



Parents and toddlers distinguish joke, pretend and literal intentional contexts through communicative and referential cues

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Available online 29 January 2016

Abstract

Parents exaggerate communicative cues (Infant-Directed Speech, IDS; smiling; gaze to children) when pretending or joking, but it is not clear why. Additionally, referential cues (gaze, point to objects) remain unexamined in these contexts. Across Action ($N = 25$; 16–20 months) and Verbal ($N = 43$; 20–24 months) studies, parents pretended, joked, and interacted literally with toddlers. Examined was whether parents use the above cues to express positive emotion, grab attention, or for pedagogical purposes. Parents exaggerated IDS, and sometimes smiling, when joking or pretending to express positive emotion. For younger toddlers, parents increased gaze to toddlers and smiling when joking compared to pretend and literal contexts, feasibly to grab attention to scaffold joke understanding. Parents decreased gaze to objects when joking, plausibly to avoid toddlers generalizing jokes' false information, following pedagogy theory. Younger toddlers responded appropriately to parents' cues, highlighting how toddlers could distinguish intentions to joke from other acts. Parents and toddlers treated pretending as literal. In the older group, parents and toddlers did not distinguish contexts, perhaps because older toddlers rely on sophisticated cues, e.g., language, over the low-level cues measured.

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Keywords: Joking; Pretending; Cues; Positive emotion; Attention; Pedagogy theory

Understanding the non-literal world, such as pretending and joking, is an essential part of development. Without this ability, we might not try out new ideas, or think of things in new and different ways. However, distinguishing literal from non-literal information may be difficult for toddlers. Toddlers have a limited understanding of artifacts and language, so simply using an object in a wrong or unusual way, or saying something wrong or unusual, may not be enough for toddlers to identify that information was not literal. Of even greater difficulty could be distinguishing different forms of non-literal intentions. While toddlers engage in joking from the first year ([Addyman and Addyman, 2013](#); [Hoicka and Akhtar, 2012](#); [Mireault et al., 2012](#)), and pretending in the second year ([Bosco et al., 2006](#); [Jackowitz and Watson, 1980](#)), it may be difficult for them to determine which of these two non-literal intentions others are expressing. One goal of the two exploratory studies is to determine whether communicative cues (Infant-Directed Speech, IDS; direct gaze; smiling) and referential cues (gazing or pointing to objects) help toddlers distinguish pretend, joke, and literal contexts during parent–child interactions. In particular, will parents exaggerate or understate these cues in each of these contexts. A further goal is to determine how these cues might help, i.e., by signaling positive emotion, attention grabbing, or pedagogy.

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Past research shows parents use explicit cues to express they are joking and pretending with their toddlers. When parents joke, they use disbelief language; that is, they correct the content of their jokes. For instance, if a parent jokes, “The ducks say moo”, they often follow this up with a sentence such as, “Ducks don’t say moo!” or “What do ducks really say?” (Hoicka and Butcher, *in press*; Hoicka et al., 2008). Parents also use a rising linear contour when joking, making the joke sound questionable (Hoicka and Gattis, 2012). When pretending to eat or drink, parents repeat actions (e.g., spoon to mouth), refer to the referent (e.g., cheerios), and make sound effects more often than when really eating and drinking (Lillard et al., 2007; Lillard and Witherington, 2004).

One limitation of explicit cues is children need to attend to and understand disbelief language, question intonation contours, the labels of references, and the meaning behind sound effects to interpret their parents’ cues. If toddlers do not yet have enough knowledge to make sense of these cues, a low-level bottom-up approach might serve them better. Even if they have the capacity to understand this information, ensuring children attend to the information is important. Past research shows parents use a variety of subtle cues to distinguish joking or pretending from literal contexts. Parents exaggerate features of IDS, including increased pitch and pitch variation, when joking and pretending versus speaking or acting literally (Hoicka and Gattis, 2012; Lillard et al., 2007; Reissland and Snow, 1996). Parents gaze to their toddler more when pretending, and sometimes smile more (Lillard et al., 2007). Parents smile more when clowning with their 3-to 6-month-olds (Mireault et al., 2012). Toddlers themselves smile while looking for a reaction more often when joking than playing literally (Hoicka and Akhtar, 2012), but smile less and look to the experimenter more when pretending versus acting literally (Rakoczy et al., 2005). However, this research does not tell us *why* parents use these cues when joking and pretending, nor whether parents use these cues to distinguish joking and pretending.

One possibility is that parents increased communicative cues in past studies to express positive emotion. Positive emotion shares several features with IDS (e.g., Banse and Scherer, 1996; Wassink et al., 2007; Fernald and Simon, 1984; Nakata and Trehub, 2004) including increased mean pitch, pitch variation, mean amplitude (loudness), and amplitude variation. IDS may increase emotional rapport between infants and caregivers (Werker and McLeod, 1989), and infants may prefer IDS because it sounds happy (Singh et al., 2002). Additionally, people increase eye contact when emotionally positive (Lalljee, 1978). Finally, smiling is universally linked to positive emotion, such as happiness, joy, enjoyment, or amusement (Darwin, 1955; Ekman and Rosenberg, 2005). Thus parents may have exaggerated communicative cues when joking or pretending versus acting literally because the control situations were serious, or at minimum less playful (Hoicka and Gattis, 2012; Lillard et al., 2007; Mireault et al., 2012; Reissland and Snow, 1996). If these cues are about positive emotion, then we would expect parents to use these cues to a greater extent when playing literally (such as playing with a toy car as a toy car), pretending or joking, compared to interacting in a serious way with their child.

Hoicka and Gattis (2012) suggested parents used IDS when joking to grab toddlers’ attention to scaffold the difficult information inherent to a joke. Therefore a second reason parents might increase the use of communicative cues when joking or pretending could be to grab toddlers’ attention. This would be a good strategy as several experiments found infants pay more attention when communicative cues are used. Six-month-olds are more likely to follow gaze to an object when direct gaze or IDS are first used (Senju and Csibra, 2008). Four-month-olds are more likely to attend to a speaker playing IDS versus Adult-Directed Speech (ADS) (Fernald and Kuhl, 1987). Parents use features of IDS to grab toddlers’ attention in difficult situations, such as noisy environments (Newman, 2003). Finally, infants better attend to and resolve difficult problems, such as discovering word boundaries and parsing sentences, when spoken in IDS versus ADS (Thiessen et al., 2005).

While communicative cues have been studied in non-literal contexts, referential cues have not. These cues draw attention to the object, e.g., gaze to the object or pointing (Csibra and Gergely, 2006). According to pedagogy theory, both communicative and referential cues are used to express that information is generalizable. If this is the case, we would expect that parents would *decrease* their use of communicative and referential cues when joking and pretending as the information is not literal, and hence not generalizable. Another possibility is that the combination of communicative and referential cues is important to pedagogy, and so we might expect that parents would decrease their communicative-referential cue combinations (where referential cues quickly follow communicative cues) when acting non-literally. However, recent research suggests children learn literal, generalizable information through pretending (Hopkins et al., 2015; Sutherland and Friedman, 2012, 2013; Weisberg and Gopnik, 2013). Therefore it is also possible that parents will treat pretend play as literal, and so not decrease any cues in a pretend situation, but still decrease them in a joke situation.

This highlights a second aspect of non-literal play – that perhaps joking and pretending will be treated differently by parents. When parents joke with their toddlers, they show more disbelief and less belief through their language and actions than when they pretend (Hoicka and Butcher, *in press*). Furthermore, using a normativity paradigm, when a first experimenter pretends with 2-year-olds, toddlers are very normative about how a second experimenter plays, and expects them to play in the same way. However, when a first experimenter jokes with 2-year-olds, toddlers are very open, and allow a second experimenter to play however she likes (Hoicka and Martin, *in press*). This suggests toddlers see pretending as a time for following rules, whereas they see joking as a time to be open-minded and try out different things. We may then expect parents to treat pretending and joking differently, even when the cues are subtle. Again, as

suggested by research on learning (Hopkins et al., 2015; Sutherland and Friedman, 2012, 2013; Weisberg and Gopnik, 2013), we might expect parents to express pretending as literal, while treating joking more distinctly.

In the current studies, parents joked, pretended, and acted literally (in both positive play and neutral contexts) with their toddlers. Study 1 focussed on younger toddlers' (16–20 months) action-based joking, pretending, and literal play. Study 2 focussed on older toddlers' (20–24 months) verbally-based joking, pretending, and literal play. The first goal for both studies was to determine whether parents increase their communicative and referential cues, as well as communicative-referential combinations, in non-literal contexts because:

Hypothesis 1 (H₁): they are expressing increased positive emotion. That is, parents exaggerate cues in joke, pretend, and play situations, compared to neutral situations.

