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Symbolic play as a zone of proximal development: An analysis of informational exchange

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Abstract

Symbolic play has long been considered a beneficial context for development. According to Cultural Learning theory, one reason for this is that symbolically-infused dialogical interactions constitute a zone of proximal development. However, the dynamics of caregiver-child interactions during symbolic play are still not fully understood. In the current study, we investigated informational exchange between fifty-two 24-month-old infants and their primary caregivers during symbolic play and a comparable, non-symbolic, functional play context. We coded over 11,000 utterances for whether participants had superior, equivalent, or inferior knowledge concerning the current conversational topic. Results showed that children were significantly more knowledgeable speakers and recipients in symbolic play, whereas the opposite was the case for caregivers, who were more knowledgeable in functional play. The results suggest that, despite its potential conceptual complexity, symbolic play may scaffold development because it facilitates infants' communicative success by promoting them to 'co-constructors of meaning'.

KEYWORDS
epistemic stance, informational exchange, shared intentionality, social interaction, symbolic play

1 | INTRODUCTION

Cultural Learning (sometimes referred to as 'Socio-Cultural' or 'Socio-Pragmatic') approaches to development argue that social interaction is the foundation upon which children develop distinctly human socio-cognitive skills (e.g., Bruner, 1983; Nelson, 1996; Tomasello, 1999; Vygotsky, 1962, 1978). One common social context that has been linked to important behavioural outcomes, such as language and theory of mind, is symbolic play (see Hirsh-Pasek, Golinkoff, Berk, & Singer, 2009; Lillard et al., 2013; Quinn et al., 2018). According to Rakoczy (2006, 2008), symbolic play constitutes the child's first unambiguous instance of *collective intentionality*, cultivating their understanding of the symbolic nature of the world and the mind states of others. Thus, by pretending a block is cake, the child not only demonstrates a capacity for symbolic representation (Piaget, 1962), they also demonstrate the ability to make an implicit conceptual pact with their interlocutor; that is, they are engaged in a cooperative meeting of the minds (see also Tollefsen, 2005).[1] As such, symbolic play provides a fruitful context in which children can engage in joint attention, shared action, and imitative cultural learning. In Vygotskyan terms (Vygotsky, 1967), symbolic play exemplifies a good candidate for a *zone of proximal development* (see Göncü & Haskins, 2011).

Vygotsky (1962, 1978) argued that interpersonal interaction is the locus of socio-cognitive development, with development mediated via culturally derived semiotic systems, most prominently language (for discussion see Wertsch, 1985). That is, as the dominant communicative medium of our species, language plays a constitutive role in the development of socio-cognitive processes because it both structures interaction and becomes the medium through which the world takes on meaning (see also Carruthers, 2002; Clark, 2006; Fernyhough, 2008). Thus, through social interaction, children gradually internalise interpersonal exchanges to build working models of self, other, and the world in which they inhabit. Importantly, not all social experiences are created equal, and therefore it is reasonable to expect that both child and interlocutor adapt to and have different roles in interaction depending on context-specific details.

Symbolic play appears to be one fertile context for language and communicative development, even for very young children who are still far from mastering the linguistic system and still learning about the humans who use it. Accordingly, symbolic play has been implicated in the development of socio-cognitive processes that provide a foundation for early language. Specifically, the development of joint attention and early communicative gesture (Bates et al., 1979; Lillard & Witherington, 2004). In a study that we build upon here, Quinn and Kidd (2019) coded joint attentional frames between 54 18-month-old infants and their caregivers across symbolic and functional play contexts (where functional play involved goal-oriented play activities, like drawing or playing a musical instrument), and found that dyads engaged in three times as much joint attention in symbolic play compared to functional play. They also reported that infants and caregivers used significantly more gestures in symbolic play. The authors explained the results by suggesting that the inherent ambiguity of symbolic play places greater demand on dyads to negotiate meaning (Sutton Smith, 1997); that is, to establish collective (or joint) intentionality, leading to richer communicative interaction.

Such communicative richness is observable in the linguistic behaviour of caregivers and its subsequent effect on interaction. Reissland (1998) reported that caregivers used different discursive styles in pretend versus non-pretend activities, showing that they used an *interactive* style in pretence (pretending to feed a doll) but an *instructive* style in non-pretence activities (learning to feed themselves with a spoon). Such styles are categorised by the use of distinct linguistic frames that, in the case of pretence, serve to draw children into conversation or, in the case of real activities, direct behaviour. Creaghe et al. (2021) analysed the conversational dynamics of the dyads studied by Quinn and Kidd (2019). Consistent with Reissland (1998), they found that in symbolic play caregivers used language with their infants that drew them into the interaction significantly more than in functional play; specifically, questions (e.g., *would you like some tea?*) and mimetics (i.e., sound effects, such as *slurp!*) (see also Taggart, Ellwood, Vasc, Chin, & Lillard, 2020; Lillard & Witherington, 2004). They also found that the dyads had significantly more conversational turns in symbolic than in functional play. In contrast, in functional play caregivers produced significantly more imperatives (e.g., *put that here*), consistent with the suggestion that non-pretend goal-oriented scenarios are

more instruction-based. Some interactive communicative acts associated with symbolic play were positively related to infants' language proficiency, both concurrently and longitudinally (at age 24 months), whereas the opposite was the case for instructional communicative behaviours; in fact, the use of imperative sentences *negatively* predicted language proficiency.

The communicative richness of symbolic play and its association with language development is consistent with the assumption, made by Cultural Learning theorists (e.g., Bruner, 1983; Nelson, 1996; Vygotsky, 1962), that language develops out of interaction based on common social routines that evolve in complexity over time. Importantly, the infant is an active partner in this process, such that their interests and bids for conversational turns are important drivers of development (e.g., Donnelly & Kidd, 2021; Hirsh-Pasek et al., 2009; Song et al., 2014). While in child language studies it is common to analyse the formal properties of what is said in interaction, it is less common to analyse how information (i.e., meaning) is exchanged during turn sequences. Yet, if symbolic play constitutes a zone of proximal development, it is reasonable to expect that informational exchange differs from comparable, but non-symbolic interactions. Some evidence for the importance of informational exchange comes from the finding that *connected talk*, that is, topic maintenance in child-caregiver exchange, positively influences the development of social understanding (e.g., Ensor & Hughes, 2008). In the current paper, we ask whether informational exchange differs across symbolic and non-symbolic play contexts.

