

**“Stinky Poop!” “Stinky Poop!” Humour and Imitation in Early Childhood Sibling
Relationships**

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Abstract

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Humour and imitation are important parts of child development. The affiliative nature of these behaviours allows children to communicate, connect, and strengthen their relationships. Sibling relationships are uniquely involuntary and offer children the ability to be silly and imitate one another. Additionally, play is a rich context in which we can observe and learn about children’s use of these affiliative behaviours. In a sample of 65 4-year-old children ($n = 65$, M age = 56.4, $SD = 5.71$ months) with an older ($n = 28$, M age = 75.8, $SD = 11.2$ months) or younger sibling ($n = 37$, M age = 34.9, $SD = 5.3$ months), the following study investigated use of humour and imitation during naturalistic observations of free play with either an older or younger sibling. Based on prior work, dyads’ production of humour and imitation were coded when instances occurred individually or simultaneously. A novel behaviour called “humorous-imitation” was coded when humour and imitation occurred simultaneously. Positive responses as well as laughter in response to humour and imitation were also coded. Humour and imitation were both very frequent during sibling play sessions, occurring more frequently individually than simultaneously. Siblings sustained reciprocal conversations while producing both behaviours. Children responded positively and laughed in response to the production of humour and imitation both alone and together. Overall, this study contributes to developmental literature demonstrating that humour and imitation are important affiliative behaviours in childhood that should be encouraged together, particularly in the context of play and social relationships.

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Introduction

Humour and imitation are both central aspects of human behaviour, particularly during childhood. Both serve affiliative functions in their ability to help individuals connect with and relate to others throughout the lifespan (Bergen, 2007; Over & Carpenter, 2013). For this reason, the role that humour and imitation play in the social development of children is an important area of study.

In early childhood, social relationships are incredibly important in helping children learn to interact with others, develop a sense of self, and navigate culture and society at large (Dunn, 1983; Dunn, 2002; Howe et al., 2022). Sibling relationships are unique in the role they play in a child's social development as they are innately involuntary and often allow for children to develop a co-constructed history with one another in the same home environment (Dunn, 2002). Due to the nature of sibling relationships, children may be able to use humour and imitation in any manner they choose without worrying about losing the relationship, as may be the case with peers and friends (Howe et al., 2022). Therefore, sibling relationships are an important context in which we can study humour and imitation in early childhood. Moreover, siblings may also co-construct meaning in their relationships through humor and imitation (Paine et al., 2021; Howe et al., 2018).

Finally, behaviour in early childhood is best evaluated through naturalistic observations of play in contrast to experimental and controlled methods of study. Play encourages creativity, spontaneity, and fun in children (Piaget, 1962). With the leeway to make up stories, develop goals, and problem solve, play is a central pillar in a child's social, emotional, and cognitive development (Piaget, 1962; Largo & Howard, 1979). Naturalistic observations of play have been

imperative in advancing child development literature, particularly with regards to children's patterns of humour and imitation (Howe et al., 2005; Paine et al., 2019).

Research on play in childhood is foundational in highlighting developmental theory, but there have been few studies specific to the interaction between play and humor in early childhood (Bergen, 2019). Additionally, imitation research has predominantly focused on its cognitive and instrumental role through experimental studies (Uzgiris, 1981; Howe et al., 2019), whereas few researchers have explored its social role in naturalistic observations of play. Further, while research on siblings in early childhood has increased in recent years, both sibling humour and sibling imitation research are relatively novel and have yet to be studied together. Therefore, the following study will evaluate the social and affiliative roles of humour and imitation in early childhood sibling relationships using naturalistic observations of play. Finally, this research may provide insight into how siblings in early childhood use humour and imitation to develop shared meanings during play by understanding each other's jokes and humour styles and sustaining their interactions through imitation (Paine et al., 2019; Howe et al., 2018).

The following thesis will encompass the theoretical foundations and existing literature regarding humour and imitation in early childhood development, with a specific focus on their social and affiliative functions. Additionally, sibling relationships will be examined in depth, both generally and how they have been studied specifically with regards to humour and imitation in early childhood. Finally, play is presented as the context in which humour and imitation in sibling dyads can be best investigated.

Therefore, the primary goal of this study is to evaluate how humour and imitation are produced in play sessions among sibling dyads during early childhood and how they may be

associated. More specifically, what are the characteristics (i.e., production and responses) of humour and imitation in early childhood sibling relationships?

Literature Review

Affiliative Behaviours in Early Childhood

Researching the behaviours, actions, and experiences of children during early childhood can provide us with the opportunity to better understand their social, cognitive, and emotional development (Carpendale & Lewis, 2015; Hartup 1989). In particular, the ways in which children form social and emotional connections with one another is an important domain of research to consider how strong, positive relationships can emerge and grow during early development and beyond (Carpendale & Lewis, 2015; Hartup 1989). Humour and imitation are two behaviours that serve an affiliative function in human interactions and relationships (McGhee, 1989; Bergen, 2007; Over & Carpenter, 2013; Howe et al., 2018). Particularly during early childhood, both humour and imitation are prominent behaviours that children may use to navigate social relationships, learn from one another, and develop tools to grow as individuals in a larger society (Southam, 2005; Uzgiris, 1981). Specifically, humour may encourage children to affiliate with others through common themes of knowledge, jokes, and by eliciting laughter, and imitation may encourage affiliation through repetition of one's play partner's behaviour in a lighthearted way (Bergen, 2007; Over & Carpenter, 2013). Additionally, using humour *and* imitation together may offer children the opportunity to demonstrate to their sibling that they are engaged with the ongoing conversation and play interaction in a more meaningful way. For example, perhaps using a lens of both humour and imitation can provide insight into how children might use silliness and lighthearted mimicry to encourage connection and bonding, as well as a merging of both children's interests and play styles (Paine et al., 2019; Howe et al.,

2018). Finally, this research may provide insight into how siblings in early childhood use humour and imitation to develop shared meanings during play by understanding each other's jokes and humour styles and sustaining their interactions through imitation (Paine et al., 2019; Howe et al., 2018). To do so, may also reflect children's social understanding of one another's thoughts and feelings. This study aims to investigate how these two behaviours are associated with one another in early childhood.

The Social/Affiliative Function of Humour in Early Childhood

Humour is a central part of being human. In terms of human connection and social competence, we often use humour to get to know one another and connect with each other (Bergen, 2007). More specifically, telling jokes, horsing around, and simply being silly are important aspects of understanding how we as humans express our emotions, transmit social and cultural norms, develop and maintain friendships, and even navigate difficult situations and taboo subjects (Bergen, 2007; Loizou & Recchia, 2019). While humour in adulthood has been extensively studied, research on childhood humour remains relatively novel and scarce in the developmental literature (Loizou & Recchia, 2019; Paine et al., 2019).

Children are exceptionally funny and are known for the outlandishly silly things they say and do. As important aspect of developing closeness and rapport with others, humor is a pillar of social development, interaction, and communication in early childhood (Bergen, 2007). Due to its highly affiliative nature, humour in early childhood is often prevalent and apparent during instances of free play between partners, such as at home with siblings or at daycare with peers (Bergen, 2019). Therefore, while experimental settings have traditionally been prioritized in research domains, it is through naturalistic observations of play that humour in early childhood can be best examined and understood (Bergen, 2019; Paine et al., 2019; 2021). Naturalistic

observations are useful in understanding humour and play as they can provide us with insight into the everyday experiences, behaviours, and thoughts of children that may not be apparent in an experimental and controlled observation.

In early childhood, humour understanding and production is typically based on the child's identification of incongruities in everyday schemas of language, actions, and play sequences (McGhee, 1989; Loizou & Recchia, 2019). As the child's social, emotional, and cognitive development matures with age, their humour will typically become more sophisticated as well (Coates & Coates, 2019). For example, as their language and speech development progresses, children will utilize humour that involves developmental features such as sound play or word play (e.g., a 7-year-old child saying, 'I'm not a goosebump, you are!') (Paine et al., 2019, p. 349). Therefore, humour may also act as a useful tool for children to navigate their personal relationships as their cognitive abilities develop over time (Loizou & Recchia, 2019). Moreover, humour in early childhood has been linked to a child's ability to empathize, develop Theory of Mind (i.e., our ability to understand mental states in both others and ourselves), and to develop strong positive relationships with others (Bergen, 2007; Bosacki, 2013; Paine et al., 2021). Thus, the functions of humour in the development of early childhood relationships may be both social and cognitive.

Additionally, laughter is an important part of humour and social interaction during infancy, childhood, and beyond (Kothbart, 1973; Kenderline, 1931). Laughter as a response to something humorous (e.g., a joke, clowning around, enacting something unexpected) may, in fact, extend the humorous act. This may create a sustained sequence between the person carrying out the humorous act and the person witnessing it, rather than just stopping the act in its tracks

(Kothbart, 1973). Therefore, laughter as a response to humour can foster an affiliative experience between play partners in childhood (Chapman, 1975).

Overall, humour is a highly affiliative behaviour in humans across the lifespan, particularly in children during early childhood. The previously outlined research demonstrates that children can strongly benefit from developing a sense of humour, particularly as an aide to navigate relationships (e.g., with adults, siblings, and peers) and social situations (Bergen, 2007).

The Social/Affiliative Function of Imitation in Early Childhood

Imitation has long been acknowledged for its importance in the domain of child development (Piaget, 1962; Bandura et al., 1963; Uzgiris et al., 1981). According to Uzgiris (1981), imitation serves two different functions in early childhood: cognitive and social. The cognitive function of imitation is Piagetian in nature, as it focuses on the assimilation of new information, actions, or processes into the child's existing schemas (Piaget, 1962). In particular, imitation during infancy and early childhood has been studied extensively in experimental settings for the cognitive and instrumental role it plays in childhood learning and skill development (Uzgiris, 1981; Howe et al., 2019). For example, a study conducted by Howe and colleagues (2019) found that imitation is a useful learning strategy during controlled instances of sibling teaching and novel task completion, therefore demonstrating the cognitive function of imitation.