H₂/H₃: they are bidding for attention, perhaps to scaffold a difficult concept. That is, parents exaggerate cues in both joke and pretend scenarios (H₂) or joke scenarios only (H₃), to ensure children are paying attention and understand what is being said or done.

H₄/H₅: Alternatively, following pedagogy theory, parents could theoretically decrease cues during joke and pretend scenarios (H₄), or joke scenarios only (H₅) to avoid children generalizing literally false information.

The second goal was to determine whether parents distinguish joking and pretending through communicative and referential cues; in particular, whether parents treat pretending more as joking (H₂/H₄) or literal (H₃/H₅). The third goal was to determine how children respond, both to the different contexts, and to parents' cues. For instance, we might expect that parents' gaze toward objects would lead toddlers to gaze toward objects, since infants and toddlers follow others' gaze (Carpenter et al., 1998; Senju et al., 2008). We might also expect toddlers to smile more when parents do so as smiling is contagious (Mojzisch et al., 2006; Schilbach et al., 2008), and parents' smiles encourage infants' smiles (Mireault et al., 2014, 2015). Thus parental cues may guide toddlers to appropriately distinguish contexts, providing a low-level mechanism by which toddlers might learn to distinguish joke, pretend, and literal acts.

1. Study 1: Action Study

Study 1 examined action-based joking, pretending, literal play and serious literal interactions. Jokes involved misusing objects, which are produced and understood as early as 15 months (Hoicka and Wang, 2011; Loizou, 2005; McGhee, 1979). Pretend actions involved pre-symbolic pretense for half the trials (e.g., “drinking” out of empty cup, where the object is still the actual object), which is produced and understood as early as 15 months; and object substitution (e.g., using long tube as scarf), which is understood as early as 15 months when the substitute is similar in form to the original (Bosco et al., 2006; Onishi et al., 2007). Thus joke and pretend actions were appropriate for the age range.

1.1. Method

1.1.1. Participants

Twenty-five parents (1 father) and their toddlers ($M = 17$ months, 12 days, $range = 16$ months, 0 days to 20 months 1 day; 13 boys) participated. Another five participants were excluded because children refused to participate. All children were Caucasian. Parents had a high school diploma (5), an undergraduate degree (9), a postgraduate degree (7) or did not report their education level (4). Participants were recruited through parent and toddler activities, and advertising through posters, facebook, and parenting websites.

1.1.2. Materials

Objects for the washing scenarios included a washing-up bin, water, liquid soap bottles, liquid soap, sponges, and cloths. Objects for the dressing scenarios included hats, scarves, gloves, plastic envelopes, a round sponge, and a long plastic tube. Objects for the eating scenarios included small cookies, pieces of rice cakes, water, orange drink, a clear plastic bottle, a clear plastic cup, and a plate. Objects for the coloring scenarios included papers with shape outlines, crayons, and sticks. Two Sony digital camcorders recorded the sessions. A Shure head-mounted microphone fit into an Olympus MP3 recorder recorded parents' speech. Videos were coded with Observer software. Audio files were coded with Praat software (Boersma and Weenink, 2008).

1.1.3. Design

The design was within-subjects. For the main analyses, the independent variable was the Action Type for each trial: Joke, Pretend, Positive Literal, or Neutral Literal. The dependent variables included (1): parents' communicative cues: gaze to child (seconds/minute; s/m), smiling (s/m), composite IDS score composed of summing z-scores of: speech rate

(syllables/second; reversed), mean pitch (semitones, st), pitch standard deviation (st), mean amplitude (decibels, dB), amplitude standard deviation (dB); (2) parents' referential cues: gaze to objects (s/m), point to object (yes or no each trial); (3) parents' communicative-referential combinations, i.e., the number of occasions a referential cue followed a communicative cue within 3 s (frequency/minute); children's communicative cues: gaze to parent (s/m), smiling (s/m); and (4) children's referential cues: gaze to objects (s/m). Children's pointing was originally coded, but this behavior was too rare to analyze. Children's age was examined for whether it interacted with the main independent variables. For the lag sequential analyses examining parent-child interactions, the variables were the above dependent variables which showed a non-null pattern of results in the initial analyses, as well as when parents and children stopped smiling or pointing as controls (if required).

1.1.4. Procedure and counter-balancing

Before the study, parents were only told that we were interested in discovering how parents and toddlers interact when playing, including when they joke and pretend. Therefore the hypotheses were not disclosed. Each parent and toddler sat at a table, with the parent in a chair, and the toddler in a high chair. Parents acted out four trials for two minutes each: Joke, Pretend, Positive Literal, and Neutral Literal. At the beginning of Neutral Literal trials, parents were told, "Be serious while you. . . (e.g., "eat a snack.") At the beginning of Positive Literal trials, parents were told, "Show your excitement and happiness. . . (e.g., "about having a special treat.") At the beginning of Pretend trials, parents were told, "You are going to pretend that. . ." (e.g., "you're eating and drinking with your child.") At the beginning of Joke trials, parents were told, "Use the objects the wrong way to make jokes with your child." Children could have heard these general instructions, however it seems unlikely that they would show a greater effect than parents' interactions themselves. We chose to instruct parents to show their excitement and happiness in the Positive Literal condition, and to be serious in the Neutral Literal condition. These were both important controls to determine which variables related to attention-grabbing (i.e., distinguishing literal and non-literal contexts), and which related to emotion (see [Hoicka and Akhtar, 2011](#)).

Each trial had three Target Sentences paired with Target Actions that parents could say and act out at any point during the trials. The Target Sentences were the same across Action Type (Joke, Pretend, Positive Literal, Neutral Literal), but Target Actions varied across Action Types (see [Appendix A](#) for all pairings). Parents said each of three Target Sentences (e.g., in the Eating trial: "I'm going to have a drink") and acted out one of the corresponding actions (e.g., Neutral Literal: drink water from cup; Positive Literal: drink orange drink from cup; Pretend: put empty cup to mouth; Joke: put cup of water to elbow). The actions were described on paper, with an accompanying photo in the Joke trials. We chose not to include an accompanying photo for the Literal and Pretend trials because the actions chosen were conventional and well-known, even if the objects differed. For example, if a parent was asked to pretend to drink from an empty cup, the action itself is easily identified. However, the joke actions did not necessarily correspond to conventional actions, e.g., we do not typically put anything to our elbow, including a cup of water. Therefore we used a photo to ensure parents understood the task, and to make performance as similar as possible across the Joke trials. Target Sentences were the same across trials to allow experimental control – any differences in responses by parents and children would be attributed to how the Target Actions related to the Target Sentences, and could not be attributed to the Target Sentences alone. While using specific sentences and actions gave better experimental control, it may have made the study less naturalistic. However, this was deemed necessary to avoid confounds, and parents appeared to act naturally throughout the study. Since these instructions were printed on paper kept away from the child, children only learned about this information through their parents. Additionally, it was necessary to use different objects across trials. For instance, if we had used gloves in all three conditions, it would be difficult for a parent to pretend to put on the glove if it really was a glove – this would lead them to literally putting on a glove. Thus we chose, in this instance, plastic envelopes so that parents could actually pretend. Additionally, we made the literal items more exciting in the Positive Literal trials to increase positive affect, and we made them less exciting in the Neutral Literal conditions to keep affect neutral.

Joke, Pretend, Positive Literal, and Neutral Literal trial types were crossed with Washing, Eating, Dressing, and Coloring scenarios (see [Appendix A](#) for all scenarios). For example, one parent would act out joke washing (e.g., putting foam on nose instead of hands), then neutral literal eating (e.g., eating rice cakes), then positive literal dressing (e.g., putting hat on head), and then pretend coloring (e.g., moving sticks on paper). However another parent would act out pretend eating (e.g., moving fingers from plate to mouth, without food), then positive literal coloring (e.g., coloring with crayons on paper), then neutral literal washing (e.g., wash hands with soap and water), then joke dressing (e.g., putting hat under arm; see [Appendix B](#) for counterbalancing). This was to ensure no carry-over from one trial to the next. For instance, if a parent joked they were drinking on one trial, and on the next trial, literally drank, parents and toddlers might return to the joke drinking if they found it fun, and not distinguish the contexts. Parents and children played with distractor objects (hammer bench, xylophone, ring stacker, one per trial, in that order) for one minute between trials.

Children played with objects with their parents throughout the trials. The experimenter sat behind an occluder during the trials, and switched the objects between trials.

