers of group identity (Whitehouse, *in press*).

Researchers have argued that participating in the rituals of one's group acts as a signal of group commitment, thereby contributing to social cohesion (Bulbulia 2004a; Cronk 1994; Irons 1996, 2001; Sosis 2000, 2003, 2005; Sosis & Bressler, 2003; Sosis & Ruffle, 2003). Social scientists have long argued that rituals promote interpersonal bonding (Bloch, 1991; Durkheim, 1912; Turner, 1969) and shared beliefs (Geertz, 1973). Public ritual displays also demonstrate commitment to in-group members by signaling group identity (Henrich, 2009). Henrich (2009) has proposed that rituals may increase cooperation within groups because they act as credibility enhancing displays (CREDS). Because verbally expressed beliefs and/or commitments are open to deception, learners have evolved cognitive mechanisms that weigh behavioral commitment against expressed commitment. When rituals are costly to perform, in terms of time, energy expenditure, pain, sacrifice, etc., they act as signals of commitment to group ideologies. Much research with adults has examined the relationship between ritual and cooperation (Henrich, 2009; Sosis 2000, 2003, 2005; Sosis & Bressler, 2003; Sosis & Ruffle, 2003) and the process by which rituals influence attitudes towards in- and out-group members.

Irons (2001) argued that due to the driving force of inter-group competition, religion and its practices serve as hard-to-fake signals of group commitment, thereby contributing to social cohesion. Specifically, Irons presents the view that irrational commitment, disregarding costs and benefits entirely, is required for religion to be an effective signal of group commitment. Sosis (2003) presents a clarification of Iron's (2001) theory of religion as hard-to-fake signals of commitment that foster intragroup cooperation, asserting that hard-to-fake ritual signals promote trust and affiliation among group members. Sosis and Ruffle (2003) found that on a religious, as opposed to secular Israeli kibbutz, the males (who engaged in public religious rituals) were more likely to cooperate in an economic game. Soler (2012) has recently provided evidence in Brazil that individuals who are adherents of Candomble who reported greater religious commitment were more likely to behave generously in an economic game and were more likely to receive cooperation from other group members. Sosis and Alcorta (2003) and Sosis and Bressler (2003) have also found that the longevity of religious communes is related to the degree of costly rituals/ signals required of commune members. Because costly rituals signal commitment to the group, the more rituals involved, the longer the existence of the group. Many correlational studies have found a relationship between ritual and commitment to group norms. Brooks (2003) and Monsma (2007) have found that ritual participation is related to the amount of resources donated to the religious group.

Anthropologists have further noted the effects of rituals involving synchronous movement on group cohesion and cooperation. Durkheim's (1912) idea of collective effervescence captures the feelings of euphoria associated with moving in time with a group of people. Using group economic games Wiltermuth and Heath (2009) demonstrated, across a series of three studies, that engaging in synchronous movement,

and even synchronous singing, increases cooperation, self-reported feelings of connection to group members, and increased trust in group members. This research also demonstrated that individuals who engaged in synchronous ritual action were more likely to continue contributing more to the public goods over a series of 5 rounds than participants in an asynchronous condition (Wiltermuth & Heath, 2009). Contrary to Durkheim's (1915) hypothesis that participation in synchronous rituals creates euphoria, or collective effervescence, that contributes to social cohesion, Wiltermuth and Heath (2009) found that feelings of happiness did not mediate the effect of synchrony on cooperative behavior.

Ritual provides a signal of group commitment and creates a strong bond between group members through the enactment of shared group norms. Affiliation with a group is essential to humans and ritual provides a means of creating and maintaining group bonds. Yet, very little research has experimentally tested how categorization within a group affects children's engagement in conventional, ritualistic behavior. Social group psychology encourages the acquisition and internalization of group norms and conventions, and these in turn contribute to group cohesion. When group membership is threatened, implicit affiliative motivations are heightened and individuals' typical responses are attempts at reinclusion (Williams, 2007). A particularly strong means of securing reinclusion is increased adherence to the norms and rituals of one's group. Children are hypothesized to react to implicit social cues when acquiring cultural knowledge, such as the threat of ostracism. Children are also likely to engage in attempts at reinclusion with their group following an experience of ostracism. Attempts at reinclusion may be comprised of increased willingness to incur a cost for the group and high fidelity copying of ritualistic action. When confronted with social exclusion, implicit affiliation goals will make children more likely to

engage in displays of commitment to the group, involving precise copying of actions. I will next briefly discuss research related to ostracism while possessing a group membership before providing the hypotheses and predictions of Experiment 2.

4.3. Ostracism by an in-group versus an out-group

Williams et al. (2000) hypothesized that ostracized individuals would be more likely to conform to a group norm. This hypothesis is based on the idea that when individuals detect potential ostracism they will be inclined to demonstrate their worth as a group member by enhancing performance (Baumeister & Tice, 1990). The authors predict, however, that the nature of the group that is ostracizing will have an effect on subsequent conformity. Social identity theory predicts that being ostracized by an in-group should have different effects than being ostracized by an out-group. Feelings of belonging should be most threatened when being ostracized by members of one's own group (Williams et al., 2000). To test these hypotheses, Williams et al. (2000) used self-assigned group membership as either a PC or a Mac user as the in-group, out-group distinction. In a between-subjects design, participants were either included in or ostracized from an in-group or out-group via Cyberball (Williams et al., 2000) or did not play Cyberball in one of two control conditions. Conformity was measured using a perceptual judgment task similar to the classic conformity tests used by Asch (1956). Following Cyberball, participants were shown the judgments of five individuals from a new group to which the participant had been reassigned. The results demonstrated a main effect of ostracism versus inclusion. Ostracized individuals conformed more than included individuals within the line judgment task. The authors found no effect of or interaction with group membership. The authors concede that had the participants been

asked to review the judgments of the group that ostracized them, instead of a new, unrelated group, the interaction may have occurred.

As Wirth and Williams (2009) note, ostracism can create a very ambiguous situation, especially within the Cyberball paradigm. Often individuals do not know why they have been ostracized and typical attributions for the experience include, something about themselves, something about the other players, and external explanations. In everyday interactions experiences of ostracism are often attributed to group membership, such as ethnicity and gender (Wirth & Williams, 2009). To test how ostracism while possessing a group membership affects threat to needs of belongingness and recovery from ostracism, Wirth and Williams (2009) had participants play Cyberball while possessing a permanent, temporary, or no group membership. The authors hypothesized that ostracized, versus, included, participants will initially endorse decreased need satisfaction as measured by self-reports on a questionnaire assessing belonging, self-esteem, control, and meaningful existence regardless of group membership. A second hypothesis was that possessing a group membership would have an effect within the reflective stage following ostracism. Specifically, the researchers had competing predictions: (1) recovery from ostracism, as measured by self-report questionnaire, would be greater for participants who attributed the experience of ostracism to their permanent group membership (gender) via the externalization of the attribution and the protection provided by permanent group membership; or (2) recovery from ostracism while possessing permanent group membership would be less due to internal attributions of group membership compared to participants in a temporary group (blue or green team) (Wirth & Williams, 2009).

The results showed that there was a main effect of ostracism but not group membership on reports of need threats immediately following the Cyberball

interaction. There was no difference between participants in the no group and temporary group conditions in recovery from ostracism. A recovery x inclusionary status x group membership interaction was found in which participants in the permanent group membership condition recovered more slowly from an experience of ostracism. This finding supported the second hypothesis the authors proposed that possessing a permanent group membership will result in a slower recovery from an experience of ostracism (Wirth & Williams, 2009). Attributions for the experience of ostracism were also collected via self-report and found that ostracized participants were just as likely to make external as internal attributions for being ostracized. Therefore, the authors conclude that different types of attributions cannot explain the effect of group membership on recovery from ostracism. Overall, the authors conclude that group membership is not a moderator of reflexive response to ostracism. It is important to note that whereas group membership has not been shown to affect responses to ostracism in terms of threat to belongingness, self-esteem, control, and meaningful existence, the dependent variables in all of these studies have been measured via self-report.

Clearly, ostracism hurts, regardless of who is excluding. All of the previously reported research has examined the immediate response to ostracism in adults by measuring self-reported threats to fundamental needs. As Williams (2007) notes the first response to ostracism is typically attempts at reinclusion. If individuals are allowed an opportunity to demonstrate group membership via the engagement in the ritual of their group, they may be more likely to rigidly copy this ritual if ostracized by an in-group as opposed to an out-group.

4.4. Hypotheses and Predictions

As a next step in examining the affiliative nature of the ritual stance, Experiment 2 uses a direct experience of ostracism as a means of examining children's copying of ritual action and pro-social behavior as related to group membership. Ritual acts as a salient group marker that allows for cohesion among group members. These effects likely result from psychological systems geared towards maintaining affiliation with group members. Children should be sensitive to contextual factors such as the nature of the group that is ostracizing and demonstrating a novel action sequence. Therefore, Experiment 2 seeks to explore the differential effects of being ostracized by an in-group, as opposed to an out-group, on copying rigidity and pro-social behavior. Children may use copying as a means of demonstrating and maintaining group membership.

Children interpret ritual action differently than instrumental action. When children interpret a novel action sequence as based in social convention (the ritual stance), they will imitate more rigidly, engage in less behavioral variability/ innovation, and provide more social explanations for their behavior (Legare et al., under review). Priming ostracism amplifies the ritual stance (and the instrumental stance to a lesser degree), likely through the enhancement of implicit affiliation goals (Experiment 1). Whereas these effects have been shown to occur merely upon the activation of the ritual stance, amplified through third-party priming of ostracism, children should also be sensitive to contextual factors such as the nature of the group that is ostracizing and demonstrating the novel action sequence. Experiment 2 addresses the question of: Will being ostracized by an in-group result in increased imitative rigidity, affiliative mimicry, and prosocial behavior as a means of demonstrating and maintaining group membership?

As reviewed in Section 2, affiliative mimicry has been shown to increase liking and rapport between individuals, and is likely an important mechanism for maintaining intra-group relations. Lakin et al. (2008) have shown that adults increase affiliative mimicry of an in-group member following an experience of ostracism. Lakin et al. (2008) suggest that affiliative mimicry can be utilized as a low-cost, low-risk attempt at reinclusion. Affiliative mimicry has not been shown to occur in children. The findings of from Experiment 1, and Over and Carpenter (2009), however, demonstrate the possibility of a continuity of function between children's overt copying and adult affiliative mimicry. Further, it may be that an experience of ostracism may in some way disinhibit affiliative mimicry within young children through the enhancement of implicit affiliation goals. Indeed, whereas reproduction of the novel gesture was low across conditions, children did engage in the gesture more within the ostracism:ritual condition (Experiment 1). It may be that object manipulation took precedence within the task, thereby masking the propensity toward gestural copying. As a next step in examining the affiliative nature of the ritual stance, I aim to use an experience of first-person ostracism as a window through which to examine children's copying of ritual action, both object-related and gestural, and prosocial behavior as related to group membership. Whereas I originally did not find that priming third-party ostracism within the ritual stance increased sharing, it may be that the third-party experience did not create enough impetus to engage in overt prosocial behavior as a means of promoting reaffiliation.

Experiment 2 was designed to assess the effects of a direct experience of ostracism, using Cyberball (Williams, Yeager, Cheung, & Choi, 2012), versus inclusion on copying fidelity of an in-group or out-group ritualistic action sequence. Cyberball has mostly been used with adult and adolescent participants and the current

experiment is the first to utilize this manipulation with young children. The program was initially piloted with 4- 5- and 6-year-olds. 4-year-olds had difficulty operating and understanding the game and therefore the current experiment includes only 5- and 6-year olds. As 3-4-year-olds have been shown to understand convention and normativity (Rakoczy et al., 2008), more research and program development is needed to modify this paradigm for younger children.

Across conditions, children were told that they were part of the yellow group, the ‘in-group,’ within the study. Because many rituals contain elements that are gestural and communicative (Heyes, in press) children watched a video in which a model performs a ritualistic action sequence that includes roughly the same amount of object-oriented actions and gestural actions. Children ostracized by in-group members were predicted to have the highest copying fidelity summary scores. Further, children included by in-group members were predicted to display high summary scores as well. The summary scores of the children within the ostracism:in-group condition, however, are hypothesized to be higher overall due to the enhanced affiliation goal created by the experience of ostracism. The scores of children within the out-group conditions are hypothesized to be much lower than the scores of children within the in-group conditions. Because ostracism is such a powerful experience, however, we may find that children within the ostracism:out-group condition have similar scores to those of children within the inclusion:in-group condition. The scores of children within the inclusion:out-group condition are predicted to be the lowest.

The question, “Why did you do it that way?” was asked to assess any potential differences in propensity to provide social versus agentic answers depending on condition. I predicted that children within the in-group conditions would give more social as compared to agentic explanations. I also predicted that children within the

ostracism conditions might have more likely to give social explanations as well. Ostracism might heighten attention to social information and therefore increase the probability of giving a social answer for behavior.

Within studies using adult participants, it has been found that experiencing ostracism via Cyberball leads to a decreased sense of belongingness. To assess participants' sense of belongingness to the groups, children were asked how much they felt they were a part of the yellow group (the in-group across conditions) and the green group (the out-group across conditions) using a Likert scale similar to the fusion scale showing smiley faces in various stages of integration with yellow circles, and the same with green circles. I predicted that following ostracism by an in-group, children would report a decreased sense of belonging to the yellow group. I further predicted that children included by the in-group would report an increased sense of belonging with the in-group. I also predicted that being included by an out-group may lead children to report an increased sense of belonging with the green group.

Children within the ostracism:in-group condition were predicted to endorse threats to belongingness. Having the opportunity to engage in a group ritual following a threat to group membership, however, may increase a sense of belongingness or the importance of belonging to the group. Participants were asked how much they like the yellow group and the green group using Likert scales. Because their group membership has been threatened, children within the ostracism:in-group condition were predicted to endorse more liking for their group than the children in the other conditions. Children within the out-group conditions may endorse no liking at all because they are able to explain away the experience of ostracism as based on group membership, or only a little liking within the inclusion:out-group condition.

Participants were also asked how important it is to them to be a part of the yellow group using a Likert scale. Because their group membership has been threatened, children within the ostracism:in-group condition may be more likely to say that being a part of the yellow group is very important to them. Children within the ostracism:out-group may also say group membership is important due to the experience of ostracism.

