

Verbal encouragement and joint attention in 18-month-old infants

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Abstract

The effects of three different attention-directing actions toward familiar and unfamiliar objects on 18-month-olds' frequency of establishing and maintaining episodes of joint attention were examined. The results demonstrated that the addition of verbal information to gestures promoted longer but not more episodes of joint attention. The results also indicated that adults' verbal encouragements were particularly effective in promoting joint attention when the infant was unfamiliar with the target object. The results are discussed in terms of the role different gestures play in the promotion and continuation of joint attention in infancy.

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One of the major milestones in early communicative development is the emergence of shared or joint attention between an adult, infant, and some object or event. The ability to participate in joint attention typically emerges between 9- and 12-months of age (Adamson & Bakeman, 1991; Butterworth & Cochran, 1980; Butterworth & Jarett, 1991; Corkum & Moore, 1998). The development of coordinated looking, or joint visual attention, is significant because it is related to early language development (Baldwin, 1993, 1995; Dunham, Dunham, & Curwin, 1993; Tomasello & Farrar, 1986). The emergence of joint attention is also important for the development of intersubjectivity and the ability to infer the intentions of others (Baron-Cohen, 1995; Tomasello, 1995; Trevarthen & Hubley, 1978). Difficulty in establishing joint visual attention appears to be one characteristic of autism (Mundy, Sigman, & Kasari, 1990). While much is known regarding the developmental significance of joint attention, less is known about

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those factors that promote infants' participation in these social exchanges. In particular, little is known about how young infants begin to use information other than ostensive gestures such as pointing and direction of gaze in establishing joint attention. The purpose of the current experiment was to examine how other sources of information specifically verbal information used in isolation, and concurrently with various physical actions, promote joint attention.

Given the significance of joint attention in terms of early social and communicative development, it is important to understand how adults' actions promote joint attention. It is well documented that between 3 and 6 months of age, infants are sensitive to deviations in adults' direction of gaze and contingent head motion (Caron, Caron, Roberts, & Brooks, 1997; Corkum & Moore, 1995; D'Entremont, Hains, & Muir, 1997; Hains & Muir, 1996; Hood, Willen, & Driver, 1998; Symons, Hains, & Muir, 1998). Between 6 and 12 months of age infants begin to establish joint attention by looking in the same direction as the adult, given actions by the adult such as (1) changes in eye-gaze coupled with a head turn and (2) changes in gaze paired with a pointing gesture (Butterworth & Cochran, 1980; Butterworth & Grover, 1988; Butterworth & Jarett, 1991; Collis, 1977; Deák, Flom, & Pick, 2000; Lempers, 1979; Morrisette, Ricard, & Gouin Dècaire, 1995; Murphy & Messer, 1977; Scaife & Bruner, 1975). As the adult's action becomes more expansive in terms of redundantly specifying the adult's focus of attention (e.g., looking and pointing compared to looking alone) infants' frequency of establishing joint attention increases (e.g., Butterworth & Grover, 1988; Butterworth & Jarett, 1991; Deák et al., 2000; Morrisette et al., 1995). While researchers have examined the effects of various physical gestures on infants' participation in episodes of joint attention, less is known about the effects of adults' verbalizations on participation in joint attention.

The significance of investigating adults' verbalizations and children's participation in these social exchanges is that joint attention, in a more fully developed form, involves more than episodes of coordinated looking between the adult and child to a specific object or event. Joint attention involves, to a degree, a level of shared understanding or shared awareness regarding some object or event. In the words of Bruner (1995), joint attention in its most fully developed form represents a "meeting of minds" (p. 6). Thus physical actions such as pointing and looking at some object of attention go a long way in promoting joint attention; nonetheless, physical actions are limited in terms of their accuracy or specificity of reference (e.g., Quine, 1960). As such, verbalizations eventually come to be a powerful source of information, and possibly provide new information regarding the object of shared attention; this is particularly true when the object of attention is not directly observable to one or both of the participants (Butterworth & Jarett, 1991). Therefore, given that joint attention comes to involve more than coordinated looking it is necessary to examine how language may help direct and or maintain infants' focus of attention. The purpose of the current experiment was to examine how adult verbalizations presented independently and also concurrently with physical gestures, such as looking and pointing, promote joint attention.