1.1.5. Coding

Parents' gaze to child, children's gaze to parent, parents' pointing, and parents' and children's gaze to objects, and smiles were coded continuously throughout trials from video using Observer software. Smile coding did not include laughter since laughter is not thought to be a marker of pedagogy or pretend play, while it is considered a marker of joking. Therefore including laughter might bias the smiling results in favor of joking, even though this is not the key concept being explored.

Target Sentences were coded for acoustic features of speech as in [Hoicka and Gattis \(2012\)](#) including speech rate (syllables/second), mean pitch (st), pitch standard deviation (st), mean amplitude (dB), and amplitude standard deviation (dB), in Praat software. Target Sentences were coded instead of continuous speech because phonemes themselves carry specific acoustic features ([Lehiste and Peterson, 1959](#)). By making the Target Sentences the same across conditions the acoustic features were isolated in relation to the page contexts.

Past research found that combining separate acoustic features (including mean pitch and pitch variability) allows the classification of different pragmatic categories within IDS (attention, approval, comfort) when using discriminant functions analysis ([Katz et al., 1996](#)). This suggests the combining of features is important in IDS, not just the summary variables. However, since discriminant functions analysis could not be combined with MANOVA GORIC (see below), z-scores of each variable were collapsed together to give a gestalt IDS score. z-scores were assigned to each acoustic feature (speech rate, mean pitch, pitch standard deviation, mean amplitude, amplitude standard deviation) for Target Sentences within each participant. For instance, if a participant said 10 sentences correctly that were not masked by noise (e.g., child yelling), z-scores were calculated for the set of 10 sentences for each of speech rate, mean pitch, etc. Then the z-scores for mean pitch, pitch standard deviation, mean amplitude, and amplitude standard deviation were added up, and the z-score for speech rate was subtracted (as exaggerated IDS has a lower speech rate). This led to a final number which represented how exaggerated (positive) or understated (negative) IDS was for each sentence within that individual's own range.

We did not code agreement for IDS as Praat software automatically coded features of sentences. Three videos (13%) were coded for parents' pointing, and parents' and children's gaze (to each other and object), and smiles, by determining whether or not the coders judged the same behavior at the beginning of each second. Agreement was very good for pointing, $k = 1.00$, and good for gaze, $k = 0.70$, and smiles, $k = 0.68$. Communicative-referential combinations were derived from contingency analyses, therefore these were not coded for agreement.

1.2. Results and discussion

1.2.1. Data analysis

Initial analyses revealed no effects of or interactions with age. Data were analyzed with MANOVA using the software Generalized Order-Restricted Information Criterion (GORIC; [Kuiper and Hoijtink, 2013](#); [Kuiper et al., 2011, 2012](#)). A standard MANOVA with a p -value tells us if there is a general effect between conditions or not. However, it cannot reveal the best theoretical explanation for multiple conditions, i.e., distinguishing whether positive emotion, attention, or pedagogy best explain the data. GORIC was chosen as it compares several theories at once to explain a data set. In Bayesian statistics, data is fitted to different theoretical models, and each model is adjusted for complexity (more complex models are given a higher penalty for fit). The best model is the one with the best fit, giving the best explanation of the data. See [van de Schoot et al. \(2011\)](#) for an explanation of when Bayesian model selection is used, and [Kuiper and Hoijtink \(2013\)](#) for an explanation of how to build these models. The models used in these analyses were (H = hypothesis, μ = mean):

Cue not used to express any of above; all parameters free (guards against weak hypotheses, [Kuiper and Hoijtink, 2013](#)):

$H_0: \mu_{\text{joke}} = \mu_{\text{positive literal}} = \mu_{\text{pretend}} = \mu_{\text{neutral literal}}$

Cue exaggerated to express positive emotion:

$H_1: \mu_{\text{joke}} = \mu_{\text{pretend}} = \mu_{\text{positive literal}} > \mu_{\text{neutral literal}}$

Cue exaggerated to grab attention to scaffold difficult concept; pretend = joke:

$H_2: \mu_{\text{joke}} = \mu_{\text{pretend}} > \mu_{\text{positive literal}} = \mu_{\text{neutral literal}}$

Cue exaggerated to grab attention to scaffold difficult concept; pretend = literal:

$H_3: \mu_{\text{joke}} > \mu_{\text{pretend}} = \mu_{\text{positive literal}} = \mu_{\text{neutral literal}}$

Cue understated to avoid generalizing information; pretend = joke:

$H_4: \mu_{\text{positive literal}} = \mu_{\text{neutral literal}} > \mu_{\text{pretend}} = \mu_{\text{joke}}$

Cue understated to avoid generalizing information; pretend = literal:

$H_5: \mu_{\text{positive literal}} = \mu_{\text{neutral literal}} = \mu_{\text{pretend}} > \mu_{\text{joke}}$

Since Target Sentences were not always said, or were sometimes masked with noise, the cumulative z-scores were averaged for all Target Sentences within each condition for each participant. For instance if a parent said all three joke Target Sentences, the joke IDS score would be the average of these three sentences. If the parent said only one sentence, the IDS score would be that sentence's score alone. Eight parents were not included in the IDS GORIC

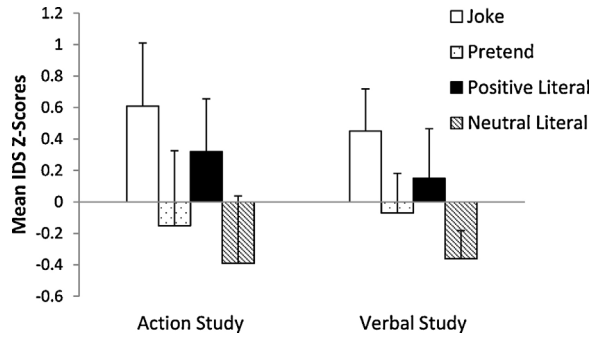


Fig. 1. Exaggeration/understatement of parents' IDS, by condition and study. A high score indicates exaggeration. A low score indicates understatement. Error bars represent standard errors.

MANOVA because they had at least one trial where they either said none of the Target Sentences correctly, or the Target Sentences were masked with noise. This left 17 parents for the IDS analysis. Due to a technical fault, the pretend trial was not video recorded for one dyad, therefore they were not include in the other analyses, leaving 24 participants.

Children's gaze to objects, and parents' communicative-referential combinations had outliers (defined as more than 1.5 times the interquartile range from the median) which caused skewness. Removing outliers normalized the data (see Judd et al., 1995). Box-Cox transformations found a natural log transformation normalized parents' smiles and children's gaze to parents. An inverse square root transformation normalized children's smiles (see Box and Cox, 1964; Osborne, 2010). No transformation normalized pointing data, therefore non-parametric statistics were used. Unfortunately there is currently no Bayesian statistic to examine repeated measures non-parametric data. Therefore instead, the likelihood of pointing was modeled using logit mixed effects models (LMEM) with the LME4 package (Bates et al., 2008) in R (R Development Core Team, 2009; see Hoicka and Akhtar, 2011; Jaeger, 2008), which at least measures differences between conditions for repeated-measures non-parametric data. LMEM examined group differences, grouping data following the six hypotheses.

1.2.2. Parents' cues and children's responses

Fig. 1 gives the means and standard errors for parents' IDS. Fig. 2 gives the means and standard errors for parents' and children's smiles. Fig. 3 gives the means and standard errors for parents' and children's gaze to objects and each other. Fig. 4 gives the means and standard errors for parents' communicative-referential combinations.

Table 1 shows the model fits for each theory for each dependent variable. A lower value indicates a model with a better fit.

Out of 24 trials, parents pointed on 7 of the Joke trials, 9 of the Pretend trials, 14 of the Positive Literal trials, and 7 of the Neutral Literal trials. None of the hypotheses significantly improved the LMEM for pointing, all $p > .05$.

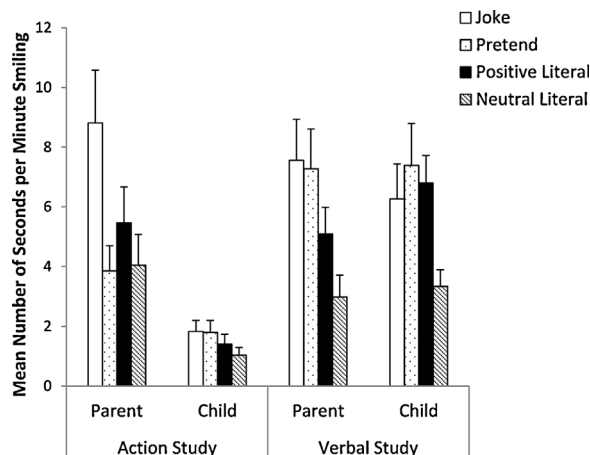


Fig. 2. Mean number of seconds per minute parents and children smiled, by condition and study. Error bars represent standard errors.