To measure the propensity towards prosocial behavior following ostracism versus inclusion by an in-group or an out-group, participants engaged in a sharing task. Participants were given three pennies. Pennies were used in the current experiment for practical reasons. They were actually more cost effective than stickers and were valued within the data collection site due to the presence of a game that required pennies. They were then be shown an image of the three avatars they played Cyberball with and told that these group members have no pennies. The participants were then be asked if they would like to share any of their pennies with these group members. Children within the ostracism:in-group condition were hypothesized to share more with their group as a means of ingratiation to group members following an experience of social exclusion.

4.5. Method

4.5.1. Participants

One hundred and four 5-6-year-olds (M age 5.51; range 5,0 to 6,11) were recruited from a university town in the American southwest. Participants ($N = 104$, 60 female) were primarily Euro-American and from middle-class families. Because there were minimal age differences in Experiment 1, 5-6-year-olds participated within the current study. Also, children younger than five may have difficulty playing the

Cyberball game³ and 5-6-year-olds have had more interaction within group settings than younger children. One participant was excluded due to computer error and one participant decided that they no longer wanted to participate and ended the study early.

4.5.2. Materials

Yellow group items. Children were given a yellow visor and two yellow wristbands (one for each wrist) to signify their membership in the yellow group.

Yellow group preferences training task. To train participants on how to use the mouse pad and to demonstrate the participant's similarity to the other members of the yellow group, a short training task was created using Powerpoint software. The Powerpoint began on a screen with a child's drawing of two children wearing yellow and holding a yellow balloon. Clicking on the drawing took participants to the next slide in which they were presented with pictures of three animals (a dog, a cat, and a horse). Participants were asked to click on which animal was their favorite. Regardless of which animal they pick they were taken to a slide that had a picture of the animal they chose next to the drawing from the start slide and were told, "people in the yellow group like that kind of animal too." This same process was repeated for fruit preferences (an apple, a pear, and a strawberry), and playground equipment preferences (the monkey bars, the swings, and the slide).

Cyberball (ostracism manipulation). To prime ostracism versus inclusion, participants played Cyberball (Williams et al., 2012), a computer game that has been extensively used in research on ostracism with adults (Figure 9), involving tossing a ball back and forth with three other individuals who were either in-group or out-group members. When the game began, participants saw their player at the bottom center of the screen in a yellow shirt. Participants saw the three other players, wearing yellow

³ Experiment 2 was piloted with 4-year-olds. Younger 4-year-olds had difficulty operating the Cyberball game. Younger 4-year-olds also had difficulty with the imitation task.

shirts within the in-group conditions and green shirts within the out-group conditions, to the upper left, upper right, and upper center of the screen. The player on the left holds the ball and tosses it to either the participant or one of the other players. In the ostracism conditions, participants received a couple of tosses and then were left out of the game for the remaining two minutes of game play. Within the inclusion conditions, participants were tossed the ball periodically throughout the game.

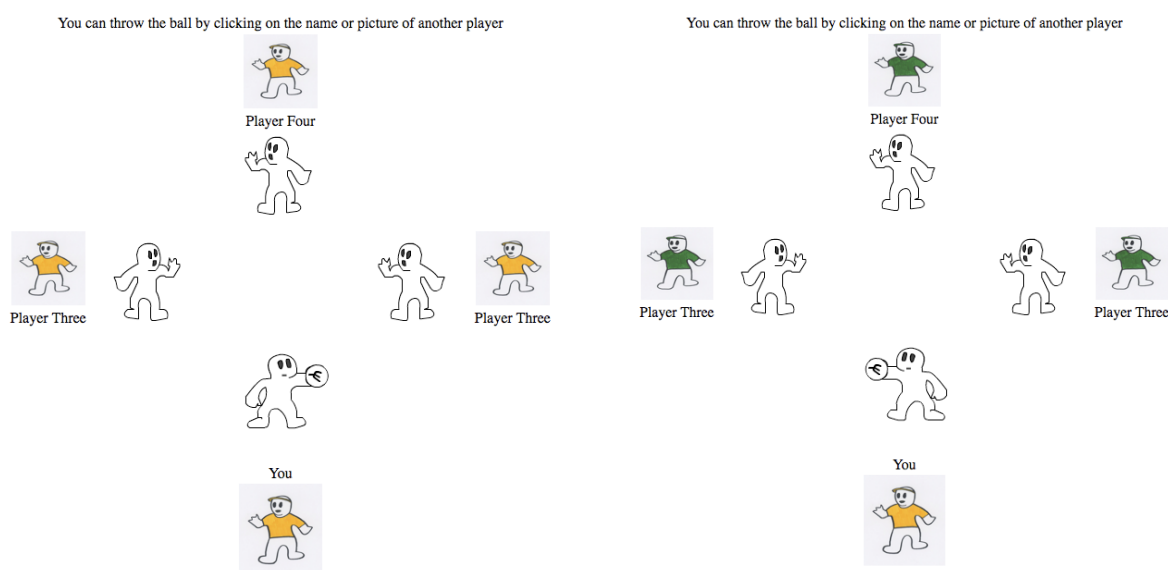


Figure 9. Cyberball screenshot examples of in-group and out-group conditions.

Object Set for Video Demonstration and Object Manipulation Task. The same set of novel objects used in Experiment 1 was utilized in order to demonstrate object manipulation in a videotaped novel action sequence, with the exclusion of the silver box. The stimuli included a blue cube, orange sphere, purple piece, and a wooden peg-board (with three wooden pegs, colored yellow, red, and green), see Figure 10.

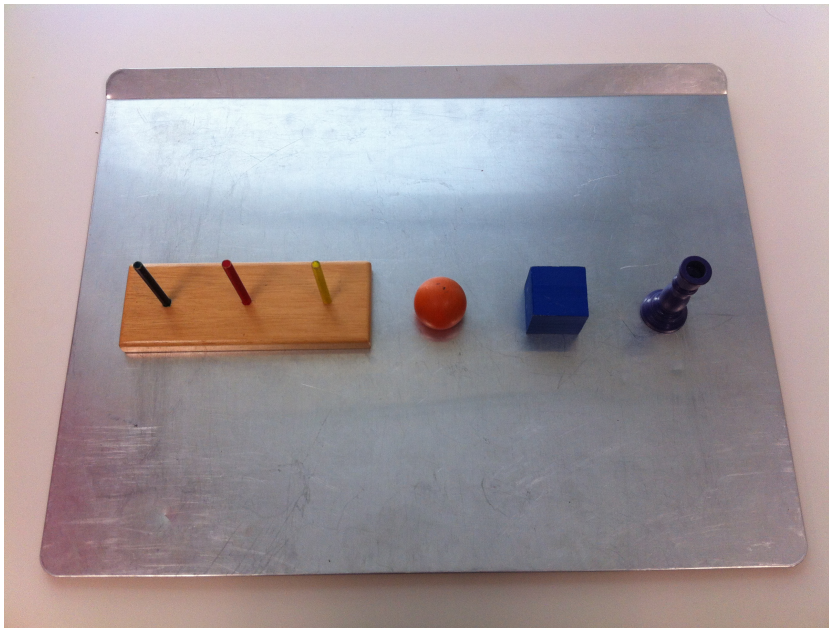


Figure 10. Object set

Video Demonstration of Novel Action Sequence. Object manipulation demonstrations were filmed for the in-group and out-group conditions for continuity in presentation to participants. For the in-group video the model was wearing a yellow shirt, visor, and wristbands. For the out-group condition the same model was wearing a green shirt, visor and wristbands. Each video was 20 seconds in length.

Sharing Task. Children were given three pennies.

4.5.3. Design and procedure

Children were told that there were two groups of people playing the game, the yellow group and the green group. All children were assigned to the yellow group and given a yellow visor and two yellow wristbands. Participants then engaged in the yellow group preferences training task to familiarize them with using the mouse to click on things on the screen. The training game was designed to show that individuals within the yellow group have similar preferences to the participant as a means of increasing a sense of shared experience and commonality. Following this, participants

were told that they were going to play the computer game that involves tossing a ball back and forth with two other individuals in different rooms. Participants were told that they can pass the ball to whichever player they like and the other players can pass the ball to whomever they choose as well. Participants were also asked to imagine that they were on a playground playing with a group of kids during the game. If the participants were in the in-group conditions they were told that they will be playing the game with three other players from the yellow group, if they were in the out-group conditions they were told that they are playing with three members from the other group, the green group. Within the ostracism conditions of the game, participants received a couple of tosses and were then left out for the remaining two minutes of game play. Within the inclusion conditions, the ball was tossed to the participants periodically throughout the game.

Following Cyberball, participants were shown the video demonstration of an adult engaging in a novel ritualistic action sequence. In the in-group conditions the demonstrator was wearing a yellow shirt, visor, and wristbands, in the out-group conditions the demonstrator was wearing a green shirt, visor, and wristbands. Conventional language was used to enhance the salience of the action sequence in relation to group membership. Participants in the in-group conditions were told, “This is how the yellow group always does it.” In the out-group conditions participants were told, “This is how the green group always does it.” To examine imitation of a ritual task as well as affiliative mimicry of body movements, the video demonstration included three gestural elements. The action sequence included a postural element as well as a gestural element that could be interpreted as intentional or idiosyncratic, and an element that included an object placed on the body.

The video begins with the demonstrator sitting behind a table with objects in front of her and her hands placed flat on the table. The demonstrator lifts her left fist and places her chin on her fist, slightly leaning to the left. The demonstrator then lifts her right hand and swipes her index finger across her right eyebrow in a sweeping motion from left to right after which she immediately picks up the blue cube which she first presses on her forehead and then moves over the green peg on the pegboard, taps on the green peg twice and places the blue cube back on the tray. The demonstrator then swipes her finger across her eyebrow as before. Following the gesture the demonstrator picks up the orange sphere, presses the orange sphere to her forehead, and then moves over the red peg and taps on the red peg twice then places the sphere back on the tray. She then swipes her eyebrow again, then places her hands back flat on the table (Figure 11).



Figure 11. Screenshots of the video demonstration. In the out-group conditions, the model is wearing all green.

Object Manipulation Task. At the conclusion of the demonstration video, the screen was turned off and the objects that the child had seen in the video were placed into view of the child, arranged in the same configuration from the child's perspective.

The experimenter told the child, ‘See these objects here? Now it’s your turn.’ The objects were then placed within reach of the child and the participant was told, ‘Here you go.’ Participants were not given any explicit instruction to copy the actions seen in the video. The child was given 120 seconds to interact with the objects before the objects were moved from within reach of the child but kept within view.

Copying fidelity coding. Copying behavior was coded for a number of dependent variables. For example, engagement in tapping action, engagement in double tapping action, and producing the modeled gesture were coded. If children produced the target behaviors listed above they were given a score of 1, if not, they were given a score of 0. Action-object pairings correctly imitated (the number of times the correct object was tapped on the correct peg the correct number of times) were also coded. There were two possible action-object pairings to imitate (i.e., blue cube tapped twice on green peg (0 or 1), orange ball tapped twice on red peg (0 or 1). Accuracy of sequencing was calculated by coding for whether children copied the core action sequences in the same order as modeled in the video (e.g., engagement with the blue cube to the forehead and then to the green peg, engagement with the orange sphere to the forehead and then to the red peg second was given a 1, all other deviations in sequencing were coded as 0. Pressing an object to the forehead was given a 1 (correct), or 0 (incorrect).

A copying fidelity summary score was calculated based on the core elements of the actions sequence (seven criteria). Pairing the blue cube with the green peg was either given a 1 (correct), or (0) incorrect (see Table 12). Pressing the blue cube to the forehead, 1 or 0. Pairing the orange sphere with the red peg was scored 1 (correct), or 0 (incorrect). Pressing the orange sphere to the forehead, 1 or 0. Performing the double tapping motion with an object on the pegs was given a score of 1 (correct), or 0

(incorrect). Actions were coded for the correct sequencing (blue cube to green peg then orange sphere to red peg). If children engaged in the correct sequencing they received a score of 1 (correct), 0 (incorrect) for engaging in any deviations of sequencing. Finally, performing the forehead swipe was scored as 1 (correct), or 0 (incorrect), and performing the posture was scored as 1 (correct) or 0 (incorrect).

Table 12. Copying fidelity summary score elements

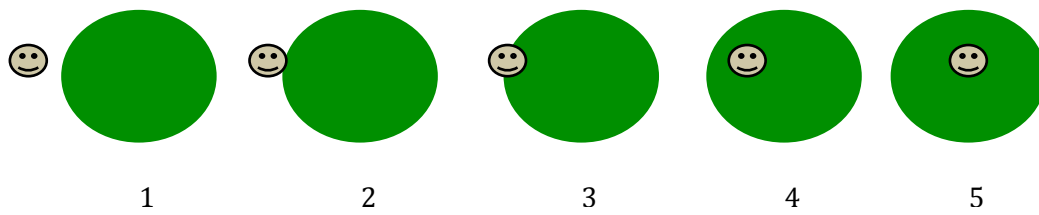
Element	Demonstration	Criteria for correct response
1. Posture	Places fist under chin and maintains posture throughout action sequence	Taking the hand to the chin at any point.
2. Blue cube to green peg	Taps blue cube on the green peg twice.	Using the blue cube on the green peg in any way.
3. Orange sphere to red peg	Taps orange sphere on red peg twice.	Using the orange sphere on the red peg in any way.
4. Object to forehead	Presses blue cube and orange sphere on forehead.	Takes an object to their forehead.
5. Double tapping action	The demonstrator taps the blue cube on the green peg twice and the orange sphere on the red peg twice.	Using any object from the set to tap on any of the pegs twice.
6. Correct Sequencing	Uses the blue cube on the green peg first, then the orange sphere on the red peg	Using the blue cube on the green peg first, then the orange sphere on the red peg
7. Forehead swipe	Swipes finger across brow three times throughout the action sequence.	Brushes hand across face at any point in the action sequence.

Explanation Task. Following the social learning task, the experimenter asked the child four questions about her engagement with the objects, beginning with, ‘Why did you do it that way?’ A follow-up question was also asked, ‘Can you tell me more about that?’