Our work is inspired by research in the field of Conversational Analysis. Conversational Analysis studies the gradient of knowledge, or informational exchange, between interlocutors in speech (Sacks, 1963, 1984; Schegloff, 2007a, 2007b). While a field of study in its own right, its use as a methodology in studies of infant development is less common (see Filipi, 2020; Forrester, 2013). Our study was inspired by one particular approach summarised in Heritage (2012), which inspects implicit *epistemic stance* (ES) (i.e., a speaker's knowledge status concerning a statement) within turns based on the responses of the speakers. For example, if one says '*I am tired*', and the other responds *'let's go to bed*', the respondent has acquired (and acknowledged) the knowledge of the original speaker (sleep is required). Here the focus is on how conversational participants' knowledge about the topic of conversation ebbs and flows across time, and how each participant uses language to signal their ES. Thus, conversations are analysed in sequence (Enfield & Sidnell, 2017), because a statement is only complete based on the response it triggers (also see Clark, 2018). In this sense, turn sequences are *actions-in-interaction*, serving or enacting a specific purpose. Importantly, analysing sequences in this manner exposes the ebb-and-flow of speakers' understanding of events.

1.1 | The current study

The current study investigated informational exchange in the infant-caregiver dyads reported in Creaghe et al. (2021), when the infants were aged 24-months (and thus when they had productive language). Thus, we investigated informational exchange between infant-caregiver dyads in symbolic and functional play. For each utterance within a turn sequence, we coded the ES of both infants and caregivers as either speakers or recipients, determining who knew more within each utterance, or if they had the same level of knowledge. Since this was, to our knowledge, the first study to investigate ES in infant-caregiver dyads, we took the conservative approach of not specifying directional hypotheses. This is because we can imagine several ways in which symbolic transformations typical of symbolic play could influence information exchange. For instance, consistent with the observation that symbolic play increases joint attention (Lillard & Witherington, 2004; Quinn & Kidd, 2019), it could be that successful informational exchange is more likely in symbolic play because it crucially establishes common ground between interlocutors (Clark, 1996). Alternatively, informational exchange may be hindered in symbolic compared to functional play precisely because symbolic transformations are challenging to infants, which would be consistent with the Vygotskian notion of *naïve participation*, in which children are drawn into activities they only later come to fully understand (see Fernyhough, 2008). Thus our analyses are exploratory rather than confirmatory.

2 | METHOD

2.1 | Participants

The participants took part in a longitudinal study investigating language and play (see Creaghe et al., 2021; Quinn & Kidd, 2019). At the first time point the infants were, on average, aged 18-months, and at the second data collection they were aged, on average, 24-months. Here we report on analyses at the 24-month session, since the children were speaking too little at the first session to analyse ES. Fifty-two infants (30 girls) and their biological primary caregivers (50 mothers) participated (M_{age} = 24.29, *SD* = 1.01, Range = 22.73–26.45 months). Forty-nine children lived in dual-parent households and three lived in single-parent households (all of whom lived with their mother). Families were recruited through opportunity sampling in a medium-sized Australian city and were still in the study at the final testing point (out of an original *N* = 54). Recruitment strategies included: advertising in local free magazines, setting up a recruitment stall at public events aimed at young families, and word-of-mouth. All infants were typically developing with no known or suspected developmental delay, as determined by a pre-screening interview at the beginning of the study (see Quinn, 2016). They were acquiring Australian English as their only native language. They knew an average of 359.56 (*SD* = 155.24) words, as measured by the MacArthur-Bates Communicative Development Inventory (Fenson et al., 2007). Their average mean length of utterance (MLU, calculated in morphemes) was 1.92 (*SD* = .52, Range: [1.1, 3.16]). Thus, all the children were capable of combining words (as indicated by MLU > 1.0), although they did vary in the linguistic knowledge, as is common for this age group (Bates et al., 1995; Kidd & Donnelly, 2020).

At the beginning of the study (i.e., at the 18-month time point), the majority of infants were first born (70%, *n* = 38/54), 67% did not have any siblings (*n* = 36/54), and 65% attended daycare (*n* = 35/54; $M_{days/week}$ = 1.73, $SD_{days/week}$ = 1.51). Socio-economic status was estimated from caregiver education as high: 78% of mothers (*n* = 42/54) and 69% fathers (*n* = 37/54) had bachelor's degrees or higher. Ethnicity information was not collected. The city that the sample was drawn from (Canberra) has a high proportion of residents of white European descent (> 90%, Australian Bureau of Statistics, 2016).[2]

2.2 | Materials

The study was devised to recreate a naturalistic play environment in which infant–caregiver dyads engaged in symbolic play and functional play, the latter designed to be a comparable but non-symbolic play context. We stress here that our goal was not to study ES within specific instances of symbolic and functional play, but to compare ES across contexts in which there is large versus minimal amounts of symbolic content (i.e., our functional play condition). Symbolic play is frequently grounded in everyday functional, real activities (e.g., drinking tea), but acts a 'Twin Earth' in which one or more parameters change due to symbolic transformation or the introduction of pretend elements (e.g., pretending to have a tea party, see Lillard, 2001a). Our goal was therefore to determine whether informational exchange changes with the introduction of frequent (and potentially challenging) symbolic content.

We did this by manipulating the toys available to infant-caregiver dyads. The type of toys available to children, the form of the toy (e.g., material, size, shape, complexity), and the child's knowledge of its function all impact how they play (Morrissey, 2014; Rubin & Howe, 1985). Therefore, in order to elicit functional and symbolic play separately, two different sets of toys were selected (see Figure 1).

Toys were selected because they were used in past research exploring symbolic (e.g., Bigham & Bourchier-Sutton, 2007; Brown et al., 2001; Fekonja et al., 2005; Largo & Howard, 1979; O'Brien & Nagle, 1987; Taylor et al., 1993) or functional play (e.g., Fenson et al., 1976; Laplante et al., 2007), as well as in standardised measures of play (e.g., Test of Pretend Play; Lewis & Boucher, 1997). They were relatively gender-neutral so as to avoid influencing the nature of the parent-child interaction based on gender (Caldera et al., 1989).