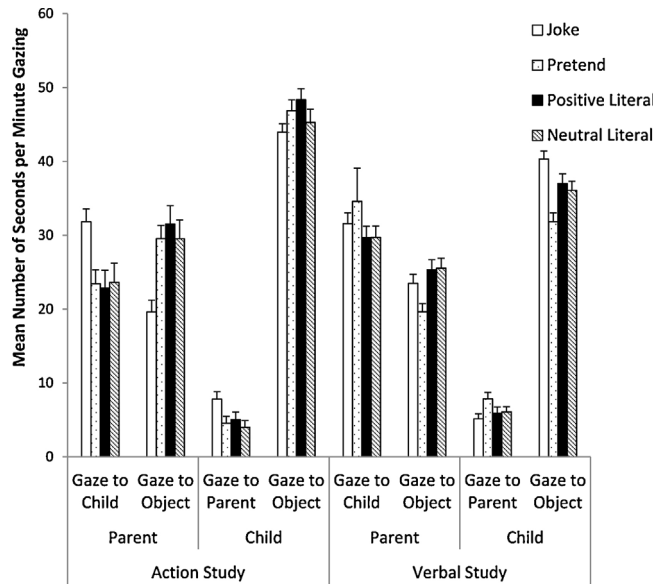


Fig. 3. Mean number of seconds per minute parents and children spent gazing to child/parent, and object, by condition and study. Error bars represent standard errors.

According to the GORIC MANOVAs in Table 1, parents most likely increased their use of communicative cues to express positive emotion or grab attention. In particular, parents most likely exaggerated IDS to increase positive emotion (H_1). Parents most likely increased smiling and gaze to children to bid for attention (H_3).

According to Table 1, parents most likely increased their use of referential cues to indicate that information is generalizable. Generalizable (versus non-generalizable) contexts led to an increase in parents' gaze to objects (H_5). Thus referential cues may be key to pedagogy theory.

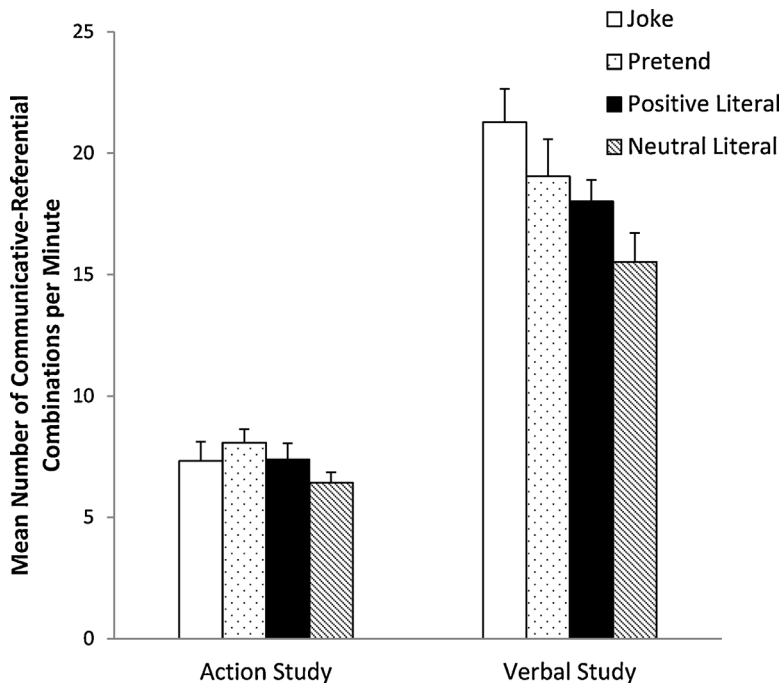


Fig. 4. Mean number of parents' communicative-referential combinations per minute, by condition and study. Error bars represent standard errors.

Table 1

GORIC values of each model for all parental cues, and children's engagement in Study 1. Numbers in bold indicate best models. IDS = Infant-Directed Speech.

	N	Unrestricted	Emotion	Attention Pretend		Pedagogy Pretend	
		H ₀	H ₁	=Joke H ₂	=Literal H ₃	=Joke H ₄	=Literal H ₅
Parents							
Gaze to child	24	701.56	710.81	710.74	696.79	710.82	710.82
Smiles	24	236.66	245.88	248.17	233.59	252.58	252.58
IDS	17	226.46	222.51	224.73	223.21	225.04	225.04
Gaze to objects	24	703.57	720.77	720.78	720.77	717.58	699.82
Communicative -> Referential	22	429.07	426.07	426.35	429.88	429.88	429.56
Children							
Gaze to parent	24	237.23	244.25	242.06	232.64	247.37	247.37
Smile	24	-24.23	-28.03	-25.17	-27.56	-25.17	-25.17
Gaze to objects	21	564.33	563.75	564.64	564.63	563.14	562.02

According to Table 1, positive emotion best explained parents' increase in communicative-referential combinations (H₁). Therefore parents may increase their use of communicative cues before referential cues when they are happy, rather than to express that information is generalizable.

According to Table 1, children were more socially and emotionally engaged during non-generalizable contexts (smiling, gaze to parents), and more engaged with objects in generalizable contexts (gaze to objects). Children smiled more in more emotionally positive situations (H₁), gazed to parents more in situations requiring more attention (H₃), and gazed to objects more in generalizable contexts (H₅). This suggests children responded appropriately to the contexts, focussing more on parents when socially warranted, and more on objects when pedagogically warranted.

When parents used cues to bid for attention (gaze to child, smiling), or to express that information is generalizable (gaze to objects), parents treated pretending as literal rather than joking. Similarly, children also treated pretending as literal rather than joking (gaze to parents, objects). This suggests parents and children use these cues to distinguish joking and pretending. While joking may seem non-literal, abstract, or wrong (e.g., Hoicka and Gattis, 2008; Hoicka et al., 2008), pretending may seem literal, reflecting definitions of pretense suggesting it is right in one's imagination (Nichols and Stich, 2003). Parents take the fact that the pretend scenario is right in one's imagination seriously, and mostly express pretending as right and generalizable. Indeed, this converges with evidence showing parents and their 16- to 24-month-olds also distinguish joking and pretending through belief and disbelief language and actions, and treat pretending as more literal than joking (Hoicka and Butcher, in press).

1.2.3. Parent-child interactions

Lag-sequential analyses (LSA) examined more closely how parents' cues predicted children's behaviors. These analyses allow one to determine which behaviors are more or less likely to follow other behaviors than chance within a large array of behaviors, avoiding Type 2 error from repeated analyses. See Bakeman and Gottman (1997) for detailed explanations of this analysis; or Montague et al. (2011) for a concise introduction. We examined the effects of parents' gaze to children and objects, exaggerated and understated IDS, and smiling (as well as when parents ceased to smile as a control), on children's gaze to parents and objects, and smiling (as well as when children ceased to smile), as parents and children used these to distinguish conditions. A 3-s time lag was used (behaviors were on average 2.5 s long, allowing parents and children time to react to each other). The total number of times each behavior followed another within 3 s was calculated automatically by Interact software's contingency analysis. Table 2 shows all frequencies, conditional probabilities, and adjusted residuals (AR) of each Behavior Type (e.g., Child Smile) following each Behavior Type (e.g., Parent Smile) within 3 s, across all participants and conditions. The distribution of behaviors in Table 2 was significantly different than expected by chance, $\chi^2(24) = 93.40$, $p < .01$. ARs greater or equal to 1.96 suggest one behavior follows another significantly more often than chance would predict, while ARs smaller or equal to -1.96 suggest one behavior follows another significantly less often than chance would predict.

According to Table 2, children were more likely to gaze to their parents after their parents gazed at them, but less likely once parents ceased smiling. Children were more likely to gaze to objects after parents gazed to objects, but less likely

Table 2

Observed frequencies (top row, no brackets), expected frequencies (top row, in brackets), conditional probabilities (middle row) and adjusted residuals (bottom row) of toddlers' behavior types following parents' behavior types within 3 s, across all participants and conditions in Study 1.