The second function of imitation is based on an interpersonal and social foundation, whereby the act of imitation itself may not as important as who is being imitated and why (Uzgiris, 1981). The model becomes more important than the modeled action and the focus becomes how individuals can relate to one another, therefore serving an affiliative function (Uzgiris, 1981). In contrast to the cognitive function of imitation, the social and affiliative

function of imitation has often been overlooked in developmental literature (Over & Carpenter, 2013). Therefore, the following section will focus on the social role of imitation in early childhood, particularly in naturalistic and observational studies.

According to Over (2020), imitation, at its foundation, is a social act. The social motivation to be like others and be connected with others is one of the fundamental functions of imitation (Over, 2020; Legare & Nielsen, 2015). Furthermore, children develop the capacity to imitate others in early infancy, making it a remarkably useful tool for social development and the need to affiliate with others (Over & Carpenter, 2013). Social imitation can therefore be presented as both verbal or nonverbal manifestations of the modeled behaviour (Howe et al., 2018). Additionally, Nielsen and Blank (2011) state that the social function of imitation also relates to the learning and dissemination of culture in childhood, particularly through high-fidelity and unnecessary copying. In a study of preschool-aged children, the researchers found that, after watching an adult perform an unnecessary and redundant task with a toy, the children repeated the task after they were given the toy by the adult (Nielsen & Blank, 2011). Further, imitation is also related to fitting in and conforming to group norms and guidelines during childhood and beyond (Over, 2020). For example, Haun and Tomasello (2011) conducted a version of Asch's conformity study in a sample of 4-year-old children, whereby children were asked to identify the correct sizes of animal images. The authors found that peer pressure and imitation were important affiliative factors in social development during early childhood, as the focal children often conformed to the incorrect answers provided by other children next to them even though they had previously and privately identified the correct one (Haun & Tomasello, 2011). These studies support the notion that imitation is a fundamental aspect of human development, particularly with regards to social and cultural affiliation and human connection.

Finally, imitation also serves as an important function during play (Piaget, 1962; Largo & Howard, 1979; Howe et al., 2018). This will be examined in the relevant literature below.

Sibling Relationships in Early Childhood

Close intimate relationships such as parent-child, sibling, and friend relationships, are important to consider when attempting to understand the social, emotional, and cognitive development of children in early childhood (Dunn, 1983; Dunn, 2002; Howe et al., 2022). Social relationships help children navigate their experiences with others and develop as individuals (Hartup, 1989). In particular, sibling relationships are unique as they are founded on co-constructed histories between brothers and sisters throughout their lifetime (Dunn, 2002; McHale et al., 2012). Due to their shared environment, children often spend a significant amount of time with their siblings, therefore impacting their ability to learn from and connect with one another (Brody, 1998; Dunn, 2002).

As stated by Howe and colleagues (2021), sibling relationships may act as a “natural laboratory” (p. 18) for children to explore and navigate their individual and shared interests, experiences, and goals, as social beings. This uniquely involuntary relationship offers children the opportunity to be silly and humorous, test out jokes, and imitate one another without the worry of losing this relationship, as may be the case with peers and friends (Dunn, 2002; Howe et al., 2022). Historically, research has emphasized the importance of sibling relationships in understanding the socio-cognitive development of children, particularly by investigating structural variables such as age, birth order, and sex of the sibling dyads (Dunn, 1983; Howe et al., 2022). For example, studies of sibling dyads over the past few decades have demonstrated that younger children tend to imitate their older siblings more often than vice versa (Abramovitch et al., 1980; Hartup, 1989; Howe et al., 2018). Nevertheless, since the effects of

sibling structural variables on child development in infancy and early childhood are not always consistent in the existing literature, recent research has attempted to redirect the focus towards the nature of sibling interactions instead (Howe et al., 2018).

In particular, a variety of factors such as sibling relationship quality, level of intimacy, and distinct characteristics between siblings may influence a child's socialization (Brody, 1998; Dunn, 2007). For example, a study conducted by Recchia and Howe (2009) found that sibling dyads with a positively-rated relationship are more likely to process an instance of conflict constructively or resolve it through compromising than those with a low-rating of sibling relationship quality. Further, research on humour and sibling relationship quality in children reported that positively-rated relationships were significantly associated with the use of specific types of humour, such as word play and sound play (Paine et al., 2020). Perhaps different types of humour may reflect a positive affective tone of communication between children and, more specifically, siblings. Therefore, sibling relationships may serve as an important foundation for children to develop both individually as well as with one another (Dunn, 2002).

Sibling Relationships as a Context for Understanding Childhood Humour

Sibling relationships are a beneficial context in which we can examine and better understand how children use, interact with, and respond to humour (Paine et al., 2019; 2021). In particular, sibling relationships offer children the opportunity to navigate the social and affiliative aspects of humour together. For example, a study conducted by Paine and colleagues (2021) found that humour production between siblings was positively related to their understanding of minds (i.e., references to internal states) and relationship quality (e.g., positive sibling relationship was associated with use of word play).

Studying humour in sibling relationships can also be beneficial to understand age differences and birth order effects between children. For example, the study conducted by Paine and colleagues (2021) found differences in type of humour based on birth order, whereby first-born focal children used more humorous banter and performed more incongruities (e.g., a child pretending to eat a roof piece of a farm set) (p. 597) than second-born focal children. Further, another study reported younger siblings used more sound play than their older siblings (Paine et al., 2019). Therefore, this research demonstrates the rich context that sibling relationships can offer to understand age and birth order differences of humour use in early childhood.

Sibling relationships can also help us understand gender differences between children's use of humour. For example, same-gender male sibling pairs produce more humour than same-gender female sibling pairs (Paine et al., 2019). Differences in frequency of humour types were also evident, whereby same-gender male sibling pairs used more taboo-style humour, more clowning around, and performed more incongruities than same-gender female pairs (Paine et al., 2019). Therefore, sibling relationships can also be beneficial when investigating dyadic gender differences of overall use of humour and specific styles of humour.

Sibling Relationships as a Context for Understanding Childhood Imitation

Sibling relationships can also be useful when investigating the social function of imitation in children (Howe et al., 2018; 2019). In particular, the context of sibling relationships allows us to observe how children may learn from one another through the imitation of procedural tasks (Howe et al., 2019) and how they may naturally use imitation to affiliate and create shared meanings with one another (Howe et al., 2018).

While the instrumental role of imitation is not of focus in this paper, research demonstrates that sibling relationships serve as an insightful context to understand how children

teach and learn from one another (Howe et al., 2019). For example, in a study investigating how younger siblings use imitation to learn a procedural task taught by their older siblings, the children assigned as learners used more nonverbal imitation than verbal imitation and engaged in this behavior immediately after procedure demonstration than after a time delay (Howe et al., 2019).

The affiliative role of imitation can also be studied in the context of sibling relationships to understand how children interact with one another socially and learn during play (Howe et al., 2018). Howe and colleagues' (2018) longitudinal study of sibling pairs during naturalistic daily interactions in their home investigated the social function of imitation, the type of imitation (e.g., verbal or nonverbal), and the response to imitation. Sibling imitation was very frequent and demonstrative of affiliative interactions. Further, the researchers found interesting differences based on age and birth order. Specifically, younger siblings imitated more overall whereas older siblings imitated significantly more during the second investigation two years later. When age was controlled, younger siblings still imitated more overall; specifically, 4-year-old older siblings used more nonverbal imitation at the first time point, whereas 4-year-old younger siblings at the second time point used more verbal imitation. This might provide us with insight into the ways that siblings scaffold and learn from one another, and facilitate their social, cognitive, and language development concurrently. Additionally, gender differences emerged demonstrating more overall imitation from same-gender pairs compared to mixed-gender pairs. Therefore, sibling relationships act as a useful lens to investigate and understand how children imitate one another.

Play as a Context for Studying Humour and Imitation in Early Childhood

Play is a rich domain for researchers to observe the naturalistic behaviours of children, including their interactions with one another and their use of affiliative behaviours such as humour and imitation (Paine et al., 2021; Howe et al., 2018; Bergen 2019). According to Piaget (1962), spontaneity, pleasure, and the absence of a formal organization as in games-with-rules are important aspects of play in childhood. Therefore, play in its varying forms (e.g., spontaneous play, pretend play, and play with toys/objects) can serve as a notable context for children to be creative, act in silly ways, navigate relationships with others, and develop their social cognition (Largo & Howard, 1979; Loizou, 2005; Bergen, 2019).

Recent research is beginning to emphasize the synergetic relationship between play and humour as well as the importance of investigating the use and production of humour in children's naturalistic instances of free play (Paine et al., 2019; 2021). Investigations in both home and daycare settings demonstrated that humour during free play is linked to the children's social-emotional, language, and cognitive skills, as well as their playfulness in general (Bergen, 2019). In a study investigating humorous instances of play in daycare-aged children, Loizou (2005) stated that children "[translate] their play activity into humorous events" (p. 106). The children created humorous events in both general play activities as well as routine activities in the daycare (e.g., a child putting a sponge on his head as a hat after being asked to clean his spot). This demonstrates children's use of incongruity and violation of expectations in a playful and humorous ways in everyday life (Loizou, 2005). Recognizing incongruity and performing incongruities are aspects of play and humour that go hand-in-hand, whereby children may attempt to go against what is expected in play themes and make light of these discoveries with their play partners (Bergen, 2019). Therefore, play and humour are important to consider in

conjunction as they contribute to the development of children both individually and when interacting with a playmate.