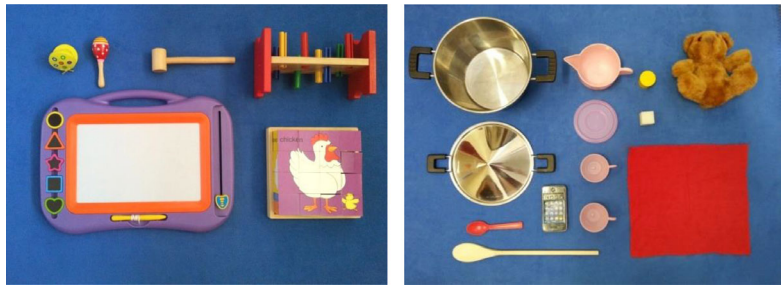

FIGURE 1 Functional (left) and symbolic (right) condition toys

Each condition contained four sets of toys that lent themselves to four different activities. In the symbolic play condition, the toys comprised both representational and nonrepresentational toys. The representational toys included a set of cooking equipment (saucepan with its lid, a wooden spoon), a tea set (comprising a teapot, two teacups, a teaspoon), a toy mobile phone, and a set of nonrepresentational toys (a piece of red cloth, a small yellow cylinder, and a small white cube). Finally, there was also a teddy bear. The representational toys were selected because toy household items (e.g., tea set, saucepan, spoons) tend to elicit symbolic play (e.g., pretending to bake a cake or drink coffee), toy mobile phones tend to elicit pretend conversations (see Taylor et al., 1993), and the teddy bear can be treated as a personified object (Brown et al., 2001; Lewis & Boucher, 1997). Non-representational objects (e.g., piece of red cloth, small yellow cylinder, and small white cube) were selected because they are more abstract, therefore encouraging object substitution. Indeed, unlike the other toys, they do not immediately represent real-world artefacts (e.g., the red cloth is a 'picnic rug', a 'blanket', a 'cape' or even a 'hat' for teddy).

Functional play was defined as object play during which the toy was used for its intended purpose in an *adult-defined* manner (Fenson et al., 1976; Laplante et al., 2007; Quinn & Kidd, 2019). These again lent themselves to four different activities; namely, drawing (a magnetic drawing board with magnetic stamps), hammering (a wooden peg and hammer set), puzzle completion (a wooden animal block puzzle containing 16 blocks; on each side of the block was a piece of a different puzzle, making one of six different animals when completed), and music (a wooden maraca and castanets). In this set, all toys do not immediately lend themselves to symbolic play. Instead, they are goal-oriented or 'rule-based' (e.g., the castanet makes music, the stamps are for stamping the drawing board).

Infant–caregiver interactions were first assessed for the level of symbolic play in both play conditions in order to ensure the manipulation was successful. The highest level of play of both caregivers and infants was recorded using the Pretend Play Observation Scale (Brown et al., 2001; see Supplementary Materials). A subset of 10 of 52 play sessions were coded independently by two coders for reliability with 93.4% agreement. There was a significantly greater level of symbolic actions in the symbolic play as compared to the functional play condition, for both infants and caregivers (infants: $M_{\text{Symbolic}} = 8.05$, $SD = 1.22$, $M_{\text{Functional}} = 1.14$, $SD = 1.3$, $t(51) = 31.06$, $p < .001$, $d = 4.31$, CI_{95} [3.43, 5.18]; caregivers: $M_{\text{Symbolic}} = 8.77$, $SD = 1.31$, $M_{\text{Functional}} = 1.75$, $SD = 1.1$, $t(51) = 30.44$, $p < .001$, $d = 4.22$, CI_{95} [3.36, 5.08]). The manipulation check confirmed that the toys used in the symbolic play condition elicited higher levels of symbolic play from infants and their caregivers than did the toys in the functional play condition. We do not claim that dyads *never* engaged in symbolic behaviour during functional play, rather that the low means in the functional condition suggest symbolic acts were extremely rare. Our goal was to create play contexts that differed minimally (i.e., both involve infant-caregiver play) but which differ in their degree of symbolic content.

2.3 | Procedure

Testing occurred in participants' homes. The parents were asked to sit on a play mat and play with their infants as they normally would. Unlike in previous studies (e.g., Lillard & Witherington, 2004), caregivers were not primed to engage

TABLE 1 Coding scheme for sequences of conversational turns and ES

Sequence of turns	Example (consider the interactions below to be sequential)	Epistemic Stance (Speaker, Recipient)
Mother initiation Mother conclusion	Mother: is this a puzzle? Child: yes Mother: can we try and put it together? Child: cluck cluck (mimics the chicken on the puzzle) Mother: funny chicken	SK+ RK- SK+ RK+ SK- RK+ SK+ RK- SK+ RK+
Infant initiation Mother conclusion	Child: a hat[a] Mother: yes, it could be a hat. Mother: Would you like to wear it?	SK+ RK- SK+ RK+ SK- RK+
Infant initiation Infant conclusion	Child: stir, stir, stir (started to stir cup with spoon) Mother: Aw, a nice cup of tea for me, thank you. Child: yes, yummy tea (hands the cup to mother)	SK+ RK- SK+ RK- SK+ RK+
Mother initiation Infant conclusion	Mother: should we call Granny? Child: hmm. Mother: We could ask her what she did today. Child: yes!	SK- RK+ SK- RK- SK+ RK- SK+ RK+

Note. K+ means superior Knowledge or ES and K- means inferior Knowledge or ES.
[a]If the 'hat' had been an actual hat, the ES would be SK+ RK+ since the mother would have known it was a hat.

in pretence, thus ensuring that play was spontaneous and ecologically-valid. Only the infant-caregiver dyad and the experimenter were present in the room at the time (i.e., no siblings were present). The infants did not have access to any of their own toys.

Both the functional and the symbolic play conditions were introduced consecutively to the dyads as one continuous play session. The dyad was randomly assigned their first set of toys at each session, which they played with for approximately 10 min, at which point the experimenter exchanged the set of toys. Their duration averaged just under 11 min, with a range between 9 min and 12 min 45 s. There was no statistical difference in duration across the conditions ($M_{Functional}$ = 646s, $SD_{Functional}$ = 32s; $M_{Symbolic}$ = 652s, $SD_{Symbolic}$ = 40s, $t(51) = .76$, $p = .45$, $d = < .001$, CI_{95} [−.001, .0002]). Although they are referred to as separate play conditions in this paper, parents were not aware that play conditions were distinct. A 2 (play condition: symbolic versus functional) x 2 (counterbalancing: symbolic-first versus functional first) repeated measures ANOVA showed that the infants' and caregivers' highest play score did not differ according to which condition they participated in first (i.e., there was no play context by counterbalancing order interaction: infants: $F(1, 50) = .959$, $p = .33$, partial eta^2 = .019; caregivers: $F(1, 50) = 1.174$, $p = .28$, partial eta^2 = .023). Thus, there was no priming of symbolic acts across conditions.