	Follows within 3 s			
	Child			
	Gaze parent	Gaze object	Smile	Cease smiling
Parent				
Gaze child	307 (265) 30% (3.46)*	467 (465) 45% (0.18)	129 (125) 13% (0.48)	124 (173) 12% (-5.93)*
Gaze object	239 (247) 25% (-0.72)	465 (433) 49% (2.40)*	110 (116) 12% (-0.79)	144 (161) 15% (-1.91)
Smile	102 (115) 23% (-1.58)	167 (201) 38% (-3.89)*	73 (54) 16% (2.56)*	103 (75) 23% (3.29)*
Cease smiling	95 (127) 19% (-4.11)*	226 (222) 46% (0.38)	44 (60) 9% (-2.76)*	126 (83) 26% (4.63)*
Exaggerated IDS	13 (10) 35% (1.12)	16 (17) 43% (-0.25)	4 (4) 11% (-0.27)	4 (6) 11% (-1.23)
Understated IDS	16 (10) 43% (1.89)	14 (17) 38% (-1.00)	4 (4) 11% (-0.27)	3 (6) 8% (-2.06)*

* $p < .05$.

after parents smiled. Children were more likely to smile after parents smiled, but less likely after parents ceased smiling. Finally, children were more likely to cease smiling after parents both smiled or ceased smiling, and were less likely to cease smiling after parents used understated IDS, or gazed to the child. The general pattern suggests parents' communicative cues increased children's communicative responses and decreased their referential responses, while parents' referential cues increased children's referential responses.

These data suggest one way in which children might distinguish contexts, as demonstrated by the GORIC MANOVAs. As parents' cues distinguished contexts, and as parents' cues predicted children's engagement, this could mean children distinguished contexts, at least in part, by responding to parents' cues. For instance, if a parent gazes more to their child in a joke context, this could cause the child to gaze to their parent, and this may then lead to children gazing to their parents more in joke contexts. Thus parents might help children distinguish contexts through a low-level mechanism of cue-following.

2. Study 2: Verbal Study

Study 2 examined whether parents use cues in the same way as in the Action Study, and whether toddlers respond in the same way, during verbally-based interactions. In particular, Study 2 examined whether cues are guided by the expression of positive emotion, attention grabbing, or pedagogy; as well as whether parents treat pretending as joking or literal. Toddlers dramatically increase their vocabulary from 16 to 24 months (Fenson et al., 1994; Hamilton et al., 2000). Toddlers' joking and pretending therefore become more verbal. Toddlers mislabel objects quite different to the original as a joke from 2 years (Hoicka and Akhtar, 2011; McGhee, 1979). Children also pretend through object substitution somewhat proficiently from 2 years when objects look dissimilar to the original objects, but have no obvious function, e.g., a block (Elder and Pederson, 1978; Fein, 1975; Jackowitz and Watson, 1980).

This was not a replication of the Action Study. Instead, the goal was to determine whether parents use communicative and referential cues in the same way as in the Action Study, using examples of joking and pretending that are developmentally appropriate for older toddlers. An interesting aspect of this stage of development is that joke and pretend acts converge to some extent (object substitution), although the form of object substitution is still somewhat different. In particular, joke objects often have a distinct form and function, while pretend objects have a distinct form, but an ambiguous function. This in turn may affect how much parents distinguish joke and pretend contexts; i.e., they may distinguish these contexts less. Additionally, pretending at this stage looks more wrong than earlier pretending, thus parents may distinguish pretending from literal play to a greater extent. Finally, a larger group of fathers was tested to determine whether mothers and fathers cue toddlers in the same way.

2.1. Method

2.1.1. Participants

A separate group of 43 parents (19 fathers) and their toddlers (age $M = 21$ months, 12 days, $range = 19$ months, 22 days to 24 months 13 days; 23 boys) participated. One child was Black and all other children were Caucasian. Parents completed high school (6), an undergraduate degree (15), a postgraduate degree (10), or did not report their education level (9). Participants were recruited as in Study 1.

2.1.2. Materials

The objects differed depending on the condition. In the literal (positive and neutral) trials, the objects matched the words (e.g., toy horse for horse). In the Pretend trials, the objects were non-descript items such as blocks and sponges (e.g., round block for horse). In the joke trials, the objects were mismatched items (e.g., coat for horse). See [Appendix C](#) for the object and label pairings by condition. Nouns for the 16 Target Sentences were high frequency nouns in English child directed speech, as verified by the Child Language Data Exchange System (CHILDES) database ([MacWhinney, 2000](#)). Thirty-eight parents filled out the Oxford-Communicative Development Inventory ([Hamilton et al., 2000](#)). Children understood $M = 94\%$ ($SD = 13\%$) of the target words. Objects for the distractor tasks, and video and audio equipment and software were the same as in Study 1.

2.1.3. Design

The design was within-subjects. The independent variable was the Trial Type: Joke, Pretend, Positive Literal, or Neutral Literal. The dependent variables were the same as Study 1. For the LSA, the variables were the same as Study 1.

2.1.4. Procedure and counterbalancing

Before the study, parents were only told that we were interested in discovering how parents and toddlers interact when playing, including when they joke and pretend. Therefore the hypotheses were not disclosed. Each parent and toddler sat at a table, with the parent in a chair, and the toddler in a high chair. Parents acted out four blocks of four 30-s trials: Neutral Literal, Positive Literal, Pretending, and Joking. Before each block of trials parents were told, “I’m going to give you four toys, one at a time.” Each object (e.g., shoe, block, chicken for Literal (Neutral and Positive), Pretend, and Joking conditions respectively) was given with an accompanying Target Sentence (e.g., “This is a shoe.”) Parents were then told: Neutral Literal: “Could you show your child the toy and you can be quite serious with this one.”; Positive Literal: “Feel free just to play with the toy with your child.”; Pretend: “This time it’s pretending. So if you could pretend that this [point to object, e.g., block] is this [point to Target Sentence; e.g., shoe] then that would be great.”; Joking: “This one’s joking so it’s about using the objects in the wrong way, so if you could joke around that this [point to object, e.g., chicken] is this [point to Target Sentence, e.g., shoe] then that would be great.” Children could have heard these general instructions, however it seems unlikely that they would show a greater effect than parents’ interactions themselves. We chose to instruct parents to show their excitement and happiness in the Positive Literal condition, and to be serious in the Neutral Literal condition to control for emotion.

Joke, Pretend, Positive Literal, and Neutral Literal trial types were crossed with each of four sets of object labels, each set containing the word for an animal, vehicle, clothing item, and eating item. Parents acted out a subset of all the condition-label set pairings. For example, one parent would joke with Set 1 (Coat = “Horse”, Chicken = “Hat”, Plate = “Train”, Airplane = “Spoon”), then interact literally (Neutral Literal) with Set 2 (Cow, Shoe, Boat, Fork), play literally (Positive Literal) with Set 3 (Dog, Bib, Bus, Cup), then pretend with Set 4 (Round Block = “Pig”, Bath Scrub = “Sock”, Scrunchy Hairband = “Car”, Square Block = “Bowl”). However, another parent would play literally (Positive Literal) with Set 4 (Pig, Sock, Car, Bowl), then joke with Set 3 (Coat = “Dog”, Chicken = “Bib”, Plate = “Bus”, Airplane = “Cup”), then pretend with Set 2 (Round Block = “Cow”, Bath Scrub = “Shoe”, Scrunchy Hairband = “Boat”, Square Block = “Fork”), then interact literally (Neutral Literal) with Set 1 (Horse, Hat, Train, Spoon; see [Appendix D](#) for counterbalancing). Across all parents, all combinations of condition, set, and order were acted out. Parents and children played with distractor objects for one minute between blocks (same as Study 1).

Target Sentences were the same across trials to allow experimental control – any differences in responses by parents and children would be attributed to how the Objects related to the Target Sentences, and could not be attributed to the Target Sentences alone. Additionally, it was necessary to use different objects across conditions. For instance, if we had used a toy train for the trial where parents say, “This is a train.” in all four conditions, it would be difficult for a parent to pretend or joke it was a train because it literally was a train. Thus we chose, in this instance, a scrunchy hairband in the pretend condition, and a plate in the joke condition, so that utterances would be non-literal. Additionally, objects differed in the pretend and joke conditions because, as stated in the introduction for Study 2, 2-year-olds pretend with objects with no obvious functions, therefore a plate would not be suitable for pretending. Similarly, we discussed that 2-year-olds joke with objects that are quite distinct, e.g., joking a car is a hat. Therefore using an ambiguous object might not have good

comedic effect. It was thus necessary to use different types of objects so that parents could express pretending and joking in age-appropriate ways.

Children played with the objects with their parents throughout the trials. The experimenter sat behind an occluder during the trials, and switched the objects between trials. Study 2 was filmed as in Study 1.