While few researchers have pursued the question of how verbal information, provided by an adult, serves to refocus the attention of a young child, the research that has been completed provides some inconsistent results and is often examined in the context of establishing word-object relations compared to examining the development and establishment of joint attention. For instance, Baldwin and Markman (1989) compared how long 10–14-month-olds and 17–20-month-olds looked at an unfamiliar object after an adult looked and pointed toward

the object compared to a circumstance in which the adult looked, pointed, and verbally described (i.e., labeled) the object. They found that infants, at both ages, looked longer at the unfamiliar object when the labeling accompanied gesture. They argued that the addition of verbal information promotes infants' sustained attention toward a novel or unfamiliar object. In a similar experiment, however, Deák et al. (2000) failed to find a reliable difference in 18-month-olds' frequency of joint attention when the object of joint attention was looked at and pointed toward by an adult compared to when the adult, looked, pointed, and verbally encouraged the infant to look at the object.

One possible explanation for the inconsistent results concerns the nature of the dependent variable of these experiments. Deák et al. (2000) examined different attention-directing gestures in terms of infants' ability to establish joint attention, i.e., infant made "x" correct looks toward the target, whereas Baldwin and Markman (1989) examined the effect of different actions on infants' duration of time spent looking toward the object of joint attention. The methodological difference in these two studies is important because certain physical gestures or behaviors, such as looking and pointing by the adult, may promote more frequent episodes of joint attention, i.e., "correct hits"; and the addition of verbal information may promote a longer or more sustained episode of joint attention. Unfortunately, the objects of joint attention used in Deák et al. (2000) did not have a clear verbal referent because they were irregularly shaped and multicolored polygons; thus one could not explicitly examine the effects of verbal information in terms of establishing joint attention. In the case of Baldwin and Markman (1989): (1) the children were unfamiliar with the objects and their verbal referent; and (2) joint attention was established prior to labeling the object; therefore in that experiment it was not possible to determine whether verbal information serves only to maintain instances of joint attention that have already been initiated or whether children younger than 14 months of age can use the addition of verbal information to elicit more instances of joint attention. One hypothesis generated by these two experiments is that verbal information promotes the sustaining of joint attention rather than serving as an "indicator" of another person's focus of attention (cf. Bruner, 1995). If this hypothesis is correct, then it might shed light on why infants in Deák et al. (2000) failed to establish more instances of joint visual attention when the adult added verbal information to their looking and pointing behaviors. Still, at some point in development, verbal information alone should elicit engagement in joint attention, e.g., "look at the book."

In the current experiment we compared the effects of verbalizations in *initiating* episodes of joint attention, as well in *maintaining* episodes of joint attention both with and without the action of looking and pointing. The set of target objects included both objects with which the children were familiar and novel objects for which the children did not have a verbal referent. Children participated in one of three conditions: (1) verbal information alone, (2) looking and pointing, and (3) looking, pointing, and verbal encouragement, in order to assess under what circumstances verbal information promotes and/or maintains episodes of joint attention and how these three different "action" conditions differ as a function of the child's familiarity with the target and its verbal referent. We selected 18-month-olds because it is well documented that they are able to establish joint attention in a wide variety of circumstances (targets can even be placed outside their visual field, e.g., Butterworth & Cochran, 1980; Butterworth & Jarett, 1991) and can use a variety of clues to determine the object of another person's focus of visual attention.

1. Method

1.1. Participants

Sixty 18-month-olds (31 females) and parents participated. The mean age was 18 months and 10 days (range: 18 months and 19 days to 17 months and 21 days). Five additional infants were excluded due to fussiness and two additional infants were excluded due to experimenter error. Infants were recruited from a database maintained at the university and were primarily Caucasian and middle-class. Parents were initially contacted by telephone.

1.2. Apparatus and objects

In an effort to reduce visual distractions, the experiment was conducted in a room in which white sheets were hung around the perimeter of the room, extending from the ceiling to the floor. The space within the white sheets measured 4.4 m \times 3.2 m. The infant was seated in a booster chair in the center of the room. The parent's chair faced the infant seat. The seats were situated so that the infants and parents' eyes were at the same height.