The sessions analysed in this paper (i.e., 24-month sessions) were transcribed into ELAN linguistic annotation software. The Language Archive, Max Planck Institute for Psycholinguistics, 2016, and were analysed in Child Language Analysis programme (CLAN, MacWhinney, 2000).

2.4 | Coding

Our coding of ES within turn sequences was motivated by Heritage's (2012) *Territories of Knowledge* taxonomy. ES was operationalised as the speaker's or the recipient's level of access to a targeted element of knowledge or information, in accordance with Heritage's definition (2012; see examples in Table 1). Their stance was determined to be either superior (K+) or inferior (K-) to their interlocutor's knowledge at the time of the utterance (when the ES of participants matched their knowledge was equivalent). It is important to note, however, that we do not claim to be replicating

TABLE 2 ES contextualised pairs

Pair	Speaker	Recipient
SK+/RK-	Superior epistemic stance	Inferior epistemic stance
SK+/RK+	Superior epistemic stance	Superior epistemic stance
SK-/RK-	Inferior epistemic stance	Inferior epistemic stance
SK-/RK+	Inferior epistemic stance	Superior epistemic stance

the approach exactly. This is because we quantified the incidence of different types of stances, which is not done in Conversational Analysis. To our knowledge, this is the first time Heritage's (2012) taxonomy has been quantified.

2.4.1 | Turn sequences

To determine a turn sequence, turn initiation and turn conclusion were coded manually, following Sacks, Schegloff, and Jefferson's (1974) review of turn-taking systems. Speakers were coded as initiating a turn sequence when they were the first in the dyad to bring attention to a new topic, or to change the action or conversational focus (Adamson et al., 2012; Clark, 1996; Schegloff, 2007a). A turn ended with the last utterance before a new sequence of turns was initiated (see Table 1). The end of a sequence was defined as an unrelated turn (see Schlegoff, 1996, p. 4). If a topic was resumed after an intervening turn sequence it was defined as a new sequence. Turn-coding was done by the first author, who then blind-coded 19% of the files (10 out of 52) greater than 6 months later to determine reliability, which was high: 95% raw agreement, $\kappa = .90$ (SE$\kappa = .01$, CI95, κ [.89, .92]).

We coded turn sequences from the session transcriptions only, and therefore did not code non-verbal communication, such as manual gesture. This may have led to us missing some turn initiations based on non-verbal mechanisms alone. However, we do not believe that this would have been many cases: children's manual gestures in intentional communicative contexts are most often accompanied by speech, be it a vocalisation in very young infants (e.g., Liszkowski & Tomasello, 2011) or language in older infants (Hall et al., 2013; Stefanini et al., 2009, see Section 4 for more general discussion of non-verbal communication).

2.4.2 | Epistemic stance

Both parent's and infant's ES were coded manually and analysed using the CLAN software (MacWhinney, 2013). For each utterance, the speaker's and the recipient's ES were coded as superior (more knowledge than the other participant) or inferior (less knowledge than the other participant). Figure 2 illustrates the four possible gradients of knowledge between speaker and recipient.

Following CLAN manual guidelines (see CLAN manual, MacWhinney, 2013, p. 116 and Brown, 1973, p. 54), the first 25 utterances of each condition were not analysed because these are often formulaic and do not represent the rest of the conversation. Similarly, only fully transcribed utterances were coded. Unintelligible or incomplete utterances and singing were omitted. Table 1 gives four examples of how speaker utterances were coded within turns.

As shown in Table 1, each utterance results in what we call an *epistemic stance pair*. Since, for any given utterance, a speaker or a recipient can be coded as K+ (i.e., superior) or K- (i.e., inferior), there are four possible combinations of ES pairs that can describe the current territory of knowledge at any one time, as shown in Table 2. Speakers with superior ES could have a recipient with either inferior or superior ES. Speakers could have the same ES if they either shared superior knowledge (i.e., SK+/RK+) or if both had inferior knowledge (SK-/RK-). The latter case typically occurred

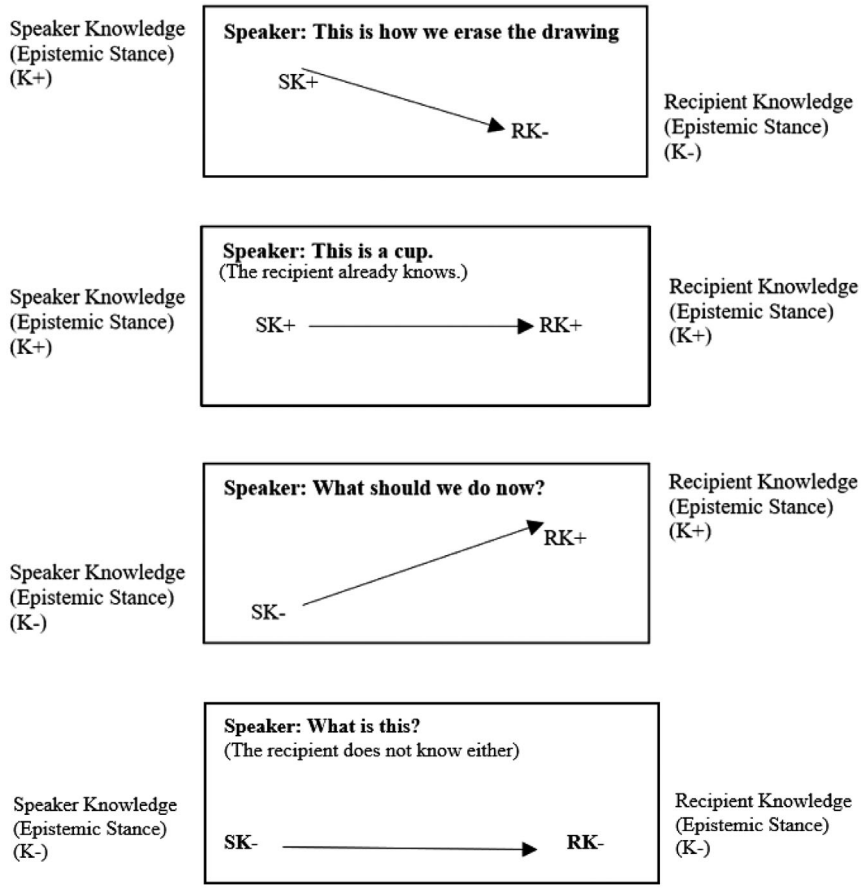

FIGURE 2 ES gradient (adapted from Heritage, 2012)

when the two partners did not understand each other, or the speaker asked a question that the recipient could not or did not answer.