Developmental research has largely focused on the relationship between play and imitation as they have been instrumental in investigating the cognitive development of children through both experimental and naturalistic observational studies (Piaget, 1962; Largo & Howard, 1979; Howe et al., 2018). In their study of spontaneous play and imitation, Largo and Howard (1979) investigated how play behaviour may change with age in a sample of infants from nine to 30 months old. A controlled, laboratory study was conducted, whereby the infant was either expected to spontaneously play with the toy, instructed to play with the toy in a specific way, or expected to imitate play by the researcher. The researchers found a relationship between infants' spontaneous play and imitation following presentation from the researcher, but this depended on the child's level of cognitive development and whether or not the action was already part of their play schema (Largo & Howard, 1979). For example, imitation of stacking was observed in infants of 18-24 months old, which corresponds to expected developmental milestones of that age. In a naturalistic longitudinal investigation of play in sibling pairs in early childhood, Howe and colleagues (2018) reported imitation was highly affiliative particularly during reciprocal play. Additionally, the researchers observed children using overall more verbal than nonverbal imitation during play, particularly with age (Howe et al., 2018). Further, Nielsen (2012) argues that children's play and imitation are crucial in the maintenance and transmission of cultural norms, social adaptation, and socio-cognitive development. In particular, pretend play offers children the opportunity to creatively explore societal structures, norms, and schemas, while imitation offers children the opportunity to learn, adopt skills, and transmit human culture

(Nielsen, 2012). Therefore, play and imitation are important aspects of child development, both together and separately.

Play as a Context for Studying Humour and Imitation in Siblings

As noted, observational studies using samples of sibling dyads are instrumental in understanding the affiliative nature of humour and imitation in early childhood through play (Howe et al., 2005; Paine et al., 2019). Naturalistic observations of play between siblings often occur in the children's home and therefore are a rich context to study these affiliative behaviours (Howe et al., 2005; Howe et al., 2018). Specifically, using both play and sibling dyads as contexts to investigate humour and imitation can be useful for understanding sibling play quality and interaction, sibling relationship quality, sibling co-construction of shared meanings, and more (Howe et al., 2005; 2018; Leach et al., 2015; 2019).

For example, Howe and colleagues' (2005) investigation of kindergarten children's use of pretend play while playing with a farm set with an older or younger sibling demonstrated that pretend play was associated with sibling co-construction of shared meanings during play. Further, subsequent research found sibling imitation to be most common in contexts of play compared to contingent activities and instances of conflict (Howe et al., 2018). Additionally, Paine and colleagues' (2019) study of shared humour between siblings also reported humour as very frequent and reciprocal during observed sessions of free play. Therefore, the use of naturalistic play settings in conjunction with sibling dyad samples are beneficial for understanding the affiliative nature of imitation and humour in early childhood.

The Present Study

Following from the theoretical and empirical literature regarding humour and imitation in early childhood sibling relationships, the present study investigated the prevalence of and

response to instances of humor and imitation in early childhood sibling relationships. The three instance types were *humorous-imitation* (an instance where both humour and imitation are observable in an exchange of play, behaviour, or communication between the children), *humour-only* (an instance where only humour is observable), and *imitation-only* (an instance where only imitation is observable). To our knowledge, this is the first study of its kind to evaluate both humor and imitation together in a sample of sibling dyads in early childhood. The sample used in this study was part of a larger longitudinal dataset that investigated sibling and friend relationships in early childhood, for example research on children's connected communication during play (Leach et al., 2021) and siblings' shared humour (Paine et al., 2019). This rich dataset has also been used to study conflict (Abuhatoum et al., 2018), internal state language (Leach et al., 2017), and connected communication in play (Leach et al., 2021) in both siblings and friend dyads. In the present study, only the sibling play sessions were included and the sessions with the friends were not employed. As mentioned earlier, sibling relationships are an interesting lens to observe and investigate early childhood humour and imitation use since these relationships are involuntary, the children often live in the same household, and perhaps they are familiar with each other's play style and silliness by default based on their co-constructed history (Dunn 2002; Brody, 1998; McHale et al., 2012). However, associations between humor and imitation have not yet been evaluated and will provide a novel perspective on the social development of siblings in early childhood. A total of four hypotheses are tested in this study in the context of 4-year-old focal children playing with an older or younger sibling.

The study focused on four research questions. First, the frequency of humour-only, imitation-only, and humorous-imitation instances in sessions of naturalistic free play is described. In accordance with the investigation of instance-type frequencies, a hypothesis is

advanced to present a general overview of the prevalence and frequency of the different kinds of humour and imitation instances during naturalistic observations of free play. It is hypothesized that humour-only or imitation-only instances will occur more frequently than instances of humorous-imitation. The frequency of humour and imitation have already been studied in separate investigations, demonstrating that they do occur very often in naturalistic observations of free play (Paine et al., 2019; Howe et al., 2018). Therefore, investigating the association of humour and imitation together is a new contribution to the literature, and the frequency of instances of shared *humorous-imitation* is currently unknown. Therefore, this analysis is exploratory.

Second, given the primary focus of the current work on humour, I investigated whether sequences with instances of both humour *and* imitation (humorous-imitation) are a more sustained experience between sibling dyads than sequences with instances of only humour (i.e., greater number of turns in the sequence). It is hypothesized that the sequence type featuring instances of humorous-imitation would be a more sustained interaction than the sequence type with instances of humour-only (specifically, more conversational turns in each type of sequence). This new sequence category will involve the back-and-forth interaction (i.e., conversational turns) between children utilizing both humour and imitation simultaneously in response to one another during play. While previous studies report humour and imitation to be frequent individually (Paine et al., 2019; 2021; Howe et al., 2018), this exploratory analysis will aim to discover if there is a greater number of turns in a sequence when children are engaging in both kinds of affiliative behaviours compared to sequences of only humor.

The third research question was what type of humour is more likely to be imitated (i.e., which humour category is more likely to be featured in an instance of humorous-imitation)?

It is hypothesized that sound play, word play, and performing incongruities would be the most imitated types of humour (Loizou, 2005; Coates & Coates, 2019). This is based on previous research that found these types of humour to be the most frequent overall, therefore supporting the notion that the most frequent kind(s) of humour would also be imitated the most (Paine et al., 2019; 2021).

The fourth research question examined how children respond to the instances of humorous-imitation, specifically by examining the frequency of positive/neutral responses to individual instances of humour-only and humorous-imitation. Additionally, which type of sequence had a higher frequency of laughs overall was examined, specifically, how many laughs were present in sequences of humour (i.e., featuring instances of humour-only) versus sequences of humorous-imitation. First, based on the exploration of frequencies of positive/neutral responses to instance types, it was hypothesized that children would have a positive/neutral response to humour-only instances more frequently than to humorous-imitation instances. There is no direct literature to support such a hypothesis, but previous research reports that responses to humour were largely positive (Paine et al., 2019). Further, humour tends to be affective in human interaction (e.g., trying to elicit laughter, telling jokes, etc.), therefore it was hypothesized that the positive response would be more frequent in the instances containing humour only than a combination of humour *and* imitation (Bergen, 2007). Additionally, it is predicted that children will respond with laughter as a response to sequences of humour-only more than often than sequences of humorous-imitation (Chapman, 1975; Kenderline; 1931).

Method

Participants

Participants included 65 4-year-old children ($n = 65$, M age = 56.4, $SD = 5.71$ months) with either an older ($n = 28$, M age = 75.8, $SD = 11.2$ months) or younger sibling ($n = 37$, M age = 34.9, $SD = 5.3$ months). The sibling dyads were primarily White, middle-class, rural, small town, and suburban families from the state of New York. The siblings were recruited from local early education centers (e.g., daycares, preschools, schools) and by word-of-mouth. The gender composition of the siblings included 33 same-gender dyads (16 sister, 17 brother pairs) and 32 mixed-gender dyads (16 sister-brother, 16 brother-sister pairs).

Procedure

Sibling dyads were observed in their homes in a semi-structured play session with a toy set (farm, village, or train set) and were video recorded for 15 minutes. Thirty-two sibling dyads played with the farm set, 31 played with the village set, and two played with the train set. While the distribution of toys was meant to be counterbalanced, two dyads accidentally received the train set, which was meant for a follow-up two years later. The children were instructed by a research assistant to play with the toy set as they wished and to sit on a comfortable floor mat. Left to play in the room alone, the siblings were able to play privately without the direction or supervision of an adult. The RA and mother sat in an adjoining room. The audio and actions from the video-recorded play sessions were later transcribed by naïve research assistants.

Measures

Coding of Humour and Imitation Instances

To investigate the association between humour and imitation during naturalistic observations of play, the present study adopted three types of instances that were present during the video-recorded sessions. The three instance types included: (1) *humorous-imitation*, (2) *humour-only*, and (3) *imitation-only* (see Appendix A). Since the video recordings and

transcripts of the play sessions were previously coded for humour and imitation separately for a variety of studies, this adapted coding scheme approached this data in a new light. To establish interrater reliability with the humour and imitation-only categories, a second naïve investigator coded 20% of the recorded play sessions for the novel instance-type of *humorous-imitation* ($\kappa = .63$).

Coding of Humor

The video recordings and transcripts of the interactions were previously coded for humor (Paine et al., 2019; 2021) and based on a coding scheme of humor types inspired by Bergen (2006). Each instance of humor was noted and coded based on seven categories of humor: (1) *performing incongruities*, (2) *word play*, (3) *preposterous statements and humorous anecdotes* (i.e., *stories*), (4) *sound play*, (5) *taboo*, (6) *banter*, and (7) *clowning* (see Appendix B). In each instance of humour, multiple categories could co-occur (e.g., “crockadoodle doo” in a silly sing-song voice would be both sound play and word play). Instances of humor were coded by two research assistants and interrater reliability was established on 22% of the play interactions ($\kappa = .78$) (Paine et al., 2021). The categories of humour were coded using the original play-session video recordings and associated transcripts.