Coding. Explanations for why the participant had engaged with the objects in a particular way were coded for content. *Social explanations* referred to a socially prescribed behavior (e.g., “Because I have to do what she does”). *Agentive explanations* referred to the child’s desire and independent initiative (e.g., “Because I can do it anyway I want to”). Descriptions of concrete actions (e.g., “I put the purple object there”), reflections on the capacity to implement those actions (e.g., “It was hard to close the box”), or descriptions of uncertainty (i.e., unknown responses), were coded as *non-explanatory responses*. Responses to the questions (i.e., “Why did you do it that way?”) were coded as 0 for agentive responses, 1 for non-explanatory responses, and 2 for social responses.

Following the explanation task participants were asked a series of five questions using scales. Children were first presented with a scale designed to assess how much they feel they are a part of the yellow group. Participants were asked to pick the picture that showed how much they felt they were a part of the yellow group, ranging from 1 “not at all,” 2 “kind of,” 3 “almost,” 4 “almost totally,” and 5 “totally.” Participants were then asked to answer the same question regarding how much they feel they are a part of the green group (see Figure 12).

Which of these pictures best shows how you fit with the **GREEN** group?



Which of these pictures best shows how you fit with the **YELLOW** group?

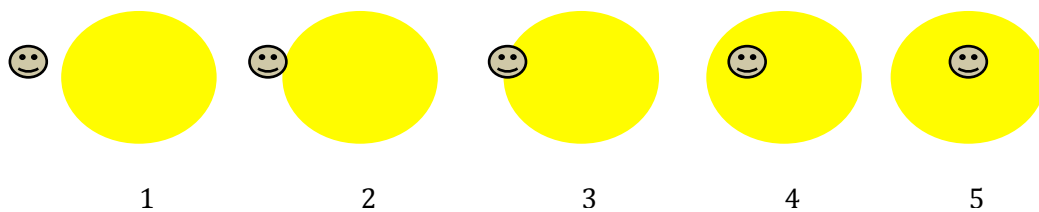


Figure 12. Group membership scales.

Participants were also asked how important it is to them to be a part of the yellow group using a Likert scale (Figure 13).

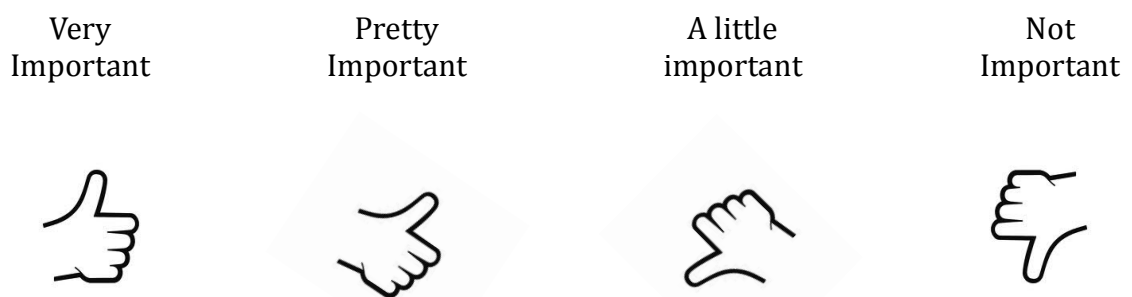


Figure 13. Importance of membership in the yellow group scale.

Participants were then asked how much they like the yellow group and the green group using Likert scales involving depictions of thumbs up = very much, thumb halfway up = a lot, thumb halfway down = a little, thumbs down = not at all (Figure 14).

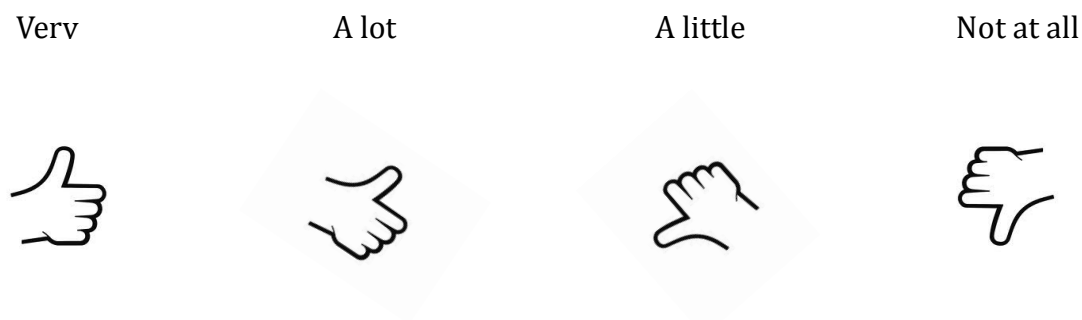


Figure 14. Liking scale.

Sharing Task. To measure the propensity towards prosocial behavior following ostracism versus inclusion by an in-group or an out-group, participants engaged in a sharing task. Twenge, Baumeister, De Wall, Ciarocco, and Bartels (2007) found that prosocial behavior in adults actually decreased following an experience of social exclusion. As Williams (2009) points out, however, this finding may be an artifact of the experimental manipulation. Participants' sense of a meaningful existence was manipulated by telling them that based on a test they took, it looked as if they would never have any meaningful, lasting relationships in their lives. It may be that when people have no hope for regaining inclusion, prosocial behavior will decrease. If provided an opportunity to attempt a potentially successful affiliation with group members, however, individuals may engage in increased prosocial behavior as an attempt at reinclusion. Participants were given three pennies. They were then shown an image of the three players they played Cyberball with and told that these group members have no pennies. The participants were then asked if they would like to share their pennies with these group members. If they replied in the affirmative they were then asked how many they would like to share.

4.6. Results

Conditional differences in the overall copying fidelity summary score was analyzed using ANOVA. Conditional differences in summary scores will also be examined using planned comparisons. To examine conditional differences in engagement of the gestural elements of the action sequence and the object-oriented elements of the action sequence, two additional summary scores were generated: Gestural summary score (posture, forehead swipe, object pressed to forehead), Object-oriented summary score (double tapping object on pegs, blue cube to the green peg, orange sphere to the red peg, correct order). During data collection, some children were observed repeating the action sequence a number of times, often fairly accurately. Whereas this repetition could be perceived as children inaccurately copying the model (the model carried out the sequence only once), this could also be interpreted as a further attempt at demonstrating imitative accuracy. Typically, the children did not deviate from the action sequence, but replicated it a number of times in the manner they observed. This repetition came across as ritualistic and focused rather than playful and variable. To explore this phenomenon, an ANOVA was conducted using how many times the children repeated the action sequence as the dependent variable. The Holm-Bonferroni adjustment was used to correct for multiple comparisons.

Conditional differences in answers to the explanation questions are analyzed using ANOVA. ANOVA was also used to analyze responses to the in- and out-group attitudes scales. Finally, conditional differences in the sharing task will be explored using ANOVA.

4.6.1. Inter-rater reliability

A second coder, who was blind to the hypothesis of the study, recoded the data from twenty-six children, representing 25% of the total sample. Inter-rater reliability was high for the copying fidelity summary scores (Cohen's Kappa = .85). Inter-rater reliability was also high for the explanation data and the group attitudes questions. All of the Kappas for this coding fall within perfect levels (Cohen's Kappas = .93 – 1.00). Reliability for the sharing task was also perfect (Cohen's Kappa = 1.00) (Landis & Koch, 1977).

4.6.2. Overall copying fidelity summary score

Table 13. Mean overall copying fidelity scores by condition

Group	Prime	
	Ostracism	Inclusion
In-group	3.73 (1.51)	2.46 (1.33)
Out-group	2.85 (1.74)	2.81 (1.55)

Note. $N = 104$, standard deviations in parentheses.

An ANOVA with prime (2: ostracism, inclusion) and group (2: in-group, out-group) as between-subjects variables and the overall 0-7 copying fidelity summary score as the dependent measure revealed a main effect of prime, $F(1, 104) = 4.69$, $p < .05$, $\eta_p^2 = .045$. Follow up pairwise comparisons with Bonferroni correction revealed that children in the ostracism conditions had higher copying fidelity scores ($M = 3.29$, $SD = 1.67$) than children in the inclusion conditions ($M = 2.64$, $SD = 1.44$), $p < .05$. There was no main effect of group, $F(1, 104) = .795$, $p = .38$. Children in the in-group conditions did not have higher copying fidelity scores ($M = 3.10$, $SD = 1.55$) than children in the out-group conditions ($M = 2.83$, $SD = 1.63$). There was also a significant interaction between prime and group, $F(1, 104) = 4.15$, $p < .05$, $\eta_p^2 = .040$, see figure 15.

Post hoc tests, using the Bonferroni correction, revealed that children in the ostracism:in-group condition ($M = 3.73$, $SD = 1.51$) had higher copying fidelity summary scores than children in the inclusion:in-group condition ($M = 2.46$, $SD = 1.33$), $p < .01$, see Table 13 for means and standard deviations by condition.

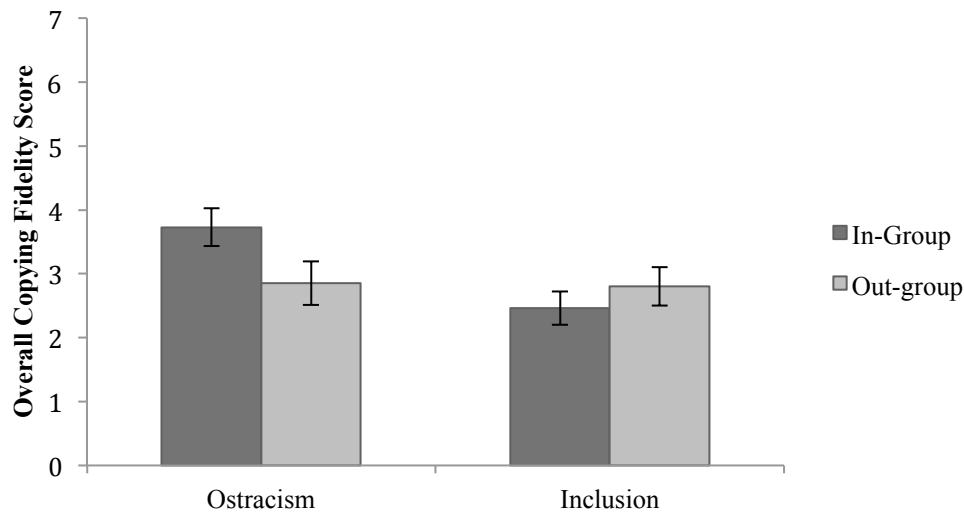


Figure 15. Mean accuracy in overall copying fidelity summary score for prime and group. Error bars represent SE.

4.6.3. Gestural elements copying fidelity summary score

Table 14. Mean gestural copying fidelity scores by condition

Group	Prime	
	Ostracism	Inclusion
In-group	.89 (.86)	.53 (.65)
Out-group	.84 (.61)	.58 (.64)

Note. $N = 104$, standard deviations in parentheses

An ANOVA with prime (2: ostracism, inclusion), task (2: in-group, out-group) as between-subjects variables and the gestural elements 0-3 copying fidelity summary score as the dependent measure revealed a main effect of prime, $F(1, 104) = 5.04$, $p < .05$, $\eta_p^2 = .048$. Follow up pairwise comparisons with Bonferroni correction revealed

that children in the ostracism conditions had higher copying fidelity scores ($M = .87$, $SD = .76$) than children in the inclusion conditions ($M = .56$, $SD = .64$), $p < .05$, see Figure 16. There was no main effect of group, $F(1, 104) = .000$, $p = 1.0$. There was also no significant interaction between prime and group, $F(1, 104) = .78$, $p = .78$. See Table 14 for means and standard deviations by condition.

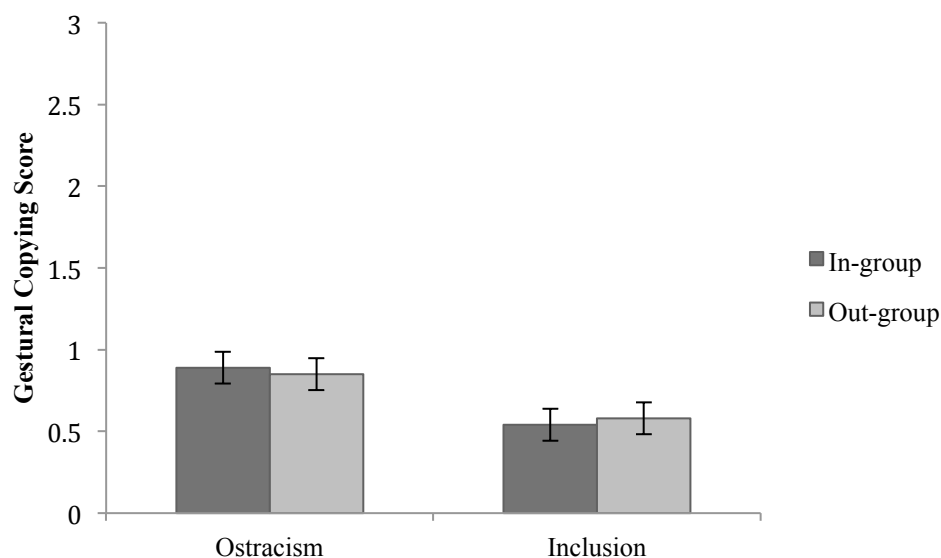


Figure 16. Mean accuracy in gestural copying fidelity summary score for prime and group. Error bars represent SE.

4.6.4. Object-oriented copying fidelity summary score

Table 15. Mean object-oriented copying fidelity scores by condition

Group	Prime	
	Ostracism	Inclusion
In-group	2.85 (.79)	1.92 (1.16)
Out-group	2.00 (1.16)	2.23 (1.18)

Note. $N = 104$, standard deviations in parentheses.

An ANOVA with prime (2: ostracism, inclusion) and group (2: in-group, out-group) as between-subjects variables and the object-oriented 0-4 copying fidelity

summary score as the dependent measure revealed no main effect of prime, $F(1, 104) = 2.33, p = .13$. There was also no main effect of group, $F(1, 104) = 1.41, p = .24$. There was a significant interaction between prime and group, $F(1, 104) = 6.47, p < .01, \eta_p^2 = .061$, see figure 17. Post hoc tests, using the Bonferroni correction, revealed that children in the ostracism:in-group condition ($M = 2.85, SD = .79$) had higher copying fidelity summary scores than children in the inclusion:in-group condition ($M = 1.92, SD = 1.16$), and children in the ostracism:out-group conditions ($M = 2.00, SD = 1.41$), $ps < .05$, see Table 15 for means and standard deviations by condition.