Let us consider the first turn sequence in Table 1 to further illustrate coding of ES. When the mother initiates a turn with the rhetorical question 'Is this a puzzle?', she has superior knowledge, and the infant has inferior knowledge. Here the mother uses the question as a rhetorical device to introduce the topic, and only she has initial privileged access to the epistemic territory (i.e., she chooses and introduces the topic). The child, in contrast, does not have access to this knowledge initially (and is hence RK-), but on the subsequent turn reveals this knowledge by answering 'yes'. Thus, both participants demonstrate equivalent ES. The mother then asks the genuine question 'Can we try and put it together?' Here she cedes the epistemic territory to her child by requesting information about the contents of the child's mind, and the mother is thus SK-, but the child, who has privileged access to the answer, is RK+. The child then produces the onomatopoeia, 'cluck, cluck', which although is related to the puzzle (it is one of the images on the blocks), is something of a non-sequitur given the question in the previous turn. Thus, the child is marked as having superior speaker knowledge (SK+), since it knows the contents of its own mind and intended meaning of its production, but the mother is marked as RK-. Note that she would have been RK+ if the child had responded to her question felicitously (e.g., by saying 'yes'). In the final turn, the mother updates her ES to SK+ by commenting on the chicken ('funny chicken'), acknowledging and aligning with her child's previous utterance.

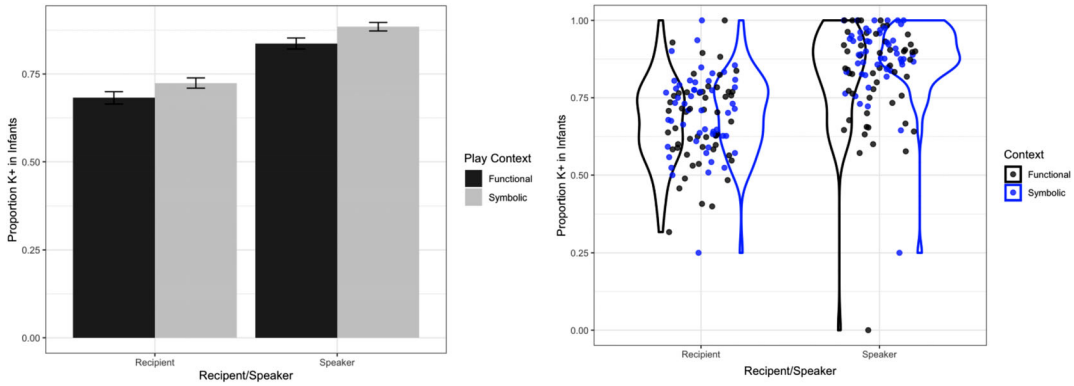

FIGURE 3 Proportion of K+ instances in infants by speaker (Recipient vs. Speaker) and play context (Functional vs. Symbolic). Left panel shows bar graph showing mean scores per condition (error bars represent standard error). Right panel is a violin plot representing the distribution of the data (dots indicate mean scores per participant.)

ES was coded by the first author, who then blind-coded 19% of the files (10 out of 52) greater than 6 months later to determine reliability, which was high: 96.1% raw agreement, $\kappa = .92$ (SE$\kappa = .01$, CI95, κ [. 91, .94]).

3 | RESULTS

Our raw data and analysis scripts can be accessed on the Open Science Framework (https://osf.io/mbrsc/). The R Markdown file contains the tables of the raw frequencies of K+/K- codes by participant type (infant, caregiver), speaker (recipient, speaker), and play context (functional, symbolic) (K+ = 1, K- = 0). Infants' and caregivers' ES was analysed separately because they were coded on the basis of the same data. That is, for every infant utterance, the infant's speaker ES and their caregiver's ES recipient status was coded. Figure 3 shows the proportion of K+ across speaker/recipient and play conditions for the infants.

Figure 3 shows, overall, infants were more knowledgeable speakers than recipients across both play conditions. However, as both speakers and recipients, infants were more knowledgeable in symbolic play compared to functional play. The data were analysed using generalised linear mixed models (GLMMs) in R (v. 4.0.3, R Core Team, 2020) using the *lme4* package (v. 1.1-23, Bates et al., 2015). Play context (contrast coded: functional = +.5, symbolic = −.5) and speaker status (contrast coded: recipient = +.5, speaker = −.5) and their interaction were entered as fixed effects. A binomial distribution was specified. The random effects structure included a random intercept for participant, and random slopes for play context, speaker and their interaction. Random slopes allow participants to vary across the two fixed effects and their interaction, ensuring that any significant fixed effects reflect the slope for the variable and not random variation across participants. Marginal and conditional R^2 effect sizes denoting goodness-of-fit were computed using the *MuMIn* package (Bartón, 2020). These estimate the proportion of the variance explained by the model both with (conditional R^2) and without (marginal R^2) controls for sources of random variance (Johnson, 2014; Nakagawa et al., 2017; Nakagawa & Schielzeth, 2013). The results of the model are show in Table 3.

The significant intercept shows that the infants were, overall, knowledgeable (i.e., K+) ($M = .77$) in more situations than not (i.e., K-) ($M = .23$). The significant fixed effect of context shows that infants were more knowledgeable speakers and recipients in symbolic ($M = .79$) compared to functional play ($M = .75$). The significant fixed effect of speaker shows that infants were more knowledgeable speakers ($M = .86$) than they were recipients ($M = .71$). The interaction was not significant, suggesting that infants' ES did not differentially vary across the two play contexts and their conversational roles as speaker or recipient.