Coding of Imitation

The presentation of imitation in sibling dyadic play sequences was previously coded using an adapted version of a coding scheme used by Howe and colleagues (2017). Two categories of imitation were coded: (1) *verbal imitation* and (2) *nonverbal imitation* (See Appendix B). Verbal imitation is defined as the imitation of speech and sound, and nonverbal imitation is defined as the imitation of an action (Howe et al., 2017). Each instance of imitation in the 15-minute video records and transcripts was coded for either of the two categories of

imitation. The imitation coding was previously based on samples of both sibling and friend dyads, and interrater reliability for 20% of the imitation instances was established for *verbal imitation* ($\kappa = .99$) and *nonverbal imitation* ($\kappa = .96$) (Howe et al., 2022, under review).

Coding of Humorous-Imitation

A novel coding scheme was created to assess the phenomenon of humour and imitation co-occurring during sibling play sessions. More specifically, *humorous-imitation* was coded when a previously coded humour-only instance *and* an imitation-only instance were observed at the same time. In other words, when two individual humour-only and imitation-only instances occurred simultaneously, they were merged as one instance of the novel *humorous-imitation* code. *Humorous-imitation* could occur in a bi-directional manner: (1) one of the children said or did something humorous while imitating something their sibling said or did (e.g., a focal child says “we’re making the ground” and the sibling started singing “we’re making the ground, we don’t care to make a ground” in a silly manner), *or* (2) one of the children imitated something humorous that their sibling said or did (e.g., a focal child was waving toy pieces in a silly manner in her sister’s face and her sister copied her). It should also be noted that *humorous-imitation* could be comprised of both verbal and nonverbal instances of humor and imitation together. For example, it would not be excluded from the coding if one of the children was imitating something verbally while simultaneously doing something humorous that would be considered nonverbal, or vice versa (e.g., the sibling dancing in a silly manner while imitating something the focal child said).

In addition to coding an instance of *humorous-imitation*, the type of humour that was associated with the imitative act was noted. For example, in one play session, a focal child called a farm piece “the roof to the shilo” and his sibling immediately imitated him afterwards by

saying the same thing. The focal child labelling of the word silo was coded for humour as *word play*. The sibling's imitation that immediately followed was coded as an instance of *humorous-imitation*, and the type of humour associated (i.e., *word play*) was noted as well. Instances of *humorous-imitation* were coded by two researchers and interrater reliability was established on 20% of the play interactions ($\kappa = .63$). Both coders had access to the play session transcripts along with the previous coding of humour and imitation that was done for prior research (Paine et al., 2019; Howe et al., 2022, under review). The researchers independently decided whether the humour and imitation codes should be considered separately or should be considered as humorous imitation.

Coding of Responses to Humour and Imitation

Children's responses to their partner's humorous and imitative acts, respectively, were previously coded categorically as: (1) *no response*, (2) *positive/neutral response*, (3) *negative response*, (4) *imitation*, (5) *clarification*, and (6) *extension*. This coding of humour responses was used in the study conducted by Paine and colleagues (2019). Some of these responses, notably positive, negative, and no response, were used in the coding scheme for imitation in a study conducted by Howe and colleagues (2018). In the present study, children's response to humour and imitation instances were analyzed as: (1) *positive/neutral response*, and (2) *laughter response* (see Appendix C). Positive/neutral and laughter responses incorporate positive social aspects of connection. Imitation and clarification were removed from the coding scheme since imitation was studied in depth in its own coding scheme and clarification was already removed from analyses in previous studies due to low frequency (Paine et al., 2021). Additionally, no response and negative responses have been removed to avoid replication of findings (Paine et al., 2020; 2021). The adaptation of this coding scheme enabled the analysis to focus on the

categories relating to affiliation in response to humor and imitation sequences, therefore targeting aspects of social development specifically.

The responses to humor and imitation were coded using both the transcripts and original play session video recordings. Tallies of *positive/neutral responses* were previously coded for *humour-only* ($\kappa = .82$), whereas *positive/neutral responses* for *humorous-imitation* were tallied by two researchers and interrater reliability was obtained for 20% of the play sessions ($\kappa = 1.00$). *Positive/neutral responses* for instances of *humorous-imitation* were based on merged responses to *humour-only* and *imitation-only* instances, whereby previous responses of *positive/neutral*, *imitation*, *clarification*, or *extension* were coded as *positive/neutral* response for instances of *humorous-imitation*, but *no response* and *negative response* were not. During the coding process, a *laughter response* was tallied each time a child verbally giggled. This was verified both in the written transcript (i.e., using key words “ha-ha”, “giggle”, and “laugh”) as well as by listening to audible cues of laughter in the video recordings. Additionally, a tally was taken for each instance of laughter that occurred within a sequence of *humorous-imitation* or *humour-only*. To establish interrater reliability, a second naïve coder was trained and invited to code 20% of the transcripts and video files of the play sessions for a *laughter response* ($\kappa = 1.00$).

Conversational Turns

How engaged the children are may differ based on different variables or contexts. Therefore, controlling for dyadic conversational turns is necessary in distinguishing possible differences in humor and imitation production. To explore the length of exchanges, two types of sequences were included in this coding scheme, each of which start with an instance-type code and end after the children pause for at least 3 seconds (see Appendix D). A humorous sequence was noted when a back-and-forth exchange occurred between the two children and one or more

instances of humour-only was present. A sequence of humorous-imitation was noted when a back-and-forth exchange occurred in the interaction between the children and one or more instance of humour-only *and* one or more instance of humorous-imitation was present. The purpose of emphasizing the distinction between these two sequence types was to verify if exchanges were longer between children depending on their use of humour alone or in conjunction with humorous-imitation (i.e., which sequence type may allow for a longer, more affiliative exchange). This was accomplished by two researchers who counted the frequency of dyads' conversational turns between children in each type of sequence, where each conversation was separated by a pause of 3 or more seconds ($\kappa = 1.00$).

Constellation Factors

Other variables of interest included gender composition, age group, and birth order of the sibling dyads. Each of these variables were categorized during the initial data collection and are outlined in the data analysis and frequency distributions to gain insight into potential individual and group differences in prevalence of and response to humor and imitation in sibling dyads.

Data Analysis

A variety of statistical analyses were performed to investigate siblings' use of humour and imitation during their 15-minute session of free play. First, all variables included in the analyses were prorated to ensure consistency in video length. This was done by taking the variable of interest, dividing it by the actual length of the video, and then multiplying it by the ideal video length: 15 minutes (e.g., 12 overall instances of humour / 13.5 minutes x 15 minutes).

First, a description of siblings' overall production of humour and imitation during play sessions is provided. This is done by providing descriptive statistics of the three instance categories: humour-only, imitation-only, and humorous-imitation. Additionally, a within-

subjects ANOVA was conducted to verify if there were significant differences between the three instance-types, followed by pairwise comparisons to outline the differences and a Bonferroni post-hoc test to control for Type II error. Since humorous-imitation is a novel code, multiple one-way ANOVAs were conducted to report differences in children's production of humorous-imitation based on dyadic gender composition, age group, and birth order.

For the second research question investigating which type of sequence (i.e., sequences with instances of humour-only or sequences with instances of humorous-imitation) incorporate more conversational turns between the siblings during free play, a paired samples *t*-test was used. First, a sequence of humour-only was coded when there were only instances of humour-only throughout the children's conversation. A sequence of humorous-imitation was coded when there was the presence of both humour-only instances *and* humorous-imitation instances. The total number of sequences per play session were counted individually and coded as either humour-only or humorous-imitation. From there, the total number of conversational turns *within* the sequences were tallied. The mean number of conversational turns by sequence category (humour-only or humorous-imitation) was calculated based on a proportion for each sibling dyad (i.e., total number of conversational turns/total number of sequences of humour-only or total number of conversational turns/total number of sequences of humorous-imitation). A within-subjects ANOVA was conducted to compare conversational turns depending on sequence type, followed by pairwise comparisons and Bonferroni post-hoc tests to control for error.

The third research question exploring which category of humour was imitated most frequently (i.e., most frequent type of humour in instances of humorous-imitation) was presented using descriptive statistics and frequencies tables. Due to the low frequency of occurrence for the

types of humor, a test of statistical significance to determine differences in the frequency of the humour-types was not conducted; therefore, the data will only be presented descriptively.

The fourth and final research question investigating siblings' response to humour-only and humorous-imitation (i.e., positive reaction and laughter) was analysed in two separate parts. First, positive responses to instances of humour-only and humorous-imitation were tallied and coded in the 65 play session transcripts. A paired samples *t*-test was conducted to verify if there were any differences between the mean instances of these two groups. This was done using proportion scores for the number of positive responses per total number of *instances* between dyads (i.e., total number of positive responses/total number of instances of humour-only or total number of positive responses/total number of instances of humorous-imitation). For the second part of the question investigating the production of laughter during play sessions, the frequency of laughter was considered based on how often this behavior occurred within a *sequence* of humour-only or humorous-imitation. The mean number of laughs by sequence category (humour-only or humorous-imitation) was calculated based on a proportion for each sibling dyad (e.g., total number of laughs/total number of sequences of humour-only or total number of laughs/total number of sequences of humorous-imitation). A paired samples *t*-test was also conducted to compare mean number of laughs based on sequence type.