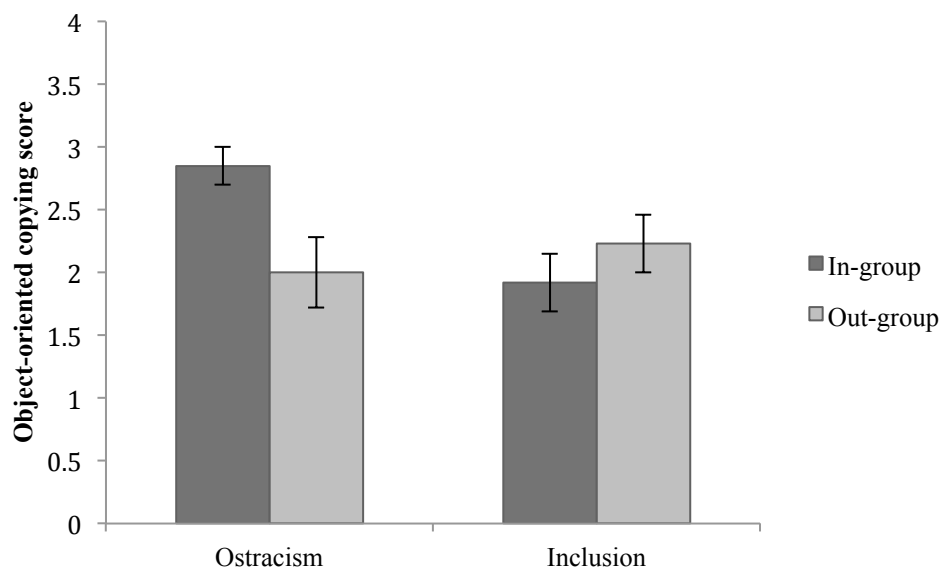


Figure 17. Mean accuracy in object-oriented copying fidelity summary score for prime and group. Error bars represent SE.

4.6.5. Repeating the action sequence

An ANOVA with prime (2: ostracism, inclusion) and group (2: in-group, out-group) as between-subjects variables and how many times the child repeated the action sequence as the dependent measure revealed a main effect of prime, $F(1, 104) = 5.70, p < .02, \eta_p^2 = .054$. Follow up pairwise comparisons with Bonferroni correction revealed that children in the ostracism conditions repeated the action sequence more ($M = .92$,

$SD = 1.85$) than children in the inclusion conditions ($M = .23$, $SD = .94$), $p < .02$. There was also no main effect of group, $F(1, 104) = .070$, $p = .79$. There was no interaction between prime and group, $F(1, 104) = .070$, $p = .79$.

4.6.7. Explanation task

“Why did you do it that way?” Children’s responses to the question “Why did you do it that way?”, asked following the object manipulation task, were coded as agentive (0), non-explanatory (1), or social (2). An ANOVA with prime (2: ostracism, inclusion) and group (2: in-group, out-group) as between-subjects variables, and the 0-2 content scale as the dependent measure revealed no main effect of prime $F(1, 104) = 1.41$, $p = .24$, $\eta p^2 = .019$. There was no main effect of group $F(1, 104) = .001$, $p = .97$, and no interaction between prime and group, $F(1, 104) = .384$, $p = .54$, see Table 16 for percentage of children who gave social, agentive, or non-explanatory accounts of their copying behavior by condition.

Table 16. Percentage of children who gave social, agentive or non-explanatory responses by condition

Response Type	Condition			
	Ost:In	Ost:Out	Inc:In	Inc:Out
Social	23%	28%	20%	21%
Agentive	19%	16%	24%	33%
Non-Explanatory	58%	56%	56%	42%

“How much do you feel like you are a part of the yellow group?” Children’s responses to the question “How much do you feel like you are a part of the yellow

group?” were coded as not at all (1), a little (2), almost (3), almost totally (4), and totally (5). An ANOVA with prime (2: ostracism, inclusion) and group (2: in-group, out-group) as between-subjects variables, and the 1-5 content scale as the dependent measure revealed no main effect of prime $F(1, 104) = .082, p=.78$. There was no main effect of group $F(1, 104) = .78, p=.78$, and no interaction between prime and group, $F(1, 104) = .384, p=.54$.

“How much do you feel like you are a part of the green group?” Children’s responses to the question “How much do you feel like you are a part of the green group?” were coded as not at all (1), a little (2), almost (3), almost totally (4), and totally (5). An ANOVA with prime (2: ostracism, inclusion) and group (2: in-group, out-group) as between-subjects variables, and the 1-5 content scale as the dependent measure revealed a marginal main effect of prime $F(1, 104) = 2.95, p=.09, \eta^2 = .029$. There was no main effect of group $F(1, 104) = .542, p=.46$, and a significant interaction between prime and group, $F(1, 104) = 6.03, p<.02, \eta^2 = .057$. Post hoc tests, using the Bonferroni correction, revealed that children in the inclusion:in-group condition ($M = 3.19, SD = 1.74$) were more likely to endorse feeling like part of the green group than children in the ostracism:in-group condition ($M = 1.88, SD = 1.45$), $p<.02$.

“How important is it to you to be a part of the yellow group?” Children’s responses to the question “How important is it to you to be a part of the yellow group?” were coded as not at all important (1), a little important (2), important (3), and very important (4). An ANOVA with prime (2: ostracism, inclusion) and group (2: in-group, out-group) as between-subjects variables, and the 1-4 content scale as the dependent measure revealed no main effect of prime $F(1, 104) = .990, p=.32$. There was no main effect of group $F(1, 104) = 1.48, p=.23$, and no interaction between prime and group, $F(1, 104) = 1.48, p=.23$.

“How much do you like the yellow group?” Children’s responses to the question “How much do you like the yellow group?” were coded as not at all (1), a little (2), a lot (3), and very much (4). An ANOVA with prime (2: ostracism, inclusion) and group (2: in-group, out-group) as between-subjects variables, and the 1-4 content scale as the dependent measure revealed no main effect of prime $F(1, 104) = .049$, $p = .83$. There was no main effect of group $F(1, 104) = .049$, $p = .83$, and no interaction between prime and group, $F(1, 104) = .049$, $p = .83$.

“How much do you like the green group?” Children’s responses to the question “How much do you like the green group?” were coded as not at all (1), a little (2), a lot (3), and very much (4). An ANOVA with prime (2: ostracism, inclusion) and group (2: in-group, out-group) as between-subjects variables, and the 1-4 content scale as the dependent measure revealed no main effect of prime $F(1, 104) = 1.13$, $p = .29$. There was no main effect of group $F(1, 104) = .132$, $p = .72$, and a trend toward an interaction between prime and group, $F(1, 104) = 2.55$, $p = .11$. Children in the ostracism:in-group condition ($M = 1.92$, $SD = 1.05$) were slightly more likely to endorse *not* liking the green group at all than children in the inclusion:in-group condition ($M = 2.57$, $SD = 1.38$), $p = .24$.

4.6.8. Sharing task

An ANOVA with prime (2: ostracism, inclusion) and group (2: in-group, out-group) as between subjects variables and the proportion of stickers shared as the dependent measure revealed a trend toward a main effect of prime on children’s sharing behavior, $F(1, 104) = 3.10$, $p = .08$. Follow up pairwise comparisons, using the Bonferroni correction, revealed that children in the ostracism conditions ($M = 1.39$, $SD = 1.11$) were slightly more likely to share their pennies than children in the inclusion

conditions ($M = 1.00$, $SD = 1.10$), $p = .08$. There was no effect of group on children's sharing behavior, $F(1, 104) = .000$, $p = 1.0$. The model further revealed that there was no interaction between prime and group, $F(1, 104) = .124$, $p = .76$.

4.7. Discussion

Similar to previous work on ostracism with adults, the findings of Experiment 2 demonstrate that children have a strong reaction to the experience of ostracism. The main effect of prime demonstrates that when ostracized, children are more likely to accurately copy a novel, ritualistic action sequence than included children. Through the activation of psychological systems geared towards detecting and addressing the threat of social exclusion, ostracism enhances affiliative motivations and creates a strong impetus to engage in behaviors promoting affiliation with the group. Like adults, children are responding to ostracism with attempts at reinclusion. In this experiment, the opportunity for reinclusion is provided by engagement in the ritualistic action sequence of the group. The prime by group interaction suggests that ostracism by an in-group increases children's copying fidelity of a novel, ritualistic action sequence demonstrated by an in-group member. Post-hoc tests revealed that children in the ostracism:in-group condition had significantly higher overall copying fidelity scores than children in the inclusion:in-group condition. Being included by the in-group resulted in the lowest mean copying fidelity score. It seems that being included by the in-group does not create enough of an impetus to demonstrate increased adherence to an in-group ritual. The findings from the object-oriented copying fidelity score further revealed that children in the ostracism:in-group condition were more accurate in reproducing these elements of the action sequence.

Earlier, I proposed a continuity of function between affiliative mimicry and overt copying behavior (Heyes, in press; Over & Carpenter, 2009). Overt copying behavior could be facilitated by the disinhibition of imitative processes related to affiliative mimicry that are motivated by affiliative goals. Similar to the findings of increased affiliative mimicry in adults following ostracism (Lakin et al., 2008), the data from the analysis of the gestural elements of the action sequence demonstrate that ostracism increases children's replication of body movements of the model. These results could also be taken as evidence that, following ostracism, children are more likely to engage in sequence imitation of body movements. This evidence demonstrates that, like adults, young children are motivated to imitate even the gestures of another person as a means of affiliation.

Whereas there were no a priori predictions regarding children's repetition of the action sequence, during data collection a number of children were observed fairly accurately reproducing the action sequence again and again and again (within the 60 second time frame). The results show that children in the ostracism conditions were more likely to repeat the action sequence a greater number of times. A hallmark of ritual action is repetition. Whereas I don't wish to draw any direct analogies between repetition of cultural rituals and children's repetition of the ritualistic actions within this experiment, it is interesting to note a possible relationship between what was observed in this experimental context and ritualized behavior in general, as seen in superstitious behavior in many animals, and obsessive compulsive disorder. The implications of the findings of the current research on the model of ritualized behavior proposed by Boyer and Lienard (2006) will be discussed in the General Discussion section.

The null findings of the explanation task do not coincide with the findings of Experiment 1. In Experiment 1, children were found to provide more social

explanations for their copying behavior in the ostracism:ritual condition. I proposed that this provided converging evidence of the affiliative basis of the ritual stance. Within Experiment 2, all children were shown and engaged in a ritual action sequence. Overall, children were more likely to give a non-explanatory, descriptive account of their actions, such as, “I put the blue on the green and the orange on the red,” or “I don’t know.” The majority of children could not provide a clear reason for why they engaged with the objects the way that they did. This finding could be related to the phenomenon of ‘moral dumbfounding’ (Haidt, 2001). More fully discussed in the General Discussion (Chapter 5). Children are likely acting intuitively without explicit knowledge of why they are performing the actions. This finding could also be related to the ritualistic nature of the action sequence. Children either were not concerned with copying the model, in which case they may be motivated to simply describe the behaviors they carried out with the objects, or children copied accurately, but did not have an explanation for why they copied the action sequence.

There were no differences in a sense of belonging to the yellow group following ostracism or inclusion by an in- or an out-group. Overall, most children endorsed feeling like they were a part of the yellow group. Even though Experiment 2 used a minimal group paradigm, group membership was made very apparent to the children. They were given a yellow hat, yellow wristbands, and engaged in a task designed to demonstrate their similarity to the other members of the yellow group. Responses to this question may be viewed more as a valid manipulation check, demonstrating that children were aware of their group assignment. Children’s responses to the out-group belonging question are interesting. Children that were included by the in-group were more likely to endorse feeling like they also belong to the green group. The children that were least likely to report any feelings of belonging to the out-group were those in

the ostracism:in-group condition. This finding could be interpreted to mean that children that have been ostracized by their in-group may be using a mild form of derogation of the out-group as a means of affiliation with their in-group. The trend toward children in the ostracism:in-group condition being more likely to say that they did not like the green group at all supports this, admittedly rich, interpretation. This interpretation would provide further evidence of the affiliative motivations underlying copying the in-group's ritual actions.

The trend toward a main effect of prime in the sharing task further hints at an affiliative response generated by the experience of social exclusion. Within Experiment 2 children were given three pennies and then asked if they would like to share any of their pennies with the three "kids" they played the game with. I predicted that children would be more likely to share more pennies in the ostracism:in-group condition due to an increased motivation to reaffiliate with their in-group following exclusion. The findings from the sharing task, however, are more in line with those of studies on ostracism with adults. Regardless of the group that is excluding, ostracism may increase pro-social behavior. The sharing task findings cannot determine how engaging in an in-group's ritual affects children's prosocial behavior. The current findings show no effect of group on children's sharing. If children had more experience with their in-group and out-group this effect may have been more pronounced. Children in the USA are taught to share in most contexts. The minimal group paradigm may not have provided enough experience with in- and out-group members to strongly increase prosocial behavior towards the in-group.

Chapter 5. General Discussion

The current work sought to examine the psychological underpinnings of ritualistic behavior in childhood as well as to investigate the cues affecting children's

engagement in this behavior to provide insight into the relationship between ritual and affiliation. My analysis of prior research on children's social learning proposes, following Legare et al. (under review), that children flexibly navigate social learning opportunities by shifting, to lesser or greater degrees, between an instrumental and a ritual stance. I have situated this proposal within the larger body of social learning literature and provide a plausible mechanism motivating imitative performance when the ritual stance is activated. I have also proposed that the motivation to imitate ritualistic action sequences is founded in a basic need to affiliate with group members. Group membership is vitally important to humans and evolution has shaped psychological processes geared towards creating and maintaining connections to other individuals. To demonstrate group membership, individuals acquire and engage in social conventional, ritualistic actions that are unique markers of group identity (Whitehouse, in press). Examining children's imitation of ritualistic action provides a window into social learning processes in general, how rituals act as group identity markers and contribute to group cohesion, and the early emerging affiliative motivations associated with ritualistic action.