2.1.5. Coding

Same as Study 1. Five (11%) of the videos were coded for agreement. Agreement was good for gaze, $k = 0.70$, pointing, $k = 0.74$, and smiling, $k = 0.61$.

2.2. Results and discussion

2.2.1. Data analysis

The same statistical software and set of hypotheses were used as in Study 1. Nineteen parents were not included in the IDS GORIC MANOVA analyses because they had at least one block where they either said none of the Target Sentences correctly, and/or the Target Sentences were masked with noise. This left 24 parents for the IDS analyses.

Outliers were removed for IDS and communicative-referential combinations to normalize data. A cubic root transformation normalized children's looks to parents. A natural log transformation normalized parents' and children's smiles. None of the transformations normalized the pointing data, so LMEM were used.

Initial analyses revealed no effects of parent gender on any variable, nor age on any variable except pointing. This suggests mothers and fathers cue their toddlers in the same ways, and toddlers respond to mothers and fathers in the same ways, converging with evidence that mothers and fathers express explicit cues in similar way with their toddlers, such as belief and disbelief language (Hoicka and Butcher, in press). Parents were more likely to point with younger children than older children (under, over 21 months, 4 days, based on median split), $\chi^2(1) = 10.36$, $p = 0.013$, Odds-Ratio = 9.53, $p < .001$.

2.2.2. Parents' cues and children's responses

Fig. 1 gives the means and standard errors for parents' IDS. Fig. 2 gives the means and standard errors for parents' and children's smiles. Fig. 3 gives the means and standard errors for parents' and children's gaze to objects and each other. Fig. 4 gives the means and standard errors for parents' communicative-referential combinations.

Table 3 shows which model best explains the data for each dependent variable. Out of 43 trials, parents pointed on 18 of the Joke trials, 17 of the Pretend trials, 16 of the Positive Literal trials, and 23 of the Neutral Literal trials. None of the hypotheses improved the LMEM for pointing, nor were there any significant interactions with age, all $p > .05$.

Table 3 shows parents increased their use of communicative cues (smiling, exaggerated IDS) to express positive emotion (H_1). In contrast, parents did not use any other cues or cue combinations to signal positive emotion, attention grabbing, or pedagogy. These results thus partially replicate the findings of the Action Study at a later stage of development, albeit, less strongly.

Table 3

GORIC values of each model for all parental cues, parents' communicative-referential combinations, and children's engagement in Study 2. Numbers in bold indicate best models. IDS = Infant-Directed Speech.

	N	Unrestricted H_0	Emotion H_1	Attention Pretend		Pedagogy Pretend	
				=Joke H_2	=Literal H_3	=Joke H_4	=Literal H_5
Parents							
Gaze to child	43	1190.42	1198.42	1190.68	1201.19	1201.42	1201.42
Smiles	43	408.68	408.45	411.25	420.28	423.23	423.24
IDS	23	266.33	263.12	265.44	263.42	267.78	267.78
Gaze to objects	43	915.92	931.03	931.04	931.03	919.27	930.98
Communicative -> Referential	42	1117.79	1119.78	1120.04	1123.78	1128.96	1128.96
Children							
Gaze to parent	43	145.96	157.54	157.38	157.54	157.54	148.03
Smile	43	378.51	377.35	406.28	408.39	408.70	408.70
Gaze to objects	43	1158.99	1197.91	1197.23	1167.32	1197.99	1197.99

Table 4

Observed frequencies and expected frequencies (brackets) of toddlers' behavior types following parents' behavior types within 3 s, across all participants and conditions in Study 2.

	Follows within 3 s	
	Child	
	Smile	Cease smiling
Parent		
Smile	162 (138)	246 (270)
Cease smiling	180 (195)	398 (383)
Exaggerated IDS	19 (24)	51 (46)
Understated IDS	16 (21)	45 (40)

Table 3 shows children also increased smiling during emotionally positive contexts (H_1). No other results were explained by the main theories.

This study suggests parents and children used some communicative cues (smiling, IDS) to express positive emotion, but otherwise, they did not use any cues to grab attention or for pedagogical purposes. This suggests that at this slightly later stage of development, parents no longer rely on subtle cues to distinguish literal from non-literal, or joking from pretending.

2.2.3. Parent–child interactions

In order to more closely examine how parents' cues predicted children's behaviors, an LSA was run, as in Study 1. However, we only included parents' smiling and IDS, and children's smiling, as parents and children only used these behaviors to distinguish contexts. Table 4 shows all frequencies of each Behavior Type (e.g., Child Smile) following each Behavior Type (e.g., Parent Smile) within 3 s, across all participants and conditions. The distribution of behaviors in Table 4 was not significantly different than expected by chance, $\chi^2(8) = 11.14$, $p > .05$. Therefore we did not follow up to determine transitional probabilities or ARs. Table 4 suggests children's smiling was not influenced by parents' smiling or IDS.

3. General discussion

3.1. Parents' cues: positive emotion, attention grabbing, or pedagogy

Parents acted out Joke, Pretend, Positive Literal, and Neutral Literal scenarios, which were action based (Study 1, 16- to 20-month-old toddlers), or verbally based (Study 2, 20- to 24-month-olds). Our first goal was to determine (1) whether parents distinguish joke, pretend, and literal contexts using communicative and referential cues, as well as communicative-referential combinations, and (2) whether this was because they were expressing increased positive emotion, bidding for attention (perhaps to scaffold a difficult concept), or to discourage children from generalizing false information. We found that parents differentiated cues for all three reasons.

The best models to explain our data suggested parents (both mothers and fathers) exaggerated IDS across both studies to express increased positive emotion. That is, parents exaggerated IDS more in joke, pretend, and play contexts than in neutral contexts. Parents (both mothers and fathers) also increased smiling in the Verbal Study to express increased positive emotion. Finally, parents increased their use of communicative-referential combinations in the Action Study for the same purpose. This suggests past research finding increases in IDS or smiling when parents joked or pretended with their toddlers may have been due to non-literal situations which were more emotionally positive than the controls (Hoicka and Gattis, 2012; Lillard et al., 2007; Mireault et al., 2012; Reissland and Snow, 1996). This converges with several other studies interpreting IDS and smiling as emotionally positive in nature (Darwin, 1955; Ekman and Rosenberg, 2005; Singh et al., 2002; Werker and McLeod, 1989). It is interesting that increased positive emotion also explained communicative-referential combinations in the Action Study. This goes against what pedagogy theory might predict, as pedagogy theory suggests these cues are about expressing that information should be learnt and generalized (Csibra and Gergely, 2006), not that people are happy. However, perhaps, as we shall see later, referential cues are more central to pedagogy and learning itself, and any additional communicative cues might be related to emotion.

However, emotion did not explain all parental cues. In the Action Study, parents increased their gaze to children and smiling in joke contexts versus all other contexts. This suggests parents bided for attention to scaffold children's understanding of intentions to joke. Smiling could help signal to toddlers that the anomalous information contained within the jokes was meant to be enjoyable. An alternative reason that parents may have increased smiling in past research could therefore be to scaffold infants' understanding of jokes (Mireault et al., 2012). Gazing to the child could grab toddlers'

attention to ensure that they then learned other information about jokes. For instance, when parents joke with their 16- to 20-month-olds, parents also increase their use of disbelief language compared to when they pretend or play literally (Hoicka and Butcher, *in press*). For example, after “drinking” with their elbow, they may say, “That’s not how you’re supposed to drink.” By gazing more often to the child, this might grab children’s attention to allow them to attend to any other information which may help toddlers understand the joke.

Interestingly, in the Action Study, parents decreased their gaze to objects, a referential cue, when joking, compared to all other conditions. This converges with pedagogy theory, as referential cues are meant to express that information should be learnt and generalized (Csibra and Gergely, 2006). Parents may be keen for their toddlers to avoid learning and generalizing information contained in jokes, so reducing this cue makes sense. In particular, if parents avoid looking at objects, children might also avoid looking at them, and hence avoid learning the jokes as true. This converges with research finding parents repeat joke actions less often than pretend or literal actions when playing with their toddlers (Hoicka and Butcher, *in press*). By drawing less attention to objects, children may be less likely to believe that the information contained within a joke is true and generalizable.