Results

Descriptive information

Instances of Humour & Imitation

The results for humour and imitation production are differentiated based on *instances* and *sequences*. A description of siblings' overall production of individual humour and imitation *instances* during their play session is found in Table 1 (presented at end of Results section). Of

the 65 sibling pairs, 62 produced at least one instance of humour-only, 51 produced imitation-only, and 30 produced humorous-imitation during their 15-minute session of free play. For example, one focal child said, “the water keeps wreckalizing!”, which is an example of an instance of humour-only. An example of an instance of imitation-only was when a focal child said, “Timmy, you want a sailboat?” and the sibling responded, “oh, a sailboat! A sailboat!”. Finally, an example of an instance of humorous-imitation was when the sibling said “Kyle!” and the focal child said “Ky-le!” in a silly imitative voice.

Sequences of Humour & Imitation

Descriptive statistics for the number of humor-only and humorous imitation *sequences* are provided in Table 2. Sequences of humour and imitation were noted when instances of humour-only or humorous-imitation occurred one after another during a continuous conversation between the children. Of the 65 pairs of siblings, 62 had at least one sequence of humour-only ($M = 5.68$, $SD = 3.69$) and 30 had at least one sequence of humorous-imitation ($M = 1.34$, $SD = 2.16$) (see Table 2). An example of a humour-only sequence is outlined in Table 3, an example of a humorous-imitation sequence is outlined in Table 4. Furthermore, the total number of conversational turns during sequences of humour-only ($M = 12.40$, $SD = 11.48$) and humorous-imitation ($M = 15.73$, $SD = 11.31$) are described in Table 5.

Sibling Constellation Factors

Additionally, sibling constellation factors were investigated to verify if they impacted siblings’ production of the novel humorous-imitation variable. A one-way ANOVA revealed that children’s total production of humorous-imitation was not significant as a function of dyadic sex composition, $F(3, 61) = 0.247$, $p = 0.863$; specifically, boy-boy ($M = 1.79$, $SD = 2.77$), boy-girl

($M = 1.98$, $SD = 3.40$), girl-girl ($M = 1.32$, $SD = 2.62$), and girl-boy dyads ($M = 1.29$, $SD = 1.82$) were not significantly different.

A second one-way ANOVA showed that children's total production of humorous-imitation as a function of age group was also not significant, $F(1, 63) = 3.480$, $p = 0.067$; a focal child with a younger sibling ($M = 0.91$, $SD = 1.75$) and a focal child with an older sibling ($M = 2.15$, $SD = 3.16$). Furthermore, a one-way ANOVA indicated there were no differences based on the focal child's birth order, $F(1, 63) = 0.110$, $p = 0.742$; the production of humorous-imitation by younger focal children ($M = 1.43$, $SD = 2.28$) and older focal children ($M = 1.64$, $SD = 2.84$) did not differ.

Finally, a one-way ANOVA was conducted to investigate differences between children's total production of humorous-imitation based on play set. Siblings' production of humorous-imitation was not significant according to play set, $F(2, 62) = 2.752$, $p = 0.072$; farm set ($M = 1.91$, $SD = 2.92$), village set ($M = 0.94$, $SD = 1.50$), and train set ($M = 4.50$, $SD = 6.36$),

Are Instances of Humour, Imitation, or Humorous-Imitation More Frequent?

To address the first research question regarding the *frequency* of the three types of instances, a within-subjects ANOVA was conducted. The analysis demonstrated that the mean number of instances of humour-only, imitation-only, and humorous-imitation were significantly different, $F(1.324, 84.705) = 30.01$, $p < .001$, partial $\eta^2 = .32$. As predicted, a series of pairwise comparisons identified that instances of both humour-only ($M = 11.58$, $SD = 11.78$) and imitation-only ($M = 8.69$, $SD = 7.40$) were significantly more frequent than instances of humorous-imitation ($M = 1.62$, $SD = 2.70$), but there was no significant difference between instances of humour-only and imitation-only (see Table 1). A Bonferroni post-hoc test was used to correct for multiple comparisons.

Do Siblings Sustain Longer Interactions in Humour-Only or Humorous-Imitation Sequences?

The second research question investigated whether sequences of humour-only or humorous-imitation were a more sustained experience by determining which sequence included a larger number of conversational turns. Siblings' back-and-forth conversations while also producing instances of humorous and imitation were interpreted as *sequences* of humour-only and humorous-imitation. The prediction that humorous-imitation would have a greater number of conversational turns than humor-only sequences was tested. Specifically, a paired-samples *t*-test compared the mean number of conversational turns during the two types of sequences and was not significant, $t(64) = 0.510, p = 0.306$; humour-only ($M = 1.96, SD = 1.10$) and sequences of humorous-imitation ($M = 1.79, SD = 2.8$) (see Table 6). Thus, the prediction was not supported.

What Types of Humour Are Sibling Dyads More Likely to Imitate?

The third research question explored what humour type would be most likely to appear in a sequence of humorous-imitation. It was hypothesized that sound play, word play, and performing incongruities would be the most imitated types of humour. Given the low frequencies of the types of humor, statistical analyses were not possible. Instead, descriptive statistics are presented to demonstrate the frequency of humour-types produced in instances of humorous-imitation (see Table 7). Frequency of instances by humour-type occurred in the following order from most frequent to least frequent: sound play, banter, word play, performing incongruities, stories (preposterous statements), clowning, and taboo. As hypothesized based on frequencies, sound play was overall most frequent, but banter was unexpectedly more frequent than word play and performing incongruities, contrary to prediction.

An example of sound play occurred when a sibling repeated the word “quack” with a squeaky silly voice to the tune of Blue Danube and the focal child did the same. One example of banter as an instance of humorous-imitation was coded when a sibling said, “do you want a noogie?” and the focal child responded, “no, I want gum”, while both laughed. An example of word play was when a focal child labelled a farm piece as a piano and their sibling said, “watch my piano.” An example of performing incongruities as an instance of humorous-imitation occurred when one sibling picked up a toy house, pretending it was blowing in the wind, and the other sibling copied that action. Preposterous statements or stories can be described with an example whereby one child said, “the troops are all lined up - line up the cows, line up the bunny rabbits” and their sibling responded “no, this is my line.” An example of clowning was when one child stood on the edge of the sofa and pretended to fall dramatically, and their sibling imitated that action. Finally, an example of taboo as an instance of humorous-imitation occurred when a child hit a few toy animals with a barn piece while saying “they’re all dead” and their sibling laughed and responded, “they’re not dead!”.

How Do Siblings Respond to Humour and Imitation Positively and With Laughter?

Positive Responses

The first part of the fourth research question first addressed the frequency of positive responses to *instances* of humour or humorous-imitation. Of the 62 pairs that produced at least one instance of humour-only, 43 had at least one positive response, whereas, of the 30 pairs that produced humorous-imitation, 21 had at least one positive response (see Table 8). Since instances of humour-only occurred much more frequently than instances of humorous-imitation, it was necessary to evaluate positive responses to these variables by controlling with a proportion score. A paired samples *t*-test, $t(28) = 0.456, p > .001$, demonstrated a nonsignificant difference

between proportion scores of positive responses to instances of humour-only ($M = 0.60$, $SD = 1.22$) versus positive responses to instances of humorous-imitation ($M = 0.45$, $SD = 0.41$) (See Table 9). Thus, contrary to prediction, instances of humour-only did not produce significantly more overall positive child responses than instances of humorous-imitation. An example of a child's response to an instance of humour-only positively was a sibling using a toy animal to destroy the farm while repeating "bock bock" in a silly high-pitched voice and the focal child smiled in response. An example of a positive response to a humorous-imitation instance was when a focal child told their sibling to use a storage lid to cover the farm and protect it from the rain, so the sibling copied the action and said "okay!".

Laughter Responses

The second part of the fourth research question explored whether *sequences* of humour-only or humorous-imitation would produce more overall instances of laughter in the children's play. Of the 62 pairs that produced humour-only, 24 laughed at least once during a sequence and, of the 30 pairs that produced humorous-imitation, 9 laughed at least once during a sequence. An example of a laughter response during each of these sequence types is found in Table 10 and Table 11. The total number of humour-only sequences with at least one laugh produced ($M = 0.77$, $SD = 1.39$) and total number of humorous-imitation sequences with at least one laugh produced ($M = 0.51$, $SD = 0.92$) are reported in Table 12. The total frequency of laughs produced during sequences of humour-only ($M = 1.03$, $SD = 1.91$) and humorous-imitation ($M = 1.34$, $SD = 3.03$) are indicated in Table 13.

It was hypothesized that sequences of humour-only would produce more laughs on average than sequences of humorous-imitation. To compare the *mean* number of laughs as a proportion during the two types of sequences, a paired-samples *t*-test was conducted and was not

significant, $t(29) = 0.243$, $p = 0.405$; humour-only ($M = 0.51$, $SD = 0.75$) and sequences of humorous-imitation ($M = 0.69$, $SD = 1.40$) (see Table 14). Thus, the prediction was not supported.

Table 1*Descriptive Statistics for Instances of Humour and Imitation.*

	<i>M (SD)</i>	Range	Sum	Percentage (%)
Humour-Only	11.58 (11.79)	0-56	753	95
Imitation-Only	8.69 (7.40)	0-27	565	78
Humorous-Imitation	1.62 (2.70)	0-12	105	46

N = 65. Percentage is based on how many dyads produced the instance-type at least once.

Table 2*Descriptive Statistics for Sequences.*

	<i>M (SD)</i>	Range	Sum	Percentage (%)
Humour-Only	5.68 (3.69)	0-17	369	95
Humorous-Imitation	1.34 (2.16)	0-12	87	48

N = 65. Percentage is based on how many dyads produced the sequence-type at least once.

Table 3

Coded Example of a Humour-Only Sequence Between Siblings.