5.1. Brief summary of previous social learning literature

Previous literature has proposed that the main mechanism of cultural learning is imitation. Imitation has been defined and distinguished from other social learning mechanisms differently by a variety of authors. A major distinction that has come to the forefront in the literature is between imitation and emulation. Briefly, imitation involves copying a model's specific actions used in bringing about an end-state, and as such an imitator can be said to be learning something about the form of behavior used to bring about an outcome. Emulation is said to occur when an individual copies the

outcome, or results, of a demonstration, using their own actions to bring about the same result. In this way, an emulator can be said to be learning about the affordances and causal relations of the environment (Tomasello, 1990, 1996, 1998). Most authors would agree that children possess a “portfolio” of learning mechanisms, as proposed by Whiten and colleagues (Whiten et al., 2009), these mechanisms are deployed in a flexible and context-dependent manner.

Tomasello and colleagues (Tomasello, 1995, 1999; Tomasello, Carpenter, Call, Behne, & Moll, 2005; Tomasello, Kruger, & Ratner, 1993) propose that imitation is dependent upon taking the perspective of another individual and representing the other’s intentions. This proposal is in line with simulation theory in which an individual simulates the experience of other persons based upon their own experiences. This simulation relies on the understanding of self as an intentional, and eventually mental, agent and the ability to attribute the same kind of intentionality and mentality to others who are seen as like the self (Tomasello 1999). Understanding the self and another as intentional is said to involve active choices of means to reach goals, as well as active choices regarding what to pay attention to in order to reach the goals (Tomasello, 1999). Understanding another as like the self does not necessarily have to be an explicit, conscious process. Indeed, Tomasello (1999, p. 76) argues that infants “simply perceive the other’s general manner of functioning via an analogy to the self,” without an explicit process of conceptualization of mental content. The child simply understands the actions of another as goal-directed much in the same way the child understands their own actions as goal-directed. The focus on goals has led to an emphasis within social learning research on instrumental learning and imitation, involving problem-solving and tool use tasks. These tasks are designed to assess what children copy from an observed action sequence, the goals, the means, or both. This

perspective has focused on children's physical-causal reasoning within imitative tasks and has sought to determine the bases of children's variously selective versus over-imitation.

Many authors have argued that children copy with high fidelity when they do not understand the causal links between actions, or goals and sub-goals, or when they do not understand a model's intentions (McGuigan et al., 2009; Williamson & Markman, 2006). Essentially, when an action sequence is causally opaque and a model's intentions are unknown, children will increase their copying fidelity. Varying access to causal information has been held as the most important feature governing children's imitation. This led to much work on children's variously selective and over-imitation. There have been some interesting findings suggesting that young children are "rational" imitators, that they decide what to copy from a demonstration based on previous knowledge, observed constraints on a model, goals, intentions, and other contextual factors (Carpenter et al., 2005; Gergely et al., 2002). Recent research, however, has also documented the phenomenon of over-imitation (Lyons et al., 2007), or over-copying, as some authors prefer (Whiten et al., 2009).

Gergely, Csibra and colleagues (Csibra & Gergely, 2009; Gergely & Csibra, 2003; Gergely et al., 2007) have proposed the model of "natural pedagogy" as an alternative to mentalistic accounts (Csibra & Gergely, 2009). These authors have previously proposed that infants likely do not yet utilize "the complex metarepresentational structures needed to represent intentional mind states" (Gergely & Csibra, 2003). Rather, infants operate from a "teleological stance" in which a reality-based action interpretation system is employed to explain and predict goal-oriented actions. From studies relating to imitation, joint attention and violation-of-expectation looking time, they conclude that infants and young children can determine actions to be

goal-directed, can evaluate constraints on the means of reaching the goal and also expect agents to use the most effective or rational means to reach the goal (Gergely & Csibra, 2003).

Leighton et al. (2010) note that many authors use the term ‘goal’ in different ways. Some refer to goals as outcomes or end-states that are not reliant on the inference of mental states (e.g. Wohlschlagel, Gattis, & Bekkering, 2003), while others specifically state or imply that to imitate, one must understand the goal-directed action of an agent and infer that the agent has intentions, which are characterized as mental states (Bellagamba & Tomasello, 1999; Carpenter et al., 2005; Meltzoff, 1995). Leighton et al. (2010), however, have demonstrated that there is not a special relationship between goals (either as a mental state or an outcome). In stark contrast to “mentalistic,” or intention-reading theories of imitation, Heyes and colleagues (Heyes, 2001; Leighton et al., 2010; Ray & Heyes, 2010) have proposed that imitation is not reliant on the inference of mental states and is rather an experience-dependent process relying on general processes of attention, perception, and motor response. Heyes (2001; see also, Leighton et al., 2010; Ray & Heyes, 2010) provides an alternative account of the mechanisms of imitation called associative sequence learning (ASL). Whereas the ASL model provides a plausible mechanism for how action perception results in motor execution of action, as Heyes (2005) notes, there must be other, motivational, processes that account for when imitation is actually carried out.

Previous theories have proposed that the motivation to engage in high fidelity imitation is associated with “implicit social demands,” that children understand that the actions were intentional and think that they are “supposed” to copy in these situations, while understanding that some of the actions were causally irrelevant. Whiten and colleagues (Horner & Whiten, 2005; McGuigan et al., 2007) have also proposed that

children over-copy out of habit, that over-copying is such an adaptive human strategy that it is even employed at the expense of efficiency. Indeed, due to the causal opacity of many cultural forms, over-copying may be the only way to acquire knowledge for which a physical-causal rationale is not currently known, as in learning to use tools. Gergely and Csibra (2006; Csibra & Gergely, 2009; Gergely et al., 2007) have proposed, in their theory of “natural pedagogy,” that when interaction is punctuated by ostensive cues, such as being addressed by name, eye contact, motherese, motionese, etc., children expect to be taught something. Lyons et al. (2007) view over-copying not as occurring due to social demands or out of habit, but as a way of learning about physical causation. They hypothesize that “children who observe an adult intentionally manipulating a novel object have a strong tendency to encode all of the adult’s actions as causally meaningful, implicitly revising their causal understanding of the object accordingly” (Lyons et al., 2007, p. 19751). The authors argue that children are imitatively learning about physical causality.

5.2. Summary of the current proposal: The ritual stance

I have argued that the focus on instrumental learning via intention reading and physical-causal reasoning has neglected an important aspect of cultural learning, normative and conventional learning that does not rely on causal reasoning or even intention reading. Much of what children need to learn to become members of their community involves learning ways of behaving that are not based in physical-causal rationales. Not all of cultural learning involves learning how to use tools and implements. Children must also learn cultural conventions, norms and practices. In this regard, it may be most beneficial for children to engage in ‘blind’ imitation, involving the copying of procedural rules in the absence of and without seeking a physical-causal

rationale for the production, and reproduction of behaviors. The current research has argued that this kind of imitation would easily allow for the acquisition of behaviors that are not grounded in causal reasoning, such as ritualistic behaviors. Thus, imitation can be used for learning social stipulation as well as for learning physical causality associated with observing others interact within the social and physical environment. The two functions of imitation rely on the same underlying mechanisms of matching observed action to motor output. The difference between imitation of instrumental skill actions and imitation of social skill conventions, such as ritual, rests on differences in how physical and social cues affect implicit affiliative motivations. It is important to note that these two functions of imitation are not mutually exclusive and likely overlap in interesting and predictable ways.

One of the goals of the current research was to examine the recent proposal by Legare et al. (under review) that there are two systems involved in imitation; one for imitatively learning about physical causality and one for imitatively learning social conventions, and these systems will be deployed based upon cues to end- and start state equivalency or distinction. Clearly, over-copying is not confined to learning about physical causality and is likely an effective means of acquiring social conventions that involve actions not grounded in physical-causal rationales. It is possible that in the context of instrumental/technical learning, such as tool use, in which, even if the causality of how a tool brings about a “goal” is opaque, the function, or end-result, is typically manifest and clear. When a clear end-state is available, children over-copy and assume that the actions have a physical-causal rationale even if it is not apparent to them. When an action sequence is causally opaque, with no indication of an end-state that differs from the start-state, children do not seek physical-causal interpretations for these actions. When an action sequence contains no clear end-state, children copy

actions with a higher degree of fidelity than under conditions in which an end-state is easily discerned (Legare et al., under review).

The current research examined the motivations underlying children's copying fidelity following exposure to ostracism, either third-party (Experiment 1) or a direct experience (Experiment 2). In Experiment 1 I hypothesized that priming with ostracism would increase copying fidelity within the ritual condition (equivalent start- and end-states) as compared to priming with affiliation or priming ostracism within the instrumental condition (distinct start- and end-states). This hypothesis is founded in the idea that when the ritual stance is triggered, social, affiliative motivations take precedence. Therefore, increasing the motivation to affiliate, via the threat of social exclusion, should increase imitative fidelity of a ritualistic action sequence compared to an instrumental action sequence. Following priming with ostracism, copying fidelity was increased in both the ritual and the instrumental conditions, however, even though the effect was slightly more pronounced in the ritual condition. Regardless of what kind of action sequence is being modeled, priming with ostracism is likely to increase motivation to copy precisely.

Experiment 2 examined the effects of a direct experience of ostracism by in- or out-group members on young children's copying fidelity of a ritualistic action sequence performed by an in- or an out-group member, group attitudes, and prosocial behavior. The findings of Experiment 2 demonstrate that while ostracism has an impact on copying fidelity overall, ostracism by an in-group is especially likely to increase copying fidelity of the in-group's ritual. The findings of Experiment 2 also indicate that ostracism is likely to increase copying of gestural elements of a ritualistic action sequence, while ostracism by the in-group in particular increases copying fidelity of the object-oriented elements of the sequence. A summary of the findings from both

Experiments 1 and 2 is presented in the following section. This summary indicates which findings recurred across both experiments as well as the unique findings of each study. Following this summary, the implications of the two experiments presented in this thesis are detailed for research on both anthropological and cognitive accounts of ritual and social cohesion, social learning, cultural transmission, and ostracism.

5.3. Summary of findings across Experiments 1 and 2

In both Experiments 1 and 2, imitative fidelity was significantly increased following either priming with third-party ostracism (Experiment 1) or a first-hand experience of ostracism from a group (Experiment 2). In Experiment 1 imitative fidelity was increased in both the instrumental and ritual conditions. Planned comparisons revealed that the effect of ostracism versus affiliation priming was only statistically reliable in the ritual condition, not the instrumental condition. Whereas Experiment 2 did not compare imitation of ritualistic and instrumental action sequences, imitative fidelity was significantly increased following ostracism, replicating the finding of Experiment 1. Experiment 2 also provided evidence that experiencing ostracism from in-group members significantly increased imitative fidelity as compared to experiencing affiliation with in-group members.

Experiment 2 also found that ostracism significantly increased imitative fidelity of the gestural elements of the action sequence. Experiment 1 only contained one gestural element, which showed trends toward increased imitative fidelity within the ostracism:ritual condition. In Experiment 1 chi-square analysis revealed that observed cell frequencies in the ostracism:ritual condition were significantly greater than expected for imitative fidelity of certain object-oriented elements of the action sequence. Specifically, opening the silver box with an object, engaging with the silver

box at the end of the sequence only, and imitating the correct sequence of actions.

Whereas the action sequence used in Experiment 2 did not include the silver box, the results of this study did demonstrate that ostracism by in-group members significantly increases imitative fidelity of the object-oriented elements of the action sequence (including correct sequencing, tapping the correct object with the correct peg, and tapping the objects on the pegs the demonstrated number of times) as compared to the other conditions.

The explanation data from the question, ‘Why did you do it that way?’ in Experiment 1 showed that children in the ostracism:ritual condition provided significantly more social explanations than children in the other conditions. This finding was not replicated in Experiment 2, in which children were most likely to provide a ‘non-explanatory’ answer such as ‘I don’t know’ across conditions. In Experiment 1, there were no differences between conditions in children’s responses to the affiliation questions (‘Do you think you would like Brooke?’ and ‘Do you think you would like to meet Brooke?’). Experiment 2 found no differences between conditions in responses to feeling like part of the yellow group (in-group), the importance of being in the yellow group, and liking the yellow group. There was a trend towards children in the ostracism:in-group condition being more likely to endorse that they don’t feel like they were a part of the green group (out-group) at all as compared to children in the inclusion:in-group condition. Also, children in the inclusion:in-group condition were more likely to endorse feeling like part of the green group (out-group) than children in the ostracism:in-group condition.

Finally, whereas Experiment 1 found no difference between conditions in sharing the stickers provided at the end of the study with the model, there was a trend

within Experiment 2 towards increased sharing of pennies by participants in the ostracism conditions (ostracism:in-group and ostracism:out-group).

5.4. Implications

The first goal of this thesis was to situate the proposal of the ritual stance within the larger body of literature on social learning and to describe the plausible mechanisms that can account for how imitation is accomplished and the similarities and differences between previous proposals of over-imitation and the ritual stance. Within this effort, I proposed, following Heyes (in press), that motor mimicry and overt, controlled imitation are reliant on the same mechanism and under some circumstances and cues (such as threat cues) motor mimicry, as an affiliative response, facilitates overt imitation of novel action sequences. Further, Heyes (in press) has stated that ‘when we are cooperatively motivated, imitative tendencies, which are normally suppressed, are allowed to ‘get out’ and influence observable behavior’ (p. 16). Because novel action sequences are composed of more “primitive” motions already in the behavioral repertoire (Heyes, 2005), an individual’s imitative performance may be aided by the disinhibition of motor mimicry processes.

Recent research on mirror neurons has similarly found that the same neural areas are activated when an individual is performing motor imitation of simple movements and when they are imitating novel behavior (Iacoboni, 2009). This disinhibition may be induced by affiliative motivations associated with the ritual stance and amplified by ostracism cues. I related these proposals to studies of affiliative mimicry (Chartrand & Bargh, 1999; Lakin et al., 2003) that found that participants who were mimicked by a social partner rated the quality of their interaction and their partner

more highly than those that were not mimicked. Also, individuals imitate members of their group more often after feeling socially ostracized (Lakin et al., 2008).