Not all cues were explained by the above hypotheses. Neither study found parents used pointing to distinguish contexts. This was likely due to the very low numbers of points that parents used. Perhaps when objects are close to hand, pointing is unnecessary. Additionally, in the Verbal Study, parents showed no differences across conditions for gaze to children or objects, or communicative-referential combinations. Altogether, the results show an interesting developmental pattern across the two studies when it comes to parental cues. In the Action Study, parents gave ample support to distinguish joke contexts from all others, through gaze to children and objects, as well as smiling. However, in Study 2, parents never distinguished intentional contexts. This could be for two reasons. First, children in Study 2 were older, and so parents may not have thought that children needed additional support to understand joking or pretending. Therefore cues may only be used for younger children. However, parents of 20- to 24-month-olds do express more disbelief than belief through their language and actions when joking versus pretending, and when pretending versus playing literally (Hoicka and Butcher, *in press*), suggesting support is given. A second possibility is that parents feel older toddlers understand explicit cues, such as disbelief language, better. Therefore they may no longer feel the need to use low-level cues to help their toddlers understand jokes. Indeed, while 20- to 24-month-olds respond appropriately to parents’ disbelief language, 16- to 20-month-olds do not (Hoicka and Butcher, *in press*). Therefore younger toddlers may need lower-level cues to support their understanding of jokes more than older toddlers.

3.2. Parents’ cues: joking versus pretending

The Action Study found parents increased their communicative cues and decreased their referential cues, when joking compared to all other contexts, including pretending. This suggests pretending was viewed more as literal than joking. In particular, during joke versus pretend and literal contexts, parents gazed to children and smiled more, but gazed to objects less. This converges with evidence that pretending is seen as normative, and is a useful context for children to learn generalizable information (Hoicka and Martin, *in press*; Hopkins et al., 2015; Rakoczy, 2008; Sutherland and Friedman, 2012, 2013; Weisberg and Gopnik, 2013; Wyman et al., 2009). Therefore parents may not view pretending and literal acts as different. Indeed, while pretend acts technically violate norms (e.g., we do not normally drink nothing), within our imaginations, the acts follow norms (Nichols and Stich, 2003). In contrast, joking is seen as violating norms (Hoicka and Gattis, 2008; Hoicka et al., 2008), and both parents and children reject information contained in jokes (Hoicka and Butcher, *in press*; Hoicka et al., 2015; Hoicka and Martin, *in press*). For instance, 3- and 4-year-olds will learn new words from a sincere speaker over someone who gives cues they are joking, even if they have never encountered either person before, and have no other information about the speakers’ knowledge or competence (Hoicka et al., 2015). Furthermore, although humor enhances learning in 18-month-olds, toddlers in this study learned the literal action, not the joke (Esseily et al., *in press*). The current study shows parents support this distinction with 16- to 20-month-olds through communicative and referential cues.

In contrast, the Verbal Study found no distinctions across intentional contexts. As discussed previously, parents may not feel they need to support older toddlers in distinguishing these contexts. However, previous research finds that parents do distinguish these contexts with explicit language and action based cues, to which older toddlers respond (Hoicka and Butcher, *in press*). Therefore it is more likely that because older toddlers are more responsive to verbal feedback (Hoicka and Butcher, *in press*), parents may no longer feel the need to guide their toddlers’ attention with lower-level cues when teaching them about abstract concepts.

3.3. Children’s responses

Our third goal was to determine whether children distinguish contexts, and whether parents’ communicative and referential cues guide toddlers to do so. Both studies found children smile more during emotionally positive contexts. That

is, they smiled more in all contexts except the neutral ones, whether they were with their mother or father. This converges with research that smiling expresses positive emotion (Darwin, 1955; Ekman and Rosenberg, 2005). Additionally, the Action Study suggests children, like parents, are more likely to gaze to parents, and less likely to gaze to objects, during joke contexts versus all other contexts. Therefore parents successfully bid for social attention when joking, suggesting children may have an opportunity to, for instance, pay attention to disbelief language (Hoicka and Butcher, *in press*). Children may also be less likely to learn and generalize jokes as they attend less to objects, supporting the pedagogical view that parents decrease referential cues so that children are less likely to learn the misinformation inherent to jokes.

These findings also suggest children saw joking and pretending as different, with pretending being more akin to literal interactions. This extends research that children distinguish intentions to joke from sincere intentions, and intentions to pretend from sincere intentions. For instance, experimental evidence suggests toddlers distinguish jokes and mistakes from 25 months (Hoicka and Gattis, 2008; Hoicka and Akhtar, 2011), and distinguish pretending from trying from 3 years (Rakoczy et al., 2004). Furthermore, 18- to 24-month-olds are more likely to laugh when being read a humorous versus literal book (Hoicka et al., 2008). This also converges with research showing 16- to 24-month-olds distinguish joking and pretending through explicit cues, including actions and language (Hoicka and Butcher, *in press*), and experimental research showing 2-year-olds are more likely to object to joking than pretending (Hoicka and Martin, *in press*).

Parental support helped children distinguish emotional and intentional contexts in the Action Study. Parents' gaze to children increased children's gaze to parents. Similarly, parents' gaze to objects increased children's gaze to objects. Additionally, parents' smiling decreased children's gaze to objects, while when parents ceased to smile, this decreased children's gaze to parents. Furthermore, children smiled more after parents smiled, and less when parents ceased to smile. Given that parental cues predicted children's communicative and referential responses, the ability to distinguish these contexts appears to be directly related to parental cues. This converges with research that parents' explicit cues, such as belief and disbelief language and actions, help toddlers distinguish joke, pretend, and literal contexts (Hoicka and Butcher, *in press*). This research also converges with evidence that parents' cues help children learn in other contexts. Toddlers whose parents provide more pretense cues at 18 months better understand adults' pretend actions at 24 months (Nakamichi, 2015). Toddlers speak more when parents produce more disbelief language during book reading (Hoicka et al., 2008). Finally, infants are more likely to laugh or re-produce strange actions when parents laugh (Mireault et al., 2012; Reddy, 2001), and are more likely to continue smiling at a joke when parents smile (Mireault et al., 2014, 2015).

However, in the Verbal Study, children, like parents, did not distinguish intentional contexts. Additionally, parental cues did not guide toddlers' responses. One possibility is that children in the Verbal Study were incapable of distinguishing contexts. However, the Action Study, where toddlers were even younger, suggests otherwise. A second possibility is that this demonstrates a developmental shift from the middle to the end of the second year. While older 1-year-olds in the Verbal Study did not distinguish intentional contexts or respond to parental cues, Hoicka and Butcher (*in press*) found older toddlers distinguished joke, pretend, and literal contexts through explicit parental cues, such as belief and disbelief language and actions. Therefore low-level cues, such as gaze and smiling, may only work for younger toddlers, who have more limited action and language understanding than older toddlers (Fenson et al., 1994; Hamilton et al., 2000). Toddlers may transition to focussing on more content-related cues as they get older, for which they may not need their parents' more subtle guidance to help them attend.

3.4. Pedagogy theory

According to pedagogy theory, parents use communicative cues to express that information should be learnt and generalized, and young children interpret these cues appropriately (Csibra and Gergely, 2006). However, the present studies found parents exaggerated communicative cues to express positive emotion, or to grab attention during joke intentional contexts, which contain information that should not be generalized. This creates a conundrum. If parents use these cues to signal both generalizable and non-generalizable contexts, how can toddlers make sense of them? And why would parents exaggerate these cues in non-literal contexts if it meant young children would generalize non-literal information, in particular jokes? The results of these studies suggest an alternative interpretation for the use of communicative cues. Instead, parents may use these cues when information is difficult, rather than when it is novel and generalizable *per se*, in order to give more social support to help their child through the situation. This interpretation makes sense for both non-literal information and novel generalizable information. Joking could be difficult for children to understand, requiring parents to gain their attention to scaffold supporting information (e.g., disbelief statements). Similarly, novel generalizable information could also be difficult for children to understand, requiring parents to gain children's attention to scaffold a different type of supporting information. The supporting information could be, for instance, the use of generic language, such as, "Dogs bark" (versus "This dog barks.") (Cimpian and

Markman, 2008; Gelman and Bloom, 2007). This interpretation is leant further support from research finding intentional cues helped 3-year-olds learn where an object was located, while communicative cues did not (Moore et al., 2013), suggesting communicative cues may not be the key to learning and generalizing information as much as content-rich cues are.

Perhaps the main focus of pedagogy theory should be referential cues. According to pedagogy theory, parents also use these cues when they want their children to learn and generalize information (Csibra and Gergely, 2006). In the current studies, parents were less likely to use referential cues to express non-literal versus literal information, in particular, joking versus all other contexts. One reason for this could be that parents did not want children to attend too much to the objects when joking because they did not want them to learn and generalize the information.