TABLE 3 Summary statistics for fixed and random effects in GLMM model predicting infants' epistemic stance

	Coefficient	se(coeff)	z	*p*
Fixed effects				
Intercept	1.429	.081	17.609	<.001***
Context	−.348	.099	−3.499	<.001***
Speaker	−1.107	.124	−8.908	<.001***
Context*Speaker	.282	.184	1.534	.125
Random effects	**Variance**	**SD**		
Intercept	.286	.535		
Context	.301	.548		
Speaker	.583	.764		
Context*Speaker	.930	.964		

N = 52, Observations = 11,121, log-likelihood = −5493.6, Akaike Information Criterion (AIC) = 11015.2; Bayesian Information Criterion (BIC) = 11117.7. $R^2_{conditional} = .21$, $R^2_{marginal} = .081$. ***$p < .001$.

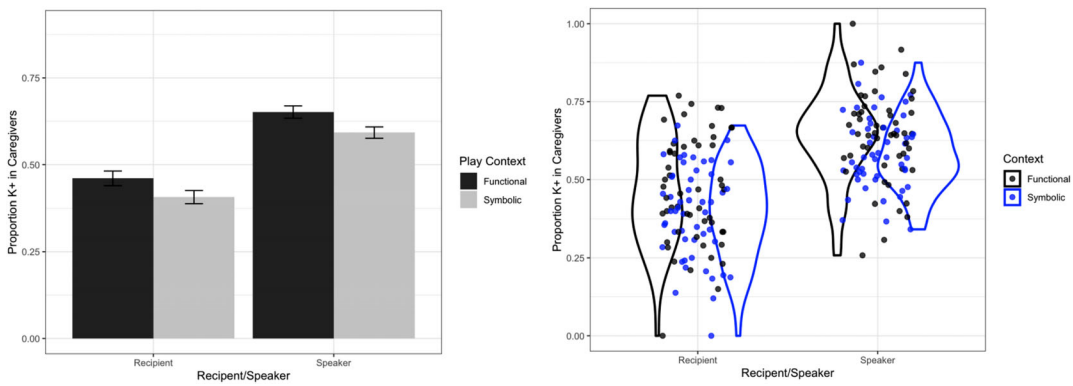

FIGURE 4 Proportion of K+ instances in caregivers by speaker (Recipient vs. Speaker) and play context (Functional vs. Symbolic). Left panel shows bar graph showing mean scores per condition (error bars represent standard error). Right panel is a violin plot representing the distribution of the data (dots indicate mean scores per participant.)

A key driver of the finding that infants were more knowledgeable in symbolic play may be because the context leads to more frequent establishment and maintenance of joint attention (Lillard & Witherington, 2004; Quinn & Kidd, 2019). That pretend activities sustain children's fragile attention suggests that the context has inherent interest to infants, which may be due to several factors, such as parental social referencing (Lillard & Witherington, 2004; Nishida & Lillard, 2007) and the flexibility of the context to maintain a degree of novelty (Kidd, Piantadosi, & Aslin, 2012). As speakers, symbolic play may engender a greater degree of interest in leading the conversation, which leads to the prediction that children would be more likely to initiate turn sequences than in functional play. We tested this exploratory hypothesis and found that this was the case: on average, infants initiated 2.46 more turn sequences in symbolic than in functional play, which was significant ($M_{Symbolic} = 13.35$, $SD = 7.75$; $M_{Functional} = 10.89$, SD = 6.75, $t(51) = 3.36$, $p = .001$, $d = 0.466$, CI_{95} [.0.178, 0.75]).

Figure 4 shows the proportion of K+ across speaker/recipient and play conditions for the caregivers, which were analysed in the same manner as the infants' data. The results are presented in Table 4. It shows that, while caregivers were overall more knowledgeable participants than not (.54 vs. .46), as indicated by the significant intercept, the

TABLE 4 Summary statistics for fixed and random effects in GLMM model predicting caregivers' epistemic stance

	coefficient	se(coeff)	z	p
Fixed effects				
Intercept	.116	.059	1.967	.049*
Context	.288	.073	3.965	<.001***
Speaker	−.782	.088	−8.898	<.001***
Context*Speaker	−.018	.109	−.165	.869
Random effects	**Variance**	**SD**		
Intercept	.150	.387		
Context	.166	.407		
Speaker	.291	.539		
Context*Speaker	.206	.454		

N = 52, Observations = 11,121, log-likelihood = −7290.3, AIC = 14608.7; BIC = 14711.1. $R^2_{conditional} = .118$, $R^2_{marginal} = .046$.
*$p < .05$, ***$p < .001$.

significant fixed effect of context showed they were, overall, more knowledgeable in functional ($M = .57$) than symbolic play ($M = .51$). Like the infants, caregivers were significantly more knowledgeable speakers ($M = .62$) than recipients ($M = .43$). The interaction was not significant, suggesting that caregivers' ES did not differentially vary across the two play contexts and their conversational roles as speaker or recipient.

4 | DISCUSSION

In this paper, we reported on an analysis of ES in infant-caregiver dyads across two play contexts: (i) symbolic play and (ii) functional play, which served as a comparable non-symbolic baseline. Past research on this cohort has suggested that the symbolic play context promoted socio-cognitive and linguistic behaviours that created a fertile context for communicative development (Creaghe et al., 2021; Quinn & Kidd, 2019). Our focus here on ES explored the possibility that, if symbolic play constitutes a zone of proximal development for language and socio-cognitive development (Bruner, 1983; Vygotsky, 1962; 1978), we would see a different pattern of informational exchange in symbolic play compared to functional play. Our results suggested that this was the case.

We found that infants' and caregivers' patterns of ES across the play contexts differed in complementary ways. Namely, the infants were superior speakers and recipients in symbolic play, whereas the opposite was the case for the caregivers. Thus, in symbolic play, infants both took greater control of the epistemic territory as speakers, and had a better command of it as recipients. Consider example 1:

(1)

*CHI: I stir it.	(SK+, RK-)
*MOT: you stir it, yeah.	(SK+, RK+)
*MOT: that (i)s right.	(SK+, RK+)
	ID3, Symbolic Play.