Motor mimicry, which involves copying mannerisms (body movements), along with a narrowed focus of perception to fine detail when combined with actions on objects (if included) may result in greater attention to, or recall of, body movements in relation to object movements, which may afford an especially high level of copying fidelity. In this way, mimicry of body movements may play a role in facilitating copying of conventional actions when implied threats are present through the processes described above. Heyes (in press) has argued that the highest copying fidelity of social conventions may be related to imitation of body movements (sequence imitation) in relation to object movements (sequence emulation). So, when the ritual stance is tuned up, in combination with implied threat cues, this may result in an exacerbation of this effect and an especially high level of copying fidelity. The findings of Experiment 2 could be argued as evidence of an increase in sequence imitation and emulation. When a ritual action sequence is combined with the threat of social exclusion, children are more likely to copy object-oriented and gestural components of the action sequence of an in-group.

At this point it is important to further discuss the claim that children do not always need to rely on intentional cues to copy with high fidelity. Whereas research has demonstrated that there is not a special relationship between imitation and intention reading, defined in terms of a mental representation or a goal (Leighton et al., 2008), this is not to say that reading intentions does not play a part in the motivational processes of imitation of ritualistic action sequences. What I have proposed is that engagement in imitation of these sequences is more automatic and affiliative in nature and does not require the representation of an intentional mental state or physical-causal

goal. In this way, when motivated by physical and social cues, such as end- start-state equivalence and the threat of social exclusion, that cue and amplify the ritual stance, children copy the actions of an adult in a more automatic manner. This kind of ‘blind’ copying is especially likely to allow for the transmission of ritualistic behavior across generations and allows for post hoc interpretations that invoke divine dictate, symbolism, or normative prescriptions.

The current proposal can also be viewed in light of recent findings related to ‘implicit mentalizing.’ Frith (2012) has recently described research related to the role of metacognition in human social interaction and presents evidence that much of social interaction involves an implicit form of mentalizing that occurs automatically without explicitly representing the mental states (beliefs, knowledge, desires) of others. Similarly, recent evidence from joint attention studies suggests that explicit metacognition is a cognitively demanding task, and that humans have a system that operates at an implicit level that can account for findings of infant metacognition (Apperly & Butterfill, 2009). De Waal and Ferrari (2010) also note that findings from neuroscience are compatible with a view of imitation that emphasizes direct action perception links involving body mapping between individuals, with perceived intentionality taking a lesser role. The findings of the current research are compatible with recent findings of implicit mentalizing, and as described in the literature review, the ASL model (Heyes, 2005, in press) likely accounts for how imitation is accomplished.

The proposal of blind copying within the ritual stance, supported by mechanisms as described in the ASL model, presented in this thesis naturally leads to the question of what motivates an individual to overtly copy observed actions. The second goal of this thesis was to experimentally examine the affiliative motivations

underlying copying ritualistic action. I argued that the motivation underlying copying ritualistic, conventional action is an implicit desire to affiliate with others. I used ostracism as a window through which to examine the affiliative motivations of imitation. The findings of Experiment 1 hinted at the possibility that threats to inclusion differentially impact copying fidelity of instrumental versus ritualistic action sequences. Converging evidence of the affiliative basis of the ritual stance was provided by the explanation task in which children in the ostracism:ritual condition were much more likely to provide a social explanation for their behavior, such as: 'Because I saw her in the video,' or 'because she did it.' Also, whereas there was not a significant difference between conditions in engagement in the novel gesture, the trends in the data suggest that children in the ostracism:ritual condition were more likely to copy this element of the action sequence. The action sequence in Experiment 1 was heavily object-centered, this may have created a focus on, and hence greater replication of, the object-oriented actions.

Experiment 2 provided evidence that ostracism may heighten copying fidelity of the gestural components of a ritualistic action sequence, as well as the object-oriented elements. This finding provides evidence that children may be more likely to engage in sequence imitation and emulation of ritualistic actions, as proposed by Heyes (in press). Experiment 2 also provided further evidence of the affiliative motivations underlying imitation. The copying fidelity summary scores were highest in the ostracism:in-group condition indicating that children were more motivated to rigidly copy an in-group member following an experience of social exclusion from their group. These findings also extend the work of Lakin et al. (2008) who found that excluded adults engaged in increased affiliative mimicry of a member of their in-group than their out-group following an experience of social exclusion. Children, like adults are likely

to copy the actions of an in-group as a means of reinclusion with their group. Wirth and Williams (2009) have found that the immediate threat to belonging-needs associated with an experience of ostracism has the same impact regardless of the group that is excluding. The main effect of prime in both Experiments 1 and 2 is likely associated with these previous findings. Ostracism hurts and there are immediate and strong reactions to the experience that extend beyond self-report of threats to belonging needs to behavior. Like the findings of Lakin et al. (2008), however, adults and children use imitation (overt and nonconscious) as a means of reaffiliating with one's in-group. It seems that if behavioral measures are used, the nature of the group that is excluding has an impact.

I proposed that ostracism heightens affiliative motivations through the activation of mental security systems dedicated to detecting and addressing threats to group membership, similar to the systems proposed by Boyer and Lienard (2006) and Szechtman and Woody (2004), that may result in security related behavior. Boyer and Lienard (2006) have proposed the Hazard Precaution System that is geared to dealing with inferred threats, as opposed to manifest threats, with anxiety levels focusing attention on low-level units of behavior instead of goal-related aspects of an action-flow (goal demotion). They argue that cultural rituals mimic the system's normal inputs thereby making them attention grabbing and compelling. There is also often a strong emotional response connected to not performing ritualistic behavior in the 'correct' and specified way (Lienard & Boyer, 2006). Boyer and Lienard (2006) suggest that ritualistic behaviors provide relief from anxiety through the 'swamping' of working memory provided by replicating actions that require a high level of cognitive control. Because anxiety is reduced through engagement in cognitively demanding actions,

ritualized action cannot become automatic and routinized. In this view, ritualized behavior cannot be automatic and must be submitted to cognitive control.

It is important to note that the model proposed by Boyer and Lienard (2006) is a model of ritualized behavior, accounting for behaviors seen in the Obsessive Compulsive Disorder spectrum, normal individual ritualized behaviors, and individual ritualized behaviors at different points in the lifespan (i.e. childhood, pregnancy, the early years of parenthood). All of these individualized ritualized behaviors may be most associated with swamping of working memory and may be unrelated to an affiliative response. The current research cannot speak to this possibility. The current research speaks to the motivation to engage in ritualistic behaviors demonstrated by another individual, and in Experiment 2, an in-group member or out-group member specifically, as a proxy for cultural rituals. Boyer and Lienard's (2006) model holds that cultural rituals mimic the compelling and attention-grabbing aspects of ritualized behavior thereby resulting in cognitive capture of the system's input.

Whereas Boyer and Lienard's (2006) model provides insight into the mechanisms of ritualized behavior in general, within this thesis I have sought to explore the cues children use to guide their engagement in imitation of ritualistic actions performed by a model. Swamping working memory as a means of anxiety reduction may take precedence within individual ritualized behaviors. When learning the ritualistic actions of a group, however, affiliation may take precedence as a means of anxiety reduction. Indeed, the HPS model proposes that within cultural rituals, other motivations often take precedence, including social exchange, only that the features of ritualization itself, rigidity, scriptedness, repetition, etc. are explained by the cognitive capture of the system's normal inputs (inferred threats) that make these features of cultural rituals compelling (Boyer & Lienard, 2006). Arguably, when the threat of

social exclusion is present, the input mechanisms also activate systems geared toward maintaining affiliation with group members. I have argued that when activated by an inferred threat to group membership, mental security systems will result in an affiliative response as a manner of dealing with negative stress. In this way, engagement in ritualistic behavior, or learning to engage in ritualistic behavior, may be motivated by implicit affiliation goals amplified by a reaction to an inferred social threat. This argument suggests that for most, if not all, collective, rituals the underlying motivation of the participants involved is maintaining and demonstrating affiliation with the group.

Navarrette et al. (2004; Navarrette & Fessler, 2005) found that any implied threat to fitness resulted in the activation of coalitional psychology. Individuals were more likely to prescribe to the normative ideologies of their in-group after being told to imagine scenarios involving death, theft of personal belongings, asking for help in a cooperative task, and social isolation. Navarrette and Fessler (2005) contend that when presented with threats ‘within the category of adaptive challenges’ coalitional thinking will be primed and people will tend to endorse a stricter adherence to in-group ideologies through ‘manifestations of normative mental representations emanating from psychological systems designed to enhance coordination and membership in social groups’ (Navarrette & Fessler, 2005, p. 297). An affiliative/cooperative response, as engendered by cues of social exclusion, may relate to the generation of normative representations in children.

Cues that relate to implied threats to fitness may be an especially strong factor that mediates the learning and transmission of behavior through enhancing associations between actions and normative representations. Also, normative representations may further contribute to the highly specified, rigid reproduction associated with ritualistic

behavior. This isn't the only way normative learning and over-copying are fostered but may be an especially effective way of producing rigid/prescribed behavioral reproduction and transmission of social conventional practices. The current proposal is similar to Kenward et al.'s (2012) recent proposal of children's automatic normative encoding of action within imitation tasks, but identifies the motivation underlying this encoding as affiliative in nature. The ritual stance in combination with ostracism cues may be especially likely to invite interpretations of actions in normative terms, leading to the assumption that this is how one ought to behave in this situation and with these objects.

The findings of Experiment 2 suggest that being ostracized by the in-group increases children's motivation to subsequently copy a ritualistic action sequence demonstrated by an in-group member. This finding is similar to those of Navarette et al. (2004), demonstrating that, following contemplation of different evolutionarily relevant threats, participants were more likely to endorse the normative ideologies of their group. Social exclusion by the in-group may be priming children's coalitional psychology, creating a strong impetus to demonstrate affiliation with an in-group member. This interpretation also sits well with the main effect of prime. Because Experiment 2 used the minimal group paradigm, ostracism may have amplified coalitional thinking even in relation to out-group members.

This interpretation does not rule out the possibility that negative stress induced by the experience of ostracism may have focused children's attention to low level units of the action flow, goal demotion, as proposed by Boyer and Lienard (2006). Indeed, the main effect of prime could also be related to swamping working memory and goal demotion as a means of anxiety reduction. Regardless of group, low level action parsing, as induced by social exclusion, may account for the finding of increased

copying fidelity in both the ostracism:in-group and ostracism:out-group conditions. Arguably, the unexpected finding of increased repetition within the ostracism conditions also supports Boyer and Lienard's model. Repetition is one of the primary characteristics of ritualized behavior. Lienard and Boyer (2006) contend that repetition is not motivated in ritual action but is perceived as appropriate and efficacious when prescribed within the ritual. The current findings suggest that in some contexts repetition of action is intrinsically motivated. In the current experimental context, children only witnessed the action sequence carried out once, yet many in the ostracism conditions felt compelled to repeat the action sequence a number of times, in a fairly accurate manner.

Also, low-level action parsing cannot account for the finding that copying fidelity scores were highest among children ostracized by their in-group. The action sequence used in Experiment 2 was highly causally opaque, containing no clear physical-causal rationale. The causal opacity of the action sequence made the search for a causal rationale inapplicable, triggering the ritual stance and an implicit interpretation of the action sequence as based in social convention (Legare et al., under review). The enhancement of affiliative motivations increased copying fidelity of the sequence significantly more in the ostracism:in-group condition. The findings of Experiment 1 also support the proposal that affiliative motivations underlie copying, especially copying conventional action. Children in the ostracism:ritual condition were more likely to provide social explanations for their copying behavior than children in the other conditions. The trend toward a main effect of prime within the sharing task of Experiment 2 further suggests that an experience of ostracism amplifies affiliative motives. Children seem to be slightly more motivated to share following an experience of social exclusion. This interpretation must be tempered however in light of the null

findings of the affiliation questions in Experiment 1 and the conflicting findings of the explanation task in Experiments 1 and 2 (explored below in the Limitations section).

Boyer and Lienard's (2006; Lienard & Boyer, 2006) model is aimed at explaining the recurrent features of ritualized behavior (repetition, scriptedness, rigidity, etc.). These compelling and attention grabbing elements play a prominent role in many collective rituals. The essence of collective rituals, however, is the gathering together as a group of individuals with affiliative bonds. As Sosis and Handwerker (2011) have described, during the Second Intifada, Israeli women engaged in increased psalm recitation as a means of coping with the stress of war. Typically, psalm recitation is done in private, during the Intifada this practice was also organized communally. Sosis and Handwerker (2011) note that even for this more private spiritual practice, during times of stress, women often stated that they engaged in recitation not so much for the act of reciting particular psalms, but for the 'sense of power and community they felt knowing that other women were reciting psalms as well' (p. 44). Engaging in the rituals of one's group demonstrates commitment to the group, thereby promoting cooperation among group members (Henrich, 2009; Soler, 2012; Sosis 2000, 2003, 2005; Sosis & Bressler, 2003; Sosis & Ruffle, 2003).

Whereas the current research is not aimed at assessing children's commitment to the in-group, this research provides additional evidence that young children are sensitive to categorization within a group and that this sensitivity extends to copying an in-group ritual, when properly motivated. This early sensitivity to the conventions and actions of one's group members likely contributes to processes of socialization and cooperation, and the formation of in-group biases and ascription to in-group normative ideologies. The current research provides evidence of the early-emerging affiliative motivations associated with ritualistic action. This research also provides preliminary

evidence that the threat of social exclusion from the in-group promotes derogation of the out-group (although in a minimal form within the current paradigm). Children who had been ostracized by their in-group were less likely to endorse feeling like they were a part of the out-group at all, and were marginally more likely to endorse not liking the out-group at all.

The current research provides a new perspective on how children acquire the social skills necessary to operate within a group, and the early emerging affiliative motivations associated with this process. Due to the motivation to foster and maintain affiliation with group members, I have argued that children's copying of cultural convention, specifically ritualistic actions, of one's group is often quite automatic and implicit. Research on children's cultural learning of social convention, coming primarily from an anthropological perspective, has emphasized that, often, there is no intention to teach on the part of the adult and no intention to learn on the part of the child (Gaskins & Paradise, 2010; Rogoff, 2003). Children begin to engage in the social behaviors characteristic of their group simply through exposure and implicit affiliative motivations associated with the importance of group membership. The research presented in this thesis has theoretically and experimentally examined how children copy conventional, ritualistic behaviors and provided evidence of some of the psychological processes underlying engagement in social convention. Children are motivated to engage in imitation of ritualistic action sequences, especially of the in-group when affiliative motivations are enhanced. Experiment 1 also found that copying fidelity of a ritualistic action sequence increases with age, demonstrating children's increasing social awareness and motivation to take part in the social context.