Finally, the individual communicative and referential cues may not be as important as the cue combinations. However, in the Action Study, parents increased the use of communicative-referential combinations to express positive emotion, rather than decreasing these combinations during joke contexts. Therefore it seems more likely that the referential cues alone are important to pedagogy, not the combination of cues.

4. Conclusion

The current studies found parents express communicative and referential cues for a variety of reasons. Parents consistently exaggerated IDS to express positive emotion, and increased smiling for the same reason in the Verbal Study. Therefore past research which found that parents increase these cues when joking or pretending may be explained by the joke and pretend situations being more emotionally positive than their controls. In the Action study, parents also increased their gaze to children and smiling, but decreased their gaze to objects, during the joke contexts. This suggests parents used communicative cues to grab toddlers' attention, perhaps to explain the jokes, but decreased referential cues so that children would avoid generalizing the misinformation inherent to jokes. Toddlers in the Action Study responded to parental cues, allowing them to distinguish emotional and intentional contexts in the same way as parents. This supports the idea that communicative and referential cues provide a low-level mechanism to guide toddlers' attention in order to learn about jokes, while also avoiding generalizing information from jokes. However these findings were not replicated in the Verbal Study, suggesting perhaps low-level cues were no longer appropriate for older toddlers who can better understand language and action based cues.

Acknowledgments

This research was supported by an ESRC small research grant RES-000-22-3888, and a British Academy small research grant SG-54221, both awarded to Elena Hoicka. I would like to thank parents and toddlers for participating, Jessica Butcher for running and coding the studies, and Claire Beattie, Angela Rodgers, and Amy Goode for help collecting and coding data. I would also like to thank Richard Moore on very helpful feedback on a previous version of the manuscript.

Appendix A

Counterbalancing of Study 1 – the Action Study.

	Trial			
	1	2	3	4
Order				
1	Joke <i>Washing</i>	Neutral <i>Eating</i>	Positive <i>Dressing</i>	Pretend <i>Coloring</i>
2	Neutral <i>Washing</i>	Pretend <i>Eating</i>	Joke <i>Dressing</i>	Positive <i>Coloring</i>
3	Positive <i>Washing</i>	Joke <i>Eating</i>	Pretend <i>Dressing</i>	Neutral <i>Coloring</i>
4	Pretend <i>Washing</i>	Positive <i>Eating</i>	Neutral <i>Dressing</i>	Joke <i>Coloring</i>
5	Joke <i>Eating</i>	Neutral <i>Coloring</i>	Positive <i>Washing</i>	Pretend <i>Dressing</i>
6	Neutral <i>Eating</i>	Pretend <i>Coloring</i>	Joke <i>Washing</i>	Positive <i>Dressing</i>
7	Positive <i>Eating</i>	Joke <i>Coloring</i>	Pretend <i>Washing</i>	Neutral <i>Dressing</i>

Appendix A (Continued)

	Trial			
	1	2	3	4
8	Pretend	Positive	Neutral	Joke
9	<i>Eating</i>	<i>Coloring</i>	<i>Washing</i>	<i>Dressing</i>
	Joke	Neutral	Positive	Pretend
10	<i>Dressing</i>	<i>Washing</i>	<i>Coloring</i>	<i>Eating</i>
	Neutral	Pretend	Joke	Positive
11	<i>Dressing</i>	<i>Washing</i>	<i>Coloring</i>	<i>Eating</i>
	Positive	Joke	Pretend	Neutral
12	<i>Dressing</i>	<i>Washing</i>	<i>Coloring</i>	<i>Eating</i>
	Pretend	Positive	Neutral	Joke
13	<i>Dressing</i>	<i>Washing</i>	<i>Coloring</i>	<i>Eating</i>
	Joke	Neutral	Positive	Pretend
14	<i>Coloring</i>	<i>Dressing</i>	<i>Eating</i>	<i>Washing</i>
	Neutral	Pretend	Joke	Positive
15	<i>Coloring</i>	<i>Dressing</i>	<i>Eating</i>	<i>Washing</i>
	Positive	Joke	Pretend	Neutral
16	<i>Coloring</i>	<i>Dressing</i>	<i>Eating</i>	<i>Washing</i>
	Pretend	Positive	Neutral	Joke
	<i>Coloring</i>	<i>Dressing</i>	<i>Eating</i>	<i>Washing</i>

Neutral = Neutral Literal; Positive = Positive Literal.

Appendix B

Target sentences and actions across conditions.

Set	Target Sentence	Target Action & Objects			
		Neutral Literal	Positive Literal	Pretend	Joke
Washing	I'm squeezing out the soap	Squeeze plain bottle of liquid soap	Squeeze sparkly bottle of liquid soap	Squeeze empty plain bottle	Squeeze plain bottle of liquid soap with elbows
	I'm washing my hands	Wash hands in bucket of water	Wash hands in bucket of foamy water	Pretend to wash hands in empty bucket	Put foam on own nose from bucket of soapy water
	I'm drying my hands	Dry hands with plain towel	Dry hands with colorful towel	Pretend to dry hands with plain towel	Rub plain towel on own head
Eating	I'm going to eat this	Eat some rice cake pieces from plate	Eat some cookies from plate	Pretend to eat from plate	Put rice cake pieces on plate on own forehead
	I'm pouring myself a drink	Pour water from bottle into cup	Pour orange drink from bottle into cup	Pretend to pour a drink from empty bottle to empty cup	Hold bottle of water over own head
	I'm going to have a drink	Take a sip from cup of water	Take a sip from cup of orange drink	Pretend to have a sip from empty cup	Put cup of water to elbow
Dressing	I'm putting the hat on my head	Put plain hat on own head	Put colorful fun hat on own head	Put sponge on own head	Put plain hat under own arm
	I'm putting the scarf around my neck	Put plain scarf around own neck	Put boa scarf around own neck	Put rubber tube around own neck	Put plain scarf on top of own head
	I'm putting the gloves on my hands	Put plain glove on own hand	Put colorful fun glove on own hand	Put plastic wallet on own hand	Put plain glove on own elbow
Coloring	Here are some crayons	Pick up black crayons from table	Pick up colorful crayons from table	Pick stick up from table	Hold black crayon with elbow
	This is how you color	Coloring with black crayons on white paper with one big shape	Coloring with colorful crayons on colored paper with lots of shapes	Pretend to color with stick on white paper with one big shape	Put white paper with one big shape on own head and color with black crayons
	I'm coloring in the shape	Coloring in one big shape with black crayons	Coloring in shapes with colorful crayons	Pretend to color in one big shape with stick on white paper	Put crayon on own nose

Appendix C

Counterbalancing of Study 2 – the Verbal Study.

Order	Block			
	1	2	3	4
1	Joke Set 1	Neutral Set 2	Positive Set 3	Pretend Set 4
2	Neutral Set 1	Pretend Set 2	Joke Set 3	Positive Set 4
3	Positive Set 1	Joke Set 2	Pretend Set 3	Neutral Set 4
4	Pretend Set 1	Positive Set 2	Neutral Set 3	Joke Set 4
5	Joke Set 4	Neutral Set 3	Positive Set 2	Pretend Set 1
6	Neutral Set 4	Pretend Set 3	Joke Set 2	Positive Set 1
7	Positive Set 4	Joke Set 3	Pretend Set 2	Neutral Set 1
8	Pretend Set 4	Positive Set 3	Neutral Set 2	Joke Set 1

Neutral = Neutral Literal; Positive = Positive Literal.

Appendix D

Target sentences and objects across conditions.

Set	Target Sentence	Literal object (positive/neutral)	Pretend object	Joke object
1	This is a horse	Horse	Round block	Coat
	This is a hat	Hat	Bath scrub	Chicken
	This is a train	Train	Scrunchy hairband	Plate
	This is a spoon	Spoon	Square block	Airplane
2	This is a cow	Cow	Round block	Coat
	This is a shoe	Shoe	Bath scrub	Chicken
	This is a boat	Boat	Scrunchy hairband	Plate
	This is a fork	Fork	Square block	Airplane
3	This is a dog	Dog	Round block	Coat
	This is a bib	Bib	Bath scrub	Chicken
	This is a bus	Bus	Scrunchy hairband	Plate
	This is a cup	Cup	Square block	Airplane
4	This is a pig	Pig	Round block	Coat
	This is a sock	Sock	Bath scrub	Chicken
	This is a car	Car	Scrunchy hairband	Plate
	This is a bowl	Bowl	Square block	Airplane

Appendix E. Supplementary data

Supplementary data associated with this article can be found, in the online version, at [doi:10.1016/j.pragma.2015.10.010](https://doi.org/10.1016/j.pragma.2015.10.010).

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