Here the infant (denoted by the *CHI) informs her mother (*MOT) of her intention to stir an imaginary food in the saucepan. Because she introduced the activity, she had privileged understanding of the epistemic territory (SK+),

whereas her mother was less knowledgeable (RK-). She maintains her superior ES as a recipient (RK+) as her mother elaborates on the activity. Compare (1) to (2), which shows an exchange in functional play between a different dyad, and where the infant was an inferior speaker:

(2)

*CHI:	these, two. what are? what are these?	(SK-, RK+)
*MOT:	what (i)s what?	(SK-, RK+)
*MOT:	what do … would you like to know?	(SK-, RK+)
*CHI: no.		(SK-, RK-)
		ID9, Functional Play

Here, at the beginning of the turn, the infant asks about the identity of two of the toys. In the functional condition, this information is important because it helps frame the interaction, and in this exchange the infant defers to the greater epistemic status (i.e., superior world knowledge) of her mother in order to get this information, though the attempt ultimately fails. This is in contrast to the symbolic play condition, where the identity and by extension function of an object is more fluid. This is shown in example (3), where an infant introduces novel content into the scene by virtue of an imaginary object (*cheese*). Since the infant made the object substitution, she has superior ES, while her mother signals her inferior ES.

(3)

*CHI: ah there is cheese.	(SK+, RK-)
*MOT: yeah?	(SK-, RK+)
	ID3, Symbolic Play

A key driver of this finding appears to be that the infants were significantly more likely to initiate turn sequences in symbolic play. That is, the context elicits a greater degree of interest in leading the conversation, which means that they begin turn sequences in a more knowledgeable position. That infants were also significantly more knowledgeable recipients in symbolic play is interesting in the context of the conceptual challenges symbolic play can pose to children. In the prototypically symbolic case of object substitutions, there is an apparent décalage between production and comprehension (Tomasello et al., 1999), where infants have been shown to produce symbolic acts in their second year of life while having a fragile understanding of the pretence acts of others (which is likely a general feature of symbolic play, e.g., Lillard, 2001b; McCune, 1995; Onishi et al., 2007; Tee & Dissanayake, 2011). In contrast, we found that infants had a fairly robust understanding of events in general, and a better understanding in symbolic compared to functional play. This may be attributable to the naturalistic nature of the interactions, which meant that dyads could play out known scripts, and caregivers could scaffold their infants.

The pattern of results for the caregivers was different to that of the infants, but on our reading indicates the dynamic manner in which caregivers responded to both the context and their children's behaviour within it. Caregivers were less knowledgeable speakers and recipients in symbolic compared to functional play. The pattern of results for caregivers suggested that they assumed different roles in symbolic and functional play. In the former, they assumed the role of an inquisitive playmate, and as such regularly displayed inferior ES. In the latter, they more often assumed a teaching role. Consider example (4), where an infant is pretending to talk to his father on the toy phone.

(4)

*MOT:	what (i)s he [dad] doing?	(SK-, RK+)
*CHI:	going shop.	(SK+, RK-)
*MOT:	oh he (ha)s gone to the shop?	(SK-, RK+)
*CHI:	yes.	(SK+, RK-)
*MOT:	what (i)s he doing at the shop?	(SK-, RK+)
*CHI:	Dadda rolls [sister].	(SK+, RK-)
*MOT:	*ah he is getting some rolls for [sister]?	(SK-, RK+)
*MOT:	aw okay.	(SK+, RK+)
*MOT:	is that for your lunch?	(SK-, RK+)
*CHI:	yes.	(SK+, RK-)
*MOT:	*mmm yummy!	(SK+, RK-)
		ID30, Symbolic Play

This long and successful exchange demonstrates a key feature of symbolic play – caregivers' frequent use of questions as a discursive device to scaffold children's creation of the pretend scenario, consistent with Reissland's (1998) proposal that pretence induces an interactive communicative style. In Creaghe et al.'s (2021) analysis of caregiver speech in these dyads, caregivers asked significantly more questions in symbolic play than in functional play, whereas in functional play caregivers used significantly more imperatives (i.e., commands, such as *put the block here*) than in symbolic play. The two sentence types have different functions and, crucially, assign members of the dyad very different roles in interaction. Notably, caregiver questions draw infants into the interaction, allowing them to 'take the floor' and co-direct the play episode, as in (4). In contrast, imperatives serve as a linguistic means to both instruct and exercise behavioural control: whereas questions in play co-construct meaning, imperatives result in more of a one-way flow of information. This is demonstrated in (5), where a child is playing with the hammer and pegs toy.

(5)

*MOT:	pop them out! [*referring to the pegs*]	(SK+, RK-)
*CHI:	there	(SK+, RK-)
*MOT:	let go of these ones and try that one.	(SK+, RK-)
		ID54, Functional Play

On other occasions the functional context was used to explicitly teach infants, as in (6), where another dyad is using the hammer and pegs.

(6)

*CHI:	that orange.	(SK+, RK-)
*CHI:	pop it here.	(SK+, RK-)
*MOT:	no bubbie, look this is yellow.	(SK+, RK-)
*MOT:	because of …	(SK+, RK-)
*MOT:	orange is this.	(SK+, RK-)
*MOT:	see this.	(SK+, RK-)
*MOT:	this is orange.	(SK+, RK-)
*MOT:	isn't it?	(SK-, RK+)
*CHI:	that (i)s er orange.	(SK+, RK-)
*MOT:	that (i)s orange.	(SK+, RK+)
*MOT:	yeah, that (.) border is orange.	(SK+, RK+)
*MOT:	and these yellow„ aren't they?	(SK+, RK-)
		ID21, Functional Play

Here the caregiver is managing the infant's use of the toy and taking the opportunity to teach the child colour terms. Notably, the caregiver is directing the conversation on her own.

The suggestion that caregivers took on different roles in symbolic and functional play is consistent with similar work by Taggart et al. (2020). They asked parents and their 4-year-old children to engage in a real (e.g., cleaning) and pretend activity (e.g., pretending to eat a snack), and both coded the interactions and asked parents to nominate the role they assumed while participating in each. In pretend play, parents regarded their role as a 'partner in fun', but during real activities regarded their role as a teacher or monitor. Notably, they also found that parents asked more questions during the pretend activity, consistent with what has been found for the cohort studied in the current study across two longitudinal time points (Creaghe et al., 2021). Taggart et al. suggested that the use of questioning may indicate the provision of learning opportunities for the child, and also 'scaffold the construction of shared meanings in pretend play' (p. 779). This is consistent with our suggestion that, due to the inherent ambiguity associated with the symbolic context, which requires interlocutors to negotiate and agree upon meaning (Rakoczy, 2006, 2008; Sutton Smith, 1997; Tollefsen, 2005), the context elicits a suite of behaviours that are established in the literature as being important for communicative development, from paralinguistic behaviours such as joint attention and gesture use (Quinn & Kidd, 2019), to child directed speech that draws children into interaction as equal play-mates and interlocutors.