Conversational Turns	Child	Quote/Behaviour	Humour-Only Instance	Humour Type
1	FC	“Where’s the mom?”		
2	Sib	“She’s under here. She died.”	2	Stories, Taboo
3	FC	Where?		
4	Sib	See? (<i>Lifts up mat</i>)		
5	FC	Where’s the father?		
6	Sib	Under here too. (<i>Points to mat</i>)	2	Stories, Taboo
7	FC	How come?		
8	Sib	He died.	1	Taboo

Note: FC = Focal child; Sib = Sibling. The two siblings are playing pretend with the toy people in the play set. The humour-only instances are tallied for each type of humour present in the conversation or behaviour. In this case, saying the “mom” toy is dead under the mat was coded as both stories (or preposterous statements) and taboo.

Table 4*Coded Example of a Humorous-Imitation Sequence Between Siblings.*

Conversational Turns	Child	Quote/Behaviour	Humorous-Imitation Instance	Humour Type	Imitation
1	FC	Grandpa don't have two roof-ez <i>(silly voice)</i>	1	Word	
2	Sib	It doesn't matter if grandpa has it.			"grandpa" verbal
3	FC	<i>(Knocks down the barn)</i> Ha-ha-ha! <i>(Taunting voice)</i>	1	Banter	
4	Sib	Ha-ha-ha! <i>(Gets in brother's face and imitates playful taunting)</i>			"ha-ha!" verbal
5	FC	Ha-ha-ha! <i>(Continues playful taunting and blows raspberries)</i>			

Note: FC = Focal child; Sib = Sibling. The two children are playing pretend with the figurines and have assigned the role of grandpa to one figurine. The children are engaging in humor and imitating at the same time. For example, at the beginning of the sequence, the focal child says,

“grandpa don’t have two rooves” and says “rooves” in a silly manner, which was coded for humour as word play. This is visible in the fourth column. Immediately afterward, the sibling engages in imitation of the word “grandpa”, which was coded as verbal imitation in the final column. This is considered a single instance of humorous-imitation. Since the sequence continues and there is more humour and imitation that occurs immediately afterwards while the children are still conversing, the entire sequence is coded as humorous-imitation.

Table 5*Descriptive Statistics for Total Conversational Turns During Sequences.*

	<i>M (SD)</i>	Range	Sum	Percentage (%)
Humour-Only	12.40 (11.48)	0-73	806	95
Humorous-Imitation	5.73 (11.31)	0-60	372	48

N = 65. Percentage is based on how many dyads produced a conversational turn at least once.

Table 6*Descriptive Statistics for Mean Conversational Turns by Sequence Type.*

	<i>M (SD)</i>	Range	Sum	Percentage (%)
Humour-Only	1.96 (1.10)	0-6	128	95
Humorous-Imitation	1.79 (2.85)	0-15	116	48

N = 65. Percentage is based on how many dyads produced a conversational turn during a sequence at least once.

Table 7*Descriptive Statistics for Categories of Humour in Humorous-Imitation.*

Humour Category	Mean	Standard Deviation	Range	Sum	%
Performing Incongruities	0.141	0.398	0-2	9	12
Sound Play	0.595	1.197	0-5	39	26
Word Play	0.228	0.592	0-3	15	15
Preposterous Statements	0.124	0.334	0-1	8	12
Taboo	0.078	0.324	0-2	5	6
Banter	0.370	0.972	0-4	24	17
Clowning	0.080	0.279	0-1	5	8

N = 65. Percentage is based on how many dyads produced the humour-type at least once.

Table 8*Descriptive Statistics for Positive Responses to Instances.*

	Positive Responses				
	<i>N</i>	<i>M (SD)</i>	Range	Sum	Percentage (%)
Humour-Only	62	2.61 (4.11)	0-19	163	69
Humorous-Imitation	30	1.36 (1.49)	0-6	41	70

Note: *N* is based on number of dyads that produced at least one positive response to the instance-type.

Table 9*Descriptive Statistics for Proportion Scores of Positive Responses to Instances.*

	Positive Responses				
	<i>N</i>	<i>M (SD)</i>	Range	Sum	Percentage (%)
Humour-Only	62	0.60 (1.22)	0-6	37	69
Humorous-Imitation	30	0.45 (0.41)	0-1	13	70

Note: *N* is based on number of dyads that produced at least one positive response to the instance-type.

Table 10*Coded Example of Laughter During a Humour-Only Sequence.*

Child	Quote/Behaviour	Humorous-Only Instance	Humour Type	Laughter
Sib	He needs to go into the pee-pee room.	1	Taboo	
FC	(Laughs)			1
Sib	(Laughs)			1

Note: FC = Focal child; Sib = Sibling.

Table 11*Coded Example of Laughter During a Humorous-Imitation Sequence.*

Child	Quote/Behaviour	Humorous- Imitation Instance	Humour Type	Imitation	Laughter
FC	<i>(Sings)</i> I'm cooking, I'm cooking all day long.				
Sib	<i>(Laughs)</i>				1
FC	I'm cooking <i>(sing-song repetition)</i>	1	Sound		
Sib	"Couking?" <i>(Mocks siblings' pronunciation)</i>			"Cooking" verbal	
FC	I'm cooking I'm cooking. <i>(Laughs)</i>				1

Note: FC = Focal child; Sib = Sibling. The following demonstrates an instance of humorous-imitation that was coded within a sequence of humorous imitation. In the second column, this example only has one instance of humorous-imitation, but it was taken as a snippet from a larger sequence. In the last column on the right, a 1 is noted for each time laughter is present during the sequence of humorous-imitation. In this case, there are 2 laughs.

Table 12*Descriptive Statistics for Total Sequences with at Least One Laugh Produced.*

	<i>N</i>	<i>M (SD)</i>	Range	Sum	Percentage (%)
Humour-Only	62	0.77 (1.39)	0-7	48	39
Humorous-Imitation	30	0.51 (0.91)	0-3	15	30

Note: *N* is based on number of dyads that produced at least one positive response to the instance-type.

Table 13*Descriptive Statistics for Total Frequency of Laughs During Sequences.*

	<i>N</i>	<i>M (SD)</i>	Range	Sum	Percentage (%)
Humour-Only	62	1.03 (1.91)	0-10	64	39
Humorous-Imitation	30	1.34 (3.03)	0-13	40	30

Note: *N* is based on number of dyads that produced at least one positive response to the instance-type.

Table 14

Descriptive Statistics for Mean Number of Laughs During Sequences.

	Laughter Responses				
	<i>N</i>	<i>M (SD)</i>	Range	Sum	Percentage (%)
Humour-Only	62	0.51 (0.75)	0-3	32	39
Humorous-Imitation	30	0.69 (1.40)	0-7	22	30

Note: *N* is based on number of dyads that produced at least one positive response to the instance-type.

Discussion

Humour and imitation are two behaviours that may serve an important affiliative function in naturalistic free play between siblings in early childhood (Bergen, 2019; Howe et al., 2018) but have not yet been researched together. To tackle this gap in the literature, four research questions were asked: (1) How do frequencies of humour-only, imitation-only, and humorous-imitation instances differ in play sessions between sibling dyads? (2) What sequence type, humour-only or humorous-imitation, is a more shared experience between siblings that includes a greater number of conversational turns? (3) What type of humour is more likely to be imitated during sibling free play? (4) How do children respond differently to humour-only and humorous-imitation? Specifically, how do frequencies of positive responses to instances of humour-only and humorous-imitation differ? What sequence type, humour-only or humorous-imitation, do siblings engage in more laughter on average during sessions of free play? All four of these research questions as well as limitations, implications, and directions for future research, are discussed.

Production Patterns of Humour and Imitation Among Sibling Dyads

Sibling dyadic production of humour alone, imitation alone, and humorous-imitation were investigated during naturalistic free play. Since sibling relationships offer children the opportunity to experiment and explore their social experiences (Howe et al., 2021), this thesis investigated how children may use affiliative behaviours such as humour and imitation to enrich their experiences with one another during play sessions. Thus, the first research question asked which type of instance (i.e., humour-only, imitation-only, or humorous-imitation) would be most frequent. It was hypothesized that humour-only and imitation-only instances would occur more frequently. As predicted, the production of humour-only and imitation only-were significantly

more frequent compared to humorous-imitation. This supports previous studies that found siblings engaged frequently in humour and imitation while playing together (Howe et al., 2018; Paine et al. 2019). It is reasonable that humorous-imitation occurred less frequently than humour and imitation since it is novel and requires both affiliative behaviours to occur simultaneously. Nevertheless, the production of humorous-imitation demonstrates that siblings in early childhood may use both humour *and* imitation to deepen their play experiences with one another. This may support previous research that found play to be an important context for children to imitate one another (Howe et al., 2018) and be humorous with one another (Paine et al., 2019). Therefore, it is plausible that the context of play supports these reciprocal behaviours simultaneously given both research and theory (e.g., Over, 2020; Paine et al., 2019). Furthermore, the production of humorous-imitation in this sample of 65 15-minute play sessions between sibling dyads demonstrates that it may be a dyadic behaviour of interest and importance for further exploration in the field of child development and social relationships. More specifically, an indepth investigation into how humorous-imitation is used and within which contexts with regards to children's affiliation is merited in future research.

Although in previous studies differences in sex composition, age, and birth order occurred for humour and imitation alone (e.g., male-sibling pairs producing more humour overall [Paine et al., 2019] and younger siblings imitating more overall than older siblings [Howe et al., 2019]), there were no differences in production of the novel humorous-imitation depending on sibling constellation factors. Previous studies uncovered findings such as younger siblings imitated their older siblings more often vice versa (Abramovitch et al., 1980; Hartup, 1989; Howe et al., 2018) and same-gender male siblings produced more humour overall than their same-gender female counterparts (Paine et al., 2019). However, the novel coding of humour and

imitation occurring simultaneously did not yield any statistically significant differences in production frequency based on age, sex, or birth order. This may support recent investigative efforts to focus on the type and quality of sibling interactions since there is often a lack of consistency in the effects of sibling constellation variables in child development research (Howe et al., 2018). Additionally, although this study did not investigate sibling relationship quality, for example, perhaps it would be interesting to investigate different aspects of sibling socialization in conjunction with their concurrent production of humour and imitation as it may relate to their affiliative function and the quality of their relationship (Brody, 1998; Dunn, 2007).