I have proposed that these processes are related to what I have termed 'blind,' and what Heyes (in press) has termed 'dumb' imitation of socio-cultural behaviors.

This kind of imitation is not mindless, different contexts and cues will lead to differing interpretations of and engagement in group-oriented action. Ritualistic action is also likely to be accompanied by cultural scripts that ascribe meaning to the action. The idea is that blind imitation is especially likely to result in the high fidelity transmission of conventional behaviors. The highly prescribed, causally opaque nature of ritual actions means that there is no other way for the actions to be performed but in the manner in which they were previously witnessed and passed down (Bloch, 1974). The current research has demonstrated, along with the work of Legare et al. (under review), that children use start- and end-state equivalence to determine when action is based in convention and should be copied precisely and when action is based in instrumentality and is more open to variation. The current research also demonstrates that imitation is based in affiliative motivations that can be amplified through the priming of ostracism. Further, this research provides evidence that engaging in high imitative fidelity of the ritual of one's in-group can act as a means of affiliation with that group, even for young children.

Anthropologists have long described the role of ritual in affirming social ties and group cohesion. Durkheim's (1915) theory of the sacred and the profane situates the group as transcendent and permanent with ritual as the mechanism through which the social order is affirmed, resulting in collective effervescence. The causal opacity of ritual action places it outside the realm of explanation using causal reasoning and allows for post hoc interpretations involving symbolism, metaphor, and appeals to the supernatural (Whitehouse, in press). The causal opacity of ritual also makes for reliable markers of group identity. Ritual action is distinct from 'everyday' action in this regard and results in strict, often unquestioning, adherence. A hallmark of ritual is the sense of collectivity not just of the immediate individuals engaged in the ritual, but also of

previous generations. Rituals must be reliably transmitted to carry on the traditions, norms, and conventions of a community, and to act as reliable group markers. To understand this process, it is essential to examine children's engagement in cultural learning. Research on cultural learning, coming from a mostly anthropological perspective, highlights the importance of social interaction and a process of learning by participating the activities of one's group (Rogoff, 2003; Gaskins & Paradise, 2010). Whereas the anthropological literature has provided rich descriptive and theoretical accounts, less work has focused on experimentally examining ritual from a cognitive perspective, using experimental methods. The research presented in this thesis provides an attempt to provide experimental evidence of how and why children reliably copy the ritualistic, conventional actions of their group by determining the cues they use to guide their engagement in ritual and the underlying social motivations associated with copying the ritualistic actions of an adult.

5.5. Limitations and Future Directions

The research presented in this thesis has examined the motivation underlying children's imitation of ritualistic behavior and attempted to provide an in depth examination of the underlying processes that account for how imitation is accomplished at all. In doing so, this work has sought to provide a preliminary account of the fidelity of transmission of ritualistic behavior. The current research, however, has limitations that future work could address. The first general limitation concerns the prompt used in both experiments. Following the video demonstration of the novel action sequence, children were presented with the object set from the demonstration and told, 'Now it's your turn. Here you go.' This prompt was used as a means of directing participants' attention to engaging with the object set while not telling them to

explicitly copy the actions they had just seen in the video. The prompt could also serve, however, as a strong indication to children that they are meant to copy the actions they saw in the video. Future research could use a less leading cue, or no cue, to ascertain if the results of the current studies can be replicated under these conditions. This may be especially important when considering how rituals are transmitted in a real-world setting. Often, children learn cultural rituals through third-party observation and are not always explicitly prompted to copy specific actions. In this case, replicating the experiments with a minimal, or no, prompt would contribute significantly to the ecological validity of the results.

The prompt, as well as the deliberate nature of the demonstrated action sequences, also limit the relevance of the current research to the ASL model (Heyes, 2005; in press). Within this text, the ASL model was used to provide a plausible account of how imitation is accomplished and to frame the proposal of the ritual and instrumental stances. One of the aims of Experiment 2, however, was to allow an examination of the imitation of the gestural and object-oriented elements of the action sequence. The results of Experiment 2 provide some evidence that imitation of the gestural elements is increased by an experience of ostracism. Whereas the results of the current experiments cannot demonstrate automatic copying as defined by Heyes (2010) and cannot directly speak to the automaticity of imitation following ostracism priming, they could be interpreted as demonstrating disinhibition of imitative tendencies as described by Heyes (in press). Because imitation, or affiliative mimicry, provides a means of rapport building (Chartrand & Bargh, 1999), when individuals are motivated to affiliate (in this case by the experience of ostracism) their tendency to mimic is ‘disinhibited’ and allowed to influence overt behavior (Heyes, in press). Also, as has been noted, when adult participants are ostracized they increase their engagement in

affiliative mimicry as compared to controls (Lakin et al., 2008). The fact that imitation of the gestural elements of the action sequence in Experiment 2 was increased specifically following the experience of ostracism suggests that affiliative mimicry and imitation of overt actions may be reliant upon the same underlying mechanism. In this case, I would argue that the disinhibition created by the experience of ostracism aids overt imitation of an action sequence. Disinhibition may somehow strengthen the horizontal processes as described by the ASL model (Heyes, 2005; in press). The current research, however, cannot directly address this claim. It is equally likely that the disinhibition of imitative tendencies affects attention in a specific way that may result in goal demotion, as discussed subsection 5.5.1.

A second general limitation, and priority for future research (described in the subsequent subsection), concerns ruling out alternative explanations for the findings of this research. I have proposed that imitative fidelity is increased via heightened affiliative motivations as induced by the ritual stance and ostracism. As described in the previous section, the results of the current research could also be interpreted as providing evidence that inferred threats (ostracism) result in goal demotion (Boyer & Lienard, 2006) that may result in the increased imitative fidelity observed in these studies. Future research will examine if any threat, or general anxiety, results in increased imitative fidelity, or if the effect is more specific to the threat of social exclusion. To do this, the current paradigms could be expanded to include conditions that prime other types of threats, such as the threat of physical harm and/or contamination, as well as a condition that could induce anxiety in general (how anxiety may affect processes of attention and the possible alternative interpretations of the current findings arising from this are fully discussed in the subsequent subsection).

The null findings of the affiliation questions in Experiment 1 and the conflicting findings of the explanation task of Experiments 1 and 2 make exploring alternative explanations for the imitation findings especially important. Whereas the findings of Experiment 1 show that children in the ostracism:ritual condition were more likely to provide social explanations for their imitative behavior, children in Experiment 2 were most likely to provide ‘non-explanatory’ answers across conditions. The social explanations provided by children (e.g. ‘Because she did it that way,’ or ‘I did it like her’) may be an indication not of affiliation, but of a desire on the part of the child to enhance their similarity to the model. Ostracism in association with the ritual stance could prompt a desire to demonstrate similarity through imitation that is distinct from affiliative motivations. Mahajan and Wynn (2012) have demonstrated that pre-verbal infants prefer individuals who are similar to them. The need for group inclusion may motivate a demonstration of shared behaviors that is distinct from learning cultural conventions.

Further, viewing the ritual sequence may have resulted in increased norm adherence in general, outside of any particular domain (in this case social), as has been argued by Kenward et al. (2011). The explanation data could be interpreted as children displaying increased adherence to the norm of copying an adult’s actions regardless of any affiliative motivations, or children in all conditions were socially motivated but were unable to articulate this motivation. This could be related to the phenomenon of ‘moral dumbfounding’ (Haidt, 2001), in which individuals make intuitive moral judgments but aren’t able to provide explicit reasoning for these judgments. Children may have been socially motivated in all conditions, but may not have been able to describe this motivation when asked in the explanation task. The fact that children in the ostracism:ritual condition did provide more social explanations for their actions,

however, suggests that, at a minimum, ostracism in association with ritualistic action forefronts social concerns. The current experiment cannot unequivocally delineate between children's imitation of ritualistic action as driven by affiliative motivations, a desire to be like the model, or general norm adherence.

Plausibly, however, a desire to enhance similarity is intimately related to a desire to affiliate, as is adherence to social norms, and these all likely contribute to learning group conventions. A good question to include may be 'If she (the model) saw you doing this, what would she think?' This would allow for an explanation of perceptions of norms in association with the action sequence. Also, the copying fidelity summary score data cannot unambiguously determine the mechanism of improved copying performance in the ritual conditions. I hypothesized that the instrumental stance opens up the possibility of behavioral variability when imitating the action sequence, however, children's omission of an element of one of the action sequences is likely related to how the cues utilized in the current experiment may affect attention to the action sequence. Affiliative motivations and/or norm adherence may affect processes of attention and interest in copying the action sequence that could not be captured within the current experiments.

The null findings of the sharing task in Experiment 1 and the only marginally significant effect of prime (ostracism versus inclusion) in Experiment 2 make it difficult to interpret how imitating a ritualistic action sequence affects prosocial behavior. As I suggested in the Experiment 1 discussion section, children in the United States are taught from a young age to share. This could have confounded the results of the current studies. Also, the resource provided in each study (stickers in Experiment 1 and pennies in Experiment 2) may not have been seen as valuable enough for children to want to keep, thus motivating children to share more. This could be addressed in

future research by using something that has high value to children within a sharing task. Further, the minimal primes within Experiment 1 may not have created enough impetus for children to act prosocially, beyond what they normally would. The marginal main effect of prime in Experiment 2 indicates that a more direct experience of ostracism motivates increased pro-social behavior. These findings, however, cannot speak directly to the affiliative consequences of engaging in a ritualistic action sequence. The findings of Experiment 1 show no main effect of action sequence (ritual versus instrumental) on sharing. If engaging in ritual results in prosocial behavior we would expect a main effect of action sequence, with children in the ritual conditions sharing more of their resource with the model. Further, the results of Experiment 2 found no main effect of group (in-group versus out-group), or interaction between prime and group, indicating that being ostracized by an in-group and engaging in an in-group ritual do not increase prosocial behavior.

Possibly, prosocial behavior as measured by a sharing task is a poor construct of group cohesion. It is also possible that the minimal group paradigm did not provide participants with enough group experience to influence pro-social behavior. If children had more information and experience with their assigned in-group the predicted effect may emerge. Further, it may be that the ritual must in some way be costly to an individual to increase pro-sociality, as has been found in research with adults (Bulbulia 2004a; Cronk 1994; Henrich, 2009; Irons 1996, 2001; Sosis 2000, 2003, 2005; Sosis & Bressler, 2003; Sosis & Ruffle, 2003). Future research should examine the situations in which engaging in a group's ritualistic action sequence affects young children's prosocial behavior.

Another limitation arises from the exclusion of an instrumental action sequence within Experiment 2. Because the objectives of the current research involved

examining how an experience of ostracism versus inclusion affects imitation of an in-versus and out-group's ritual, an instrumental action sequence was not included within Experiment 2. It is possible that being ostracized by in-group members does not increase imitative fidelity of an instrumental action sequence in the manner it does for a ritualistic action sequence. In future research, the effects of ostracism on imitation of an in-group's versus out-group's instrumental action sequence will be explored.

More specific limitations will be explored in the following subsections, regarding the effects of ostracism on attention (subsection 5.5.1.), what the current research can contribute to an understanding of affiliative mimicry (subsection 5.5.2), cultural transmission of rituals (subsection 5.5.3), increasing the ecological validity of the current research using an observational methodology (subsection 5.5.4), and replicating the current research cross-culturally (subsection 5.5.5)

5.5.1. Effects of ritual and ostracism on attention

The current research has provided evidence that social exclusion increases affiliative motivations. Social exclusion, as a threat to group membership, increases anxiety. I have proposed that this results in security related behavior, involving increased copying fidelity as a means of demonstrating affiliation, aimed at addressing the threat to group membership. The current research, however, cannot address how this motivation affects attention to the action sequence. An inferred threat may create a focus on performing actions correctly and modulate attention.

Friedman and Forster (2010) have recently reviewed evidence from a variety of studies that have found that implicit danger cues (cues to threatening situations) narrow perceptual and conceptual focus to local aspects of visual stimuli and inhibit free associations and global processing. This is based in an interpretation of the

Easterbrook (1959) hypothesis, which suggests that anxious states involving physiological arousal and negative valence will narrow the scope of perception. The same effect is found using implicit cues that do not necessarily involve conscious emotional arousal. Evidence shows that “stimuli that do not involve emotional feelings but are merely associated with benign versus threatening situations tune attention in a manner analogous to conscious states of positive or negative emotional arousal” (Friedman & Forster, 2010, p. 877). The color red has also been shown to produce this effect. The color red “implicitly evokes a motivation to avoid threats” and thereby narrows the scope of attention (Friedman & Forster, 2010). Mehta and Zhu (2009) have found that in tasks that benefit from a narrowing of attention, exposure to the color red aids performance. For example, when participants are asked to determine whether pairs of identical or slightly different names or addresses were the same, participants exposed to red were better able to spot discrepancies and therefore outperformed those exposed to blue or white (Mehta & Zhu, 2009). Mehta and Zhu (2009) also found that the color red created a concern with not making mistakes in an experimental task.

Implicit threat cues, such as priming ostracism, could focus children’s attention to detailed aspects of the action sequence, and when combined with ritualistic action sequences may be especially likely to result in a high level of copying fidelity. Pickett et al. (2004) and Gardner et al. (2000) have shown that when individuals have been ostracized they display greater attention to and recall of social information. These findings have been proposed as support for the social monitoring system that aims to address threats to belongingness through a motivation to pay closer attention to social information as a means of improving subsequent social interactions. The results of the current research could be interpreted as a demonstration of the activation of this system. The ritualistic action sequence acts as social information about a group.

Increased attention to this sequence as a source of social information could improve copying performance. This interpretation would be in line with the current proposal suggesting that copying ritual action is based in social affiliative motivations. Future research could disentangle how motivation affects attention through examining how ostracism cues affect children's attention to fine details of an action sequence, and/or social information, and how this attention affects memory of an action sequence.