Taken together, these results suggest several ways in which symbolic play relates to both language and cognitive development. Firstly, consistent with the Cultural Learning approach (Bruner, 1983; Tomasello, 2003; Vygotsky, 1967), the provision of non-verbal and verbal behaviours that positively influence language demonstrates a proximal effect of symbolic play on language. This is consistent with decades of research on the topic (e.g., Bates et al., 1979; Hirsh-Pasek et al., 2009; McCune, 2008; Piaget, 1962; for meta-analytic review see Quinn et al., 2018), but highlights the importance of the *context* of symbolic play as an important social experience contributing to development. Secondly, the analyses from the current study demonstrate how participants take on different roles in constructing meaning across play contexts, with symbolic play drawing infants into a more equitable co-construction role. Consistent with Vygotsky (1962, 1978), these interactions occur through the medium of language, but may have developmental effects beyond the mastery of the linguistic system. That is, through the business of negotiating meaning, language reveals the representational nature of the world (i.e., in a given context a cup is a hat) and eventually the minds of humans that inhabit it, such that symbolic play likely constitutes *one context* where language and socio-cognitive processes converge to help children develop epistemologies of their world (Ochs, 1993; Göncü et al., 2007; Göncü et al., 2002).

Thus, we follow others in arguing that the key to understanding the influence of symbolic play on development is via its role in promoting intersubjectivity between the child and its play partner, which allows the joint construal and manipulation of meaning (e.g., Göncü & Haskins, 2011). The explicitly dialogical nature of this process lays the foundation for subsequent development in language and related socio-cognitive processes (Fernyhough, 2008). An important concept in this process is *dialogical thinking* (Fernyhough, 2008) – the notion that children come to operate with internalised, semiotically-mediated perspectives of others, fostered by richly scaffolded social exchange (Meins et al., 1998). Symbolic play, as a ZPD, may enable children to operate at higher developmental levels in situated conversation, from which developmental benefits can flow. This could at least partly explain not just the link between symbolic play and language development (see Quinn et al., 2018), but also the link between symbolic play, what collaborative symbolic play entails (i.e., connected talk, Ensor & Hughes, 2008), and social understanding (e.g., theory of mind, see e.g., Meins et al., 2013; Youngblade & Dunn, 1995).

Several potential limitations warrant comment. The first concerns the size of the effects we observed across play contexts. In the infants, overall, we observed a 4% advantage in superior knowledge in symbolic versus functional play. On face value this seems quite small, and may lead some to question the psychological significance of the effect. We suggest that this needs to be contextualised against the raw number of utterances (and therefore verbal exchanges), which were 31.4% higher in symbolic play (6316 vs. 4805). Thus, while the difference in the proportion of K+ was small but significant in favour of symbolic play, the raw difference in successful exchanges of meaning across play contexts in only 10 min of interaction per context, from the perspective of the infant, was large (5004 vs. 3604). Thus, in symbolic play, children both interact more and with greater success.

A second limitation is that we primarily used our language transcripts to code ES. While we do not have any concern that this resulted in false positives in our data, we do acknowledge that a systematic analysis of non-verbal communication would significantly enrich our knowledge of how symbolic play might scaffold development within social interaction. Language is inherently multimodal (Holler & Levinson, 2019), and there is good evidence that pretend acts are non-verbally signalled to children (Lillard & Witherington, 2004; Nishida & Lillard, 2007) and manually enacted (Quinn & Kidd, 2019). Fine-grained analyses of how non-verbal signalling and communication work in concert with spoken language to establish and define the boundaries of social action and meaning exchange would be a major step forward in the field (for an example of how facial expressions signal the production of questions versus responses in adults see Nota et al., 2021).

Finally, we emphasise that these data are from a socio-economically homogenous population from a WEIRD (Western Education Industrial Rich Democratic) society, reflecting a general sampling bias in developmental research (Nielsen et al., 2017). While symbolic play appears to be a universal behaviour in humans, it is significantly moderated by variables such as socio-economic status and culture (Lillard, 2017; Doyle et al., 1991). Thus, while we have argued that symbolic play constitutes a zone of proximal development, it is most certainly the case that children from different backgrounds have very different experiences of play and undoubtedly still develop language and socio-cognitive skills all the same. Thus, symbolic play can only be one beneficial context for development. Indeed, *any* context that hold infants' attention and encourages them to actively co-construct meaning will likely do. Finally, our study is open to the criticism that the differences we have observed are toy-dependent. We think this possibility is unlikely: there were many toys in each set, and dyads were free to choose whichever ones they preferred. Even so, it will be important to replicate the results in separate sample of children using different toys.

5 | CONCLUSION

The current study investigated how patterns of informational exchange in infant-caregiver dyads differ between symbolic play and a comparable non-symbolic context. The results showed that the epistemic flow of knowledge was different for infants and parents across the play contexts. Notably, children were significantly more knowledgeable speakers

and recipients in symbolic play, the opposite was the case for their caregivers. We interpret these data to support the suggestion that symbolic play represents a zone of proximal development for infants, where their promotion to co-constructors of meaning facilitates the expression and exchange of meaning in conversation.

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DATA AVAILABILITY STATEMENT

Our raw data and analysis scripts can be accessed on the Open Science Framework (https://osf.io/mbrsc/).

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ENDNOTES

[1] Note that while Rakoczy (2006, 2008) argued that pretend play marks an early capacity for *collective intentionality*, the age at which children typically engage in pretence is somewhat younger than the age at which the capacity for collective intentionality is thought to develop (Tomasello, 2019; Tomasello & Rakoczy, 2003). We use collective intentionality here to be consistent with Rakoczy's original framing, but note that the core of our point is that symbolic play requires an intersubjective connection between infant and interlocutor (i.e., joint or 'shared' intentionality). For an enlightening discussion of shared and collective intentionality, see Moll et al., 2020).

[2] https://quickstats.censusdata.abs.gov.au/census_services/getproduct/census/2016/communityprofile/8ACTE?opendocument

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