Humour and Imitation as a Shared Experience

The second research question aimed to investigate whether sequences containing instances of humorous-imitation were a more sustained experience than sequences containing instances of humour-only. To gain insight into how sibling dyads engage with one another while producing humour and imitation, this thesis investigated their use of these affiliative behaviours sequentially by examining the mean number of conversational turns that occurred during back-and-forth sequences of humour or humorous-imitation. There was no significant difference in mean length of conversational turns between children depending on whether they were producing humour only or a mix of humour *and* imitation, thus, the hypothesis that sequences of humorous-imitation were a more sustained experience than sequences of humour-only was not supported.

This investigation offers an important understanding of how children engage with one another while using these behaviours. Child development literature indicates how being silly and telling jokes are important for individuals to understand themselves and others, develop friendships and strengthen relationships, and even to deal with conflict (Bergen, 2007; Loizou &

Recchia, 2019). Specifically, humour is an important aspect of social development since it is foundational in early childhood and it may serve to help us affiliate with others (Berger, 2007). In the same regard, imitation serves an important function in human connection and social relationships and feeds the desire to be similar to others (Over, 2020; Legare & Nielsen, 2015). Specifically, the social function of imitation offers children the ability to learn social norms making it an important tool for children to navigate relationships (Over, 2020). Therefore, both behaviours serve an important role as tools to help children communicate and identify with one another. The novel investigation of sibling dyads producing humorous-imitation supports previous research that these two behaviours are highly affiliative during reciprocal or free play (Howe et al., 2018; Paine et al., 2019). Additionally, since there was no significant difference between the mean length of humour-only sequences versus humorous-imitation sequences, it may be that the novel humorous-imitation sequence may be just as important with regards to children's social competence, communication, and closeness with others, as humour has been deemed (Bergen, 2007). Finally, one can speculate that the lack of significant difference between conversational turns while producing humour alone versus humorous-imitation may demonstrate that these behaviours are already foundational behaviours in children's play and conversations – both individually *and* together.

Imitation of Humour

How children imitate certain types of humour can also provide insight into how they use humorous-imitation during play. Thus, the third research question asked what humour category was most frequently observed during instances of humorous-imitation. It was hypothesized that sound play, word play, and performing incongruities would be the most frequently imitated humour types based on Paine et al. (2021). While the sample of humorous-imitation instances by

type of humor was too small to conduct statistical analyses, descriptive statistics can provide a general picture of how children imitated certain types of humour during their play sessions. As predicted, children imitated instances of humorous sound play (e.g., using a country twang accent when saying “I’ll make a barn) more often than other types of humour during the play sessions. This supports previous research conducted by Paine and colleagues (2021) whereby sound play was the most frequent type of humour produced in sibling and peer play sessions. Furthermore, sound play was associated with positively-rated sibling relationships (Paine et al., 2020) and understanding of emotions (Paine et al., 2022). Therefore, the current finding regarding sound play as being the most imitated type of humour supports previous literature and may be demonstrative of positive affective communication.

It can be speculated that the imitation of sound play as the most frequent type of humorous-imitation may be relate to children’s exposure to music and nursery rhymes, as many examples of sound play included the imitation of popular songs and media in a silly way, i.e., “music play” (Morin, 2001, p. 25). For example, one sibling duo repeated “quack quack”, “moo moo”, and “tweet tweet” in a squeaky silly voice to the tune of Blue Danube at various points during their play session. Another sibling pair sang the Sesame Street theme song in a gruff and silly voice while incorporating aspects of their play materials. In another example, while the children were playing with a farm set, one child sang “at the top of Sesame Street” and later changed the words to “at the cocky cock a coo coo”. Clearly, further research is required to investigate this speculation regarding the association of music and sound play.

While it was not predicted, banter was observed as the second most frequent type of humour during instances of humorous-imitation, which is not too surprising considering it was the third and fourth-most prevalent type of humour produced in previous research by Paine and

colleagues (2019; 2021). Therefore, it may be speculated that banter overall is a frequent type of humour and merits more focus in future research. Additionally, since banter as a humour category encompasses lighthearted teasing, perhaps it makes sense that it is more frequently imitated since children sometimes mimic one another while teasing each other. For example, in one sibling pair, the focal child laughed, their sibling responded, “ha ha ha to you” in a silly taunting manner, and the focal child blew raspberries and responded, “ha ha ha to YOU”.

Word play (e.g., labeling a roof piece as a drawbridge) was the third most frequent humour type to be imitated. This finding supports previous research, whereby in the study conducted by Paine and colleagues (2019), word play was the second most frequent type of humour produced. Therefore, it appears as though banter and word play switched orders of frequency when being investigated as humour alone (Paine et al., 2019) versus in conjunction with imitation (i.e., novel humorous-imitation sequences). Although word play was not as frequently produced in humorous-imitation as it was in previous research as humour alone, it is possible that word play is an important category of humour with regards to children’s affiliation. Sibling dyads often used word play and imitation while discussing the play materials in their respective structures (i.e., farm, village, or train set). For example, one dyad labeled a farm piece as a piano, whereas another dyad labeled a roof piece as a diving board. Perhaps relabeling the play materials offered children the opportunity to engage in pretend play and transform objects in creative ways. This interpretation supports previous literature conducted by Howe and colleagues (2005), who reported pretend play was associated with siblings’ co-construction of shared meanings. Furthermore, this may, yet again, demonstrate that play serves as an important context for children to utilize humour and imitation in an affiliative manner (Paine et al., 2019; Howe et al., 2018).

Additionally, children were also inclined to imitate any incongruities that were performed in a humorous manner (e.g., making a toy animal fly). While it was hypothesized that performing incongruities would be the third-most frequent humour-type, this still follows a similar pattern to previous studies, whereby incongruities were second-most frequently produced (Paine et al., 2021) and third-most frequently produced (Paine et al., 2019) in sibling pairs. This also supports development literature that states humour production in childhood is often centered on incongruities that the child identifies from their own existing schemas (McGhee, 1989; Loizou & Recchia, 2019). This finding is also similar to Loizou's 2005 study whereby children often used humour to playfully violate expectations of their tasks in daycare.

Previous studies have emphasized the affiliative nature of imitation as a proponent of social learning, particularly between siblings during play (Howe et al., 2018). Additionally, how children may learn from one another and create shared meanings is another important facet of imitation (Howe et al., 2018). Therefore, looking specifically at how children imitated humour may give us insight into how they learn from one another. What they are learning from one another cannot be assumed in this study without further investigation, but whether it is learning about a procedural task by doing a silly unexpected action or using toy figurines as characters to create a story, using imitation to extend an incongruous humorous action may suggest how humour and imitation may encourage cognitive and social learning – particularly when they are used in conjunction. Since the main task of the children's play session included building either a toy village, farm, or train set, it is interesting that children frequently imitated incongruities while playing with the material in a humorous manner. This perhaps demonstrates that children may also use humour and imitation to navigate everyday tasks, teamwork, collaboration, as well as problem solving, but this requires future research.

The final three humour-types that occurred less frequently were stories, clowning, and taboo. While the orders were different, these three categories were also the three least frequent humour types in Paine and colleagues' 2019 and 2021 studies on siblings. Overall, the pattern of current findings is overall similar to the research conducted by Paine and colleagues regarding humour production in sibling pairs in early childhood (2019; 2021).

Affective Responses to Humour and Imitation

The last research question was separated into two parts. The first part asked if there were more positive responses to instances of humour-only or humorous-imitation, whereas the second part focused on the frequency of laughter during sequences of humour-only and humorous-imitation.

Positive Responses

Comparing rates of positive responses to humour alone versus humorous-imitation may provide insight into the affective nature of these behaviours. Due to the large difference in frequencies of humour-only instances and humorous-imitation instances, it was necessary to control this by using a proportion score for each dyad. Contrary to the hypothesis, there were not significantly more positive responses to instances of humour-only compared to instances of humorous-imitation. While this does not support the hypothesis that there would be more positive responses to humour-only instances, it may demonstrate that both humour-only *and* humorous-imitation encourage affiliation between siblings. This supports previous research whereby positive responses to humour were frequent in sibling dyads (Paine et al., 2019; 2021). Additionally, it merits future investigation into the positive and affiliative nature of humorous-imitation, specifically, do children respond more positively to humorous-imitation in specific contexts than others (e.g., play materials, play partners, types of humour)? For example, since

Paine and colleagues (2019) found children produced more humour with the village set than the train set; perhaps humorous-imitation would have similar findings with different play sets.

Additionally, recent research has also emphasized that different play materials (i.e., village set or train set) do not necessarily encourage pretense in the same way nor encourage communication in the same way (Howe et al., 2022; Howe et al., 2022). Therefore, the investigation of play materials and humorous-imitation production in early childhood sibling relationships merits further examination.

Laughter Responses

The second part of the fourth research question asked if a response of laughter would be more frequent during sequences containing instances of humour-only or sequences containing instances of humorous-imitation. The production of laughter during back-and-forth sequences of humour alone or humorous-imitation may also provide us with insight into the affective nature of these behaviours. While it was predicted that there would be more laughter on average during sequences including humour-only than during humorous-imitation, surprisingly there were no significant differences. This is an interesting finding as it sparks a new conversation regarding laughter as a response to the interaction of humour *and* imitation rather than just humour alone. This finding supports previous literature that describes laughter as a pillar of social interaction and humour throughout the lifespan, as well as a behavior that can promote a continued humorous interaction and shared experience between children (Kothbart, 1973). Therefore, laughter in this study may demonstrate that the interaction of humour and imitation promotes affiliation during sibling dyadic sessions of naturalistic free play.