To test the social basis of the ritual stance more generally, further conditions priming threat outside of the social realm could be added to the current experiments. For instance, in addition to the primes used in Experiment 1, a video depiction priming threat of physical harm, or threat of contamination, or both, could be included as separate conditions. This could be done using the third-party minimal primes as in Experiment 1, or using narratives, or actual realistic depictions of these kinds of threats. Using narratives or other kinds of video depictions would provide a conceptual replication of the findings of Experiment 1 as well. Alternatively, a prime that evokes a general state of anxiety could also be utilized. As discussed above, the color red has been shown to have effects similar to that of threats on attention (Mehta & Zhu, 2009). Using a flashing red light could induce a general state of anxiety.

Using a between-subjects design, children would view, or listen to, one of the primes (ostracism, affiliation, contamination, physical harm; or, alternatively, a flashing red light), then view the ritual or instrumental action sequence demonstration, depending on condition. They would then be given the object set and their engagement with the objects would be coded and their summary scores analyzed for conditional differences as in Experiment 1. From this, competing hypotheses emerge. On one hand, if the ritual stance is fundamentally associated with affiliative motivations we would expect increases in imitative fidelity when priming ostracism in association with the

ritual stance. The other conditions should show similar levels of imitative fidelity. On the other hand, however, because most threats can be addressed by the aid of conspecifics, any kind of threat could activate coalitional psychology and increase affiliative motivations. In this case, we would expect all threat conditions to increase imitative fidelity.

5.5.2. Affiliative mimicry

The current research provides some evidence that when ostracized, especially by one's in-group, children are more likely to copy the gestural components of an action sequence. I argued that this finding provides evidence of continuity of function between mimicry of actions already in the behavioral repertoire and overt copying of novel behavioral action sequences. Whereas recent research has demonstrated that infants engage in spontaneous, overt mimicry of an adult (Fawcett & Liszkowski, 2012), children have not been shown to engage in automatic mimicry as adults do in normal social interactions. At some point in development, mimicry of interaction partners must become more automatic. The development of affiliative mimicry has yet to be explored experimentally. Future research could aim to determine when and how children begin to engage in this kind of behavior. The findings of the current research suggest that young children can be motivated to copy the gestures of an adult. Future research could examine how this motivation may influence the development of affiliative mimicry. Also, future research could examine, possibly through the use of more naturalistic, observational techniques, how children use imitation as a means of affiliation with peers. This kind of work could inform what kinds of behaviors are imitated as a means of building affiliative bonds. It may be that copying body movements acts as a more salient means of social interaction.

Heyes's (in press) distinction between sequence imitation and emulation and end-point imitation and emulation could also be more fully explored from a developmental perspective. This could possibly be achieved through the use of eye-tracking technology. This would allow for examination of what children are attending to when viewing the video demonstration. This would also allow for examination of differences of attention between children that have experienced social exclusion and children who have experienced inclusion.

5.5.3. Transmission of ritualistic behavior

The current research has provided evidence that the fidelity of children's imitation is influenced by cues indicating a ritualistic framing of action that is enhanced via increased affiliative motivations. This fidelity is likely related to the transmission of these kinds of action sequences, however, the current research did not explicitly address how rituals are actually transmitted from individual to individual. An important area of future research is to experimentally examine how these actions are actually transmitted from person to person. Previous research has investigated the transmission of tool-use along diffusion chains with children (Flynn, 2008; Flynn & Whiten, 2008). In this task, an initial child witnesses an adult demonstrate causally relevant and irrelevant action on a transparent or opaque puzzle box to retrieve a reward. The initial child is then given the opportunity to reenact the demonstration and is then assigned to demonstrate to another child, this recurs down a chain of five children. Flynn (2008) found that whereas the initial child will over-imitate the action sequence, the causally irrelevant actions are quickly discarded within the chain. The core method used to retrieve the reward, however, is maintained.

From the perspective of the ritual and instrumental stances, the findings of Flynn (2008) are consistent with the proposal that instrumental action is more open to innovation and behavioral variability. While the core method of retrieval was maintained throughout the chain, the causally irrelevant actions were quickly discarded. Using similar methods, future research could examine the transmission of conventional, ritualistic behaviors in diffusion chains. As a first step in examining how ritualistic behavior is transmitted along a diffusion chain, a between-subjects design could be used incorporating the ritual and instrumental actions sequences from Experiment 1. In one condition the initial child in the chain would be shown the instrumental action sequence, and in the other condition the initial child would be shown the ritual action sequence. The initial children in both conditions would then be allowed to carry out the action sequence with minimal prompting and would then be told that their assistance is needed in demonstrating the action sequence to a subsequent child (the children could be told that the video equipment had malfunctioned). Each initial child would then demonstrate the action sequence to the second child in the chain. These demonstrations would occur down a chain of five total children with a goal of obtaining six chains per condition for a total of $N = 60$ (30 per condition). I predict that the ritual action sequence would be transmitted with high fidelity, due to the lack of physical-causal rationales and an interpretation of the action as socially stipulated. In the instrumental condition children may quickly discard many of the actions and go straight for opening the silver box and placing an object inside.

Priming ostracism versus inclusion could also impact the transmission of ritualistic behavior. To test this, a between-subjects design using the affiliation and ostracism primes could be utilized. One condition would begin with the initial child viewing the ostracism prime and then watching the ritual action sequence

demonstration. The other condition would begin with the initial child viewing the affiliation prime and then the ritual action sequence demonstration. Following this, children in each condition would be given the opportunity to engage with the objects from the demonstration video. The children in each condition would then be told that their assistance is needed in demonstrating the action sequence to a subsequent child. The subsequent children in each condition would be exposed to the same ostracism or affiliation prime based on condition. This would occur down the chain of five children ($N = 60$, 30 per condition). Based upon the findings of Experiments 1 and 2, I expect that children that are primed with ostracism will engage in higher fidelity imitation down the chain than children primed with affiliation.

5.5.4. Observational research of the ritual and instrumental stances

Increasing the ecological validity of the current research and examining imitation of ritualistic and instrumental behavior as it naturally occurs is a priority for future research on this theoretical account. The current research utilized tightly controlled experimental techniques to explore the ritual and instrumental stances. Whereas this is essential to establishing a cause and effect relationship, controlling all potentially confounding variables can result in a contrived picture of behavior. I proposed that the video demonstration utilizing start- and end-state equivalency (the ritual condition) led children to interpret the actions as ritualistic, lacking a clear physical-causal rationale and instrumental purpose. For this reason, the video demonstrations appeared very deliberate and scripted and involved an adult model. An adult model was used because children often learn convention from adults. Children also learn many conventions, however, from peers (Rogoff, 2003).

It is still an open question as to whether or not children interpret action sequences with equivalent start- and end-states as conventional/ritualistic action, or possibly as play. Bjorklund and Pellegrini (2003) have noted that a definition of children's play often involves actions that are purposeless, where means are emphasized over any concrete end. Play affords a means for children to explore and gain experience in behaviors that are essential to their developing roles in their social world (Bjorklund & Pellegrini, 2003). It is possible that one of the crucial means by which children learn the conventions, as well as technical skills, of their culture is through play. The current experimental context cannot rule out the possibility that children may be motivated to play rather than, or in addition to, imitate. Indeed, imitation is likely an important and recurrent feature of young children's play and future research should address how play 'scaffolds' learning ritualistic behavior.

If we want to increase our confidence that start- and end-state equivalencies, as well as affiliative motivations, are actually related to the ritual stance, additional methodologies must be utilized. Children's cultural learning occurs in an intricate web of interrelated cues and dynamics. Arguably, a large portion of a child's day is devoted in some way to play, broadly defined in such a way as to include engagement in activities that look like adult activities, but that result in no concrete output, such as pretending to cook food. To more adequately contextualize children's cultural learning, observational methods could be used to code behavior as children engage in their daily activities. Observational methods would allow exploration of how play and imitation allow children experience within their social world.

These methods would involve filming behavior in preschool classrooms to capture a variety of everyday social activities. This observational research would provide a broader perspective on how children use imitation flexibly as a tool for

cultural learning. Given that children's socialization is not restricted to school settings, these observational techniques could be used to systematically examine imitation in home and play group settings. Children's interactions with peers and their caretakers in a variety of settings, ranging from food preparation areas to family homes and play areas, could be recorded and analyzed.

These recordings would then be reviewed and cut into smaller 'behavioral units' to capture particular episodes of behavior from start to finish. Behavioral units would then be coded to identify target behaviors of interest and then to combine all the samples into a comprehensive depiction of the rich interactions captured during observation. Behaviors could also be coded for both duration and frequency, allowing data to be explored in a wide variety of arrangements. The recordings could be analyzed for instances of instrumental learning versus ritualistic learning and gradations in between. The general features surrounding these activities could be captured in a much more naturalistic manner that would provide an important complement to the highly structured laboratory setting of the current research. The kind of verbal cues that surround more or less ritualistic and instrumental activities could be coded, as well as particular features associated with these activities, including varying degrees of start- and end-state equivalency. With the advent of software specifically designed for coding behavior from observation, such as JWatcher (Blumstein & Daniels, 2007), these rich interactions can be quantified and statistically analyzed.

5.5.5. Cross-cultural examination of the ritual stance and ostracism

If the mechanisms of and motivations underlying social learning are evolved cognitive adaptations we would expect them to have cross-culturally recurrent features. It is likely, however, that cultural inputs will have an influence on the development of

these mechanisms and learning strategies. As such, it is crucial to test individuals in non-Western cultural contexts to explore the possible uniformity and diversity present in children's social learning. Cultures that do not emphasize formal education would provide an ideal contrast with children from a university town in the United States. As suggested in the Introduction, cultural input is likely to influence how children learn via observation. Gaskins and Paradise (2010) have described the 'open attentional stance' that is characteristic of many cultures that do not employ Western models of education. Children in these cultures capable of paying attention to a variety of activities at the same time. This pattern of attention is not found to the same degree in Western cultures, where children are encouraged to pay close attention to one thing at a time (Gaskins & Paradise, 2010). How children are expected to attend to the ongoing activities they are exposed to is likely to play a strong role in how children learn. Also, in the United States, individuality and innovation are emphasized from an early age. Cultural emphases on individuality versus collectivity, and adhering to social norms, or tradition versus innovation, are going to vary widely across cultures.

Whereas features of social group psychology are likely universal, cultural input is also likely to influence reactions to and attributions for experiences of ostracism. As such, it is critical to determine patterns of recurrence and variability within cognition and behavior in diverse cultural contexts. Determining these patterns will shed light on the cultural and ecological factors involved in the development of imitation, norm acquisition, and response to social exclusion. Future research should aim to explore these patterns in communities that have rejected the influence of Western models and continue to embrace their traditional ways of life. Communities that are very tightly-knit, self-sustaining groups of families would provide a comparison with Western contexts. In tightly-knit communities, in which there are very few options for

alternative group membership, ostracism could be a particularly devastating experience for an individual. Whereas the aversion to and pain associated with social exclusion is likely universal, the degree of this aversion and pain may vary cross-culturally.

Future research is currently being planned that will begin with work in a selection of villages in Tanna, Vanuatu. Tanna was selected as a field site due to its relative isolation from Western influences and limited industrialization. Vanuatu provides the opportunity to examine multiple childrearing environments. Because the in-group typically takes precedence over the individual, fostering a collective and cooperative community is central to Ni-Vanuatu culture. In Tanna, there are villages that maintain *kastom*, or “ancestrally enjoined rules for life” (Keesing, 1982), as well as villages that have begun to engage in Western models of education that includes “kindies,” akin to US preschools. This will allow for comparison of how imitation is used for cultural learning in samples that have no Western education models to those that are transitioning towards Western models to US samples where children are accustomed to being taught in one-on-one situations with teachers and parents (Rogoff, 2003; Gaskins & Paradise, 2010). Because children in Tanna are expected to learn through observation, imitation may play an even more central role in Ni-Vanuatu children’s cultural learning. Considering that the vast majority of research on cultural learning has taken place in Western settings that typically place an emphasis on individuality and competition, Tanna will provide a valuable comparison point.

The research in Tanna will provide novel insight into imitation beyond Western settings in which adult-child interaction is often highly structured. Children outside of Western settings have been shown to engage in greater observational learning and do not experience much explicit teaching (Gaskins & Paradise, 2010). To date, however, only one study (Nielsen & Tomaselli, 2009) has experimentally examined children’s

propensity for engagement in high fidelity imitation outside of Western settings.

Nielsen & Tomaselli (2009) documented its existence as a tool for social learning but there have been no studies examining the role of social and contextual cues in the implementation of imitation cross-culturally. A priority for this research is examining ritual and instrumental learning in Vanuatu, this will involve experimentally replicating the finding that start- and end-state equivalency activates the ritual stance, and the motivation to engage in ritualistic action, as well as utilizing observational methodology to gain an in-depth picture of cultural learning in Vanuatu. Determining the social and contextual cues that activate the ritual and instrumental stances cross-culturally is essential to furthering our basic understanding of children's social learning.

5.6. Conclusion

The research presented in this thesis has addressed questions of how children navigate social learning opportunities, the affiliative motivations underlying engagement in ritualistic action sequences and how cues to the threat of social exclusion affect the imitation of modeled behavior. A further aim of this thesis was to provide a theoretical analysis of the mechanisms underlying how imitation is accomplished to situate the proposal of the ritual and instrumental stances within the larger body of literature on children's social learning. I proposed that imitation is accomplished via basic associative processes and in this way can be a more automatic process. I further proposed that even though imitation can be more or less automatic, motivational processes determine whether or not children actually engage in imitation as well as the fidelity of imitation. I proposed that the motivation to affiliate with group members is an important factor influencing children's engagement in imitation,

especially of a ritualistic action sequence. This research demonstrates that children use physical and social cues to navigate opportunities for cultural learning. When children interpret an action sequence as instrumental their imitation is less rigid than when an action sequence is interpreted as ritualistic and based in social convention and stipulation. This research also demonstrates the importance of affiliative motivations underlying children's engagement in imitation. This research presents novel insight into children's developing social awareness, engagement in social convention, and the early-emerging importance of group membership. A unique contribution of this work comes from the finding that children use imitation as a means of reaffiliation with group members following an experience of social exclusion. The research presented in this thesis has provided a developmental perspective and experimental evidence of the long-standing theoretical importance of ritual and group cohesion.

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