Additionally, since laughter has not yet been investigated as a response to imitation, this finding demonstrates that there is merit to investigating what children find funny beyond jokes

and being silly. While laughter is often associated with humour, this finding demonstrates children use laughter in multifaceted ways. Finally, the presence of laughter while children are conversing, playing, and using both humour *and* imitation, paints a picture of affiliation, connection, and strengthening of the sibling relationship.

Limitations and Future Directions

Overall, the investigation of humorous-imitation was largely exploratory. Therefore, defining this new variable consisted of substantial revisions, modifications, and an overall iterative approach to developing the coding scheme. Since the coding scheme of humorous-imitation was based on previous coding schemes developed separately for humour and imitation, some of the codes were modified for the purpose of the research questions in the present study. For example, responses to humour such as negative responses, extension of responses, clarifications, or imitation of responses were omitted from the present coding scheme to avoid repetition and to focus on positive affective responses (i.e., positive responses and laughter). Furthermore, the coding scheme for positive responses to humorous-imitation was developed as a hybrid of the separate coding schemes for humour and imitation for different projects (Paine et al., 2019; Howe et al., 2018). These coding schemes had a bit of variability and, therefore, future research would benefit from expanding the humorous-imitation coding scheme to include other positive responses (i.e., smiling, continuing the humour, or praising).

Furthermore, the sample used in this dataset was relatively homogenous, with 65 sibling dyads from predominantly White, mostly middle-class families, nevertheless the families were from rural, small town, and suburban communities and reflected the local populations. Future research could benefit from using a sample of children from diverse racial, cultural, and socio-

economic backgrounds to obtain a more representative understanding of how children use humorous-imitation.

Since humorous-imitation is a novel way of looking at affiliative behaviours in childhood, future research could benefit from investigating its production in dyads of friends as well. Previous researchers have investigated humour production in a sample of peer dyads (Paine et al., 2021), but no research has considered examining humorous-imitation. Additionally, a comparison of the production and responses to humorous-imitation between siblings and friends longitudinally (i.e., at two different age points) would provide an interesting perspective on affiliation and connection in early childhood relationships (McGhee, 1989; Uzgiris, 1981; Over & Carpenter, 2013; Paine et al., 2021). Finally, an investigation of humorous-imitation and sibling relationship quality would perhaps provide further insight into the affiliative nature of this novel behavioral interaction. This approach would be beneficial to study given previous literature that humour production and relationship quality as well as constructive conflict resolution and relationship quality are positively associated (Recchia & Howe, 2009; Paine et al., 2020, 2021).

The implications of this research demonstrate that, while humour production may occur alone or in combination with imitation, both parents and educators should encourage children to utilize these behaviours in their early childhood relationships. The reinforcement of using both humour and imitation in early childhood should be a priority rather than being discouraged (i.e., in the context of children making jokes or copying one another). Instead, parents and educators should observe how children use humour and imitation amongst themselves to strengthen their relationships with others. Finally, while this research is largely exploratory and novel, it validates the notion that children use play to communicate and learn with one another. Perhaps allotting

more independent free play time with a stimulating play set allows children the freedom to explore their sense of humour and mimic one another in a positive, affiliative way.

Conclusion

In conclusion, humour and imitation are two behaviours that serve an affiliative function. This study explored the role that humour and imitation can play in early childhood sibling relationships, both separately and concurrently. Overall, both humour and imitation were very frequently produced during 15-minute naturalistic observations of free play between siblings. While instances humour-only and imitation-only occurred more frequently than instances of the novel humorous-imitation, mean lengths of humour-only and humorous-imitation sequences were not significantly different. Additionally, sound play, banter, and word play were the three most frequently imitated types of humour (i.e., humour types in instances of humorous-imitation). Finally, responses to humour and imitation, including positive responses to instances of humour-only and humorous-imitation as well as laughter responses during sequences of humour-only and sequences of humorous-imitation, were overall frequent. Although there were no significant differences between responses to instances or sequences of humour-only, this study is the first of its kind to investigate laughter in response to humour and imitation in early childhood sibling responses. While many of the study was largely exploratory, this research demonstrates the need for further investigation into how children use and respond to humour *and* imitation. Finally, these affiliative behaviours merit focus of interest for the joy, bonding, and connection they may promote in childhood and beyond.

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Appendix A

Humour and Imitation Instance Coding Scheme

Instance Type	Description	Sibling Examples
Humorous-Imitation	An instance where both humour <i>and</i> imitation are observable at the exact same time. Specifically, one of the children is saying or doing something humorous while imitating something that their sibling recently said or did. Inversely, it can also occur as one of the children immediately imitating something humorous that their sibling recently said or did.	<p>Sibling 1: “Another boat, another boat, another button on your coat” (in a sing-song fashion).</p> <p>Sibling 2: “Another boat, another boat, another boat.”</p>
Humour-Only	An instance of humour only, no imitation is observable. Humour instances can be distinguished by type: performing incongruities, word play, sound play, preposterous statements and humorous anecdotes (i.e., stories), taboo, banter, and clowning.	<p>Sibling 1: puts a tree on top of the house.</p> <p>Sibling 2: “Trees don’t go on houses!”</p>
Imitation-Only	An instance of imitation only, no humour is observable. Imitation instances can be distinguished by type: verbal or nonverbal imitation.	<p>Sibling 1: “You make the inside.”</p> <p>Sibling 2: “What inside?”</p> <p>Sibling 1: The inside of the train track.”</p> <p>Sibling 2: “What do you mean the inside of the train track?”</p>

Note. Instance type may not co-occur.

Appendix B

Individual Humor and Imitation Categories in Coding Scheme

Humor Category	Description	Sibling Examples
Performing incongruities	Enacting a conflict between what is normal/expected and reality. For example, placing an object in a wrong location or making a toy perform a wrong action.	“These trees are for eating, <i>nom!</i> ” and pretends to eat a tree.
Word play	Nonsense words, rhyming words, riddles, jokes, label-based humor, calling something the wrong name. Making deliberate mistakes in language or changing words in well-known songs.	Example 1: “Goosebump man. That’s funny!” Example 2: “Horkin-torkin peekaboo.”
Preposterous statements and humorous anecdotes	Creating absurd or unusual stories, anecdotes, announcements, or nonsense sentences.	“They [the animals] don’t want to be mushed chocolate!”
Sound play	Humorous singing and chanting. Over exaggerated vocalizations or speech, exaggerated gasps, animal noises, using a very deep or gruff voice in a silly or unconventional way.	“It’s a slide, a slidey slide [singing to the theme of Sesame Street].”
Taboo	Disgusting noises, such as blowing raspberries, fart noises, burp noises. Using taboo words or discussion and/or enacting taboo themes.	Example 1: “Look at my nose!” and shows a large bubble of snot to sibling. Example 2: “Dropping in a big lump of poop!”
Banter	Humorous aggression, derision, teasing or mocking imitation. Include light-hearted insults. Rough and tumble play.	“You are the biggest and loudest and the despicablest!”
Clowning	Silly or over exaggerated body movements, dancing, posing or face contortions.	Child puts foot on their sibling’s head.

Imitation Category	Description	Sibling Examples
Verbal imitation	Intentionally imitating or copying speech or sound.	Sibling: ‘Cheesy cheddar’ Sibling 2: “Cheesy cheddar”
Nonverbal imitation	Intentionally imitating or copying a nonverbal action.	Sibling 1: Jumps on couch and uses cushion as a shield. Sibling 2: Does the same act.

Note. Individual categories of humor and categories of imitation may co-occur. Coding schemes are based on previous studies (Howe et al., 2017; Paine et al., 2019; 2021).

Appendix C

Response to Humor and Imitation Categories in Coding Scheme

Response Category	Description	Sibling Examples
Positive/Neutral	<p>Any verbal or nonverbal behaviour that reinforces humour or imitation production, including positive affect (smiling), praising or commending humour. Any verbalisation or behaviour that serves to continue the humour is also coded.</p> <p>Note: Positive/Neutral responses to instances of <i>humorous-imitation</i> were based on previously coded responses to <i>humour-only</i> and <i>imitation-only</i> instances and were modified based on previous coding schemes that included more response categories. Therefore, response categories of <i>imitation</i> and <i>extension</i> were also included in the tally of positive/neutral response for instances of <i>humorous-imitation</i>.</p>	<p>Sibling 1: <i>naaaay</i> (horse noise) I have a horse!</p> <p>Sibling 2: Woooo, I have a horse (while smiling).</p> <p>Sibling 1: It's a drawbridge (mislabels roof piece).</p> <p>Sibling 2: Okay, it's a drawbridge.</p>
Laughter	<p>A child's response to humour and/or imitation that manifests as a giggle, chuckle, or a roaring laugh. This is based on both audible cues of laughter directly from the video recordings of play and written descriptors in the transcripts based on the video recordings (e.g., "ha-ha", "laugh", or "giggle").</p>	<p>Sibling 1: "give me that barn" (laughs).</p> <p>Sibling 2: (laughs) you funny Joshy!</p>

Note. Coding scheme is based on a previous study (Paine et al., 2019).

Appendix D

Sequence of Conversational Turns

Sequence Type	Description
Humour-Only	A humorous sequence was noted when a back-and-forth exchange occurred between the two children and one or more instance of humour-only was present. Each conversation was separated by a pause of more than 3 seconds.
Humorous-Imitation	A sequence of humorous-imitation was noted when a back-and-forth exchange occurred in the interaction between the children and one or more instance of humour-only <i>and</i> one or more instance of humorous-imitation was present. Each conversation was separated by a pause of more than 3 seconds.