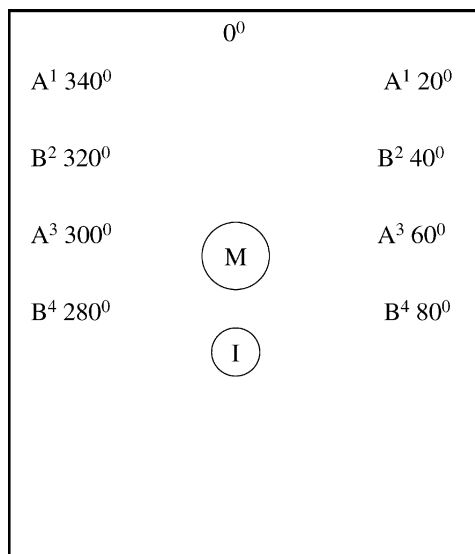
From a list of 16 objects one of the infant's parents identified eight objects as possible target objects for his or her infant (see [Appendix A](#) for the list of target objects). Four objects were identified as "familiar," meaning the infant had this object at home, and the infant comprehended the label for it. Four objects were identified as "unfamiliar," meaning the infant had limited, or no exposure to the object and did not know its label or name.

During each trial four objects were presented to the infant on a set of stands. On each trial two of the four objects were familiar and two were unfamiliar. Each stand had a peg that protruded through small holes cut in the sheets. Infant's behavior was recorded from three video cameras. One camera was mounted above the parent and infant, providing a top-down or bird's-eye perspective. The two remaining cameras, not visible to the infant, were placed behind the curtains to the left and to the right of the infant. The three camera signals were combined into one video output by a video mixer and a digital stopwatch was also electronically printed onto the videotape.

1.3. Design and setting

Object location and target object type were varied within subjects. Eight unique target object locations were divided into two different target configurations. In configuration A, objects were located at 20° and 60° to the right *and* left of the infant's midline. In configuration B the objects were located at 40° and 80° to the right *and* left of the infant's midline. The two different target object configurations were used to reduce the possibility that infants might be conditioned or somehow biased to look toward a previous location. Each infant completed eight trials; one for each of the four locations within the two target configurations (see [Fig. 1](#)).

Target configuration (A or B) and target object familiarity (familiar or unfamiliar) for each trial was randomized across infants. The objects in each trial consisted of two familiar and two unfamiliar objects. On each trial the target object was placed at one of the four target locations within the configuration, and distractor objects were placed at the remaining three



4 Trials at Configuration A (Pairs 1 & 3)

4 Trials at Configuration B (Pairs 2 & 4)

Fig. 1. Layout of target configurations.

target locations. Thus if the target object was one of the familiar objects, then two of the three distractors were unfamiliar and the remaining distractor was familiar. Similarly if the target object for a particular trial was unfamiliar then two distractors were familiar and one distractor was unfamiliar. While presentation of a familiar or unfamiliar object as the target object was randomized, we did impose the constraint that infants were not to complete more than two trials in a row with a familiar or unfamiliar target object. Similarly infants were not to complete more than two consecutive trials within a particular target configuration. The objects and infant were separated by approximately 1.25 M. Attention-directing behavior was varied between subjects. Infants were randomly assigned to one of three different attention-directing conditions (i.e., verbalizing alone; looking and pointing; looking, pointing, and verbalizing). In the verbalizing-only condition parents were asked to provide only verbal information about one of the targets and were asked not to look or point toward the target object. This verbal information could include a description of the object's function, properties of the object, and the object's label. In the look and point condition parents turned to look and pointed toward the target object while remaining silent. In the looking, pointing and verbalizing condition, parents looked, pointed and verbally encouraged their infant to look at the target object.

1.4. Procedure

The purpose of the experiment and the procedure were explained to the parents upon their arrival at the laboratory. The parents were instructed as to how they were to redirect their

infants' focus of attention. Before each trial began the experimenter informed the parent of the correct target location. The parent then called the child by name until the child looked toward their parent. The experimenter then signaled the parent to begin cueing the infant to look toward the designated target. The experimenter did not begin a trial until the infant and the parent had established eye contact. Each trial lasted 15 s from either the parent's first head turn or verbalization regarding the target object.

1.5. Coding

Two dependent variables were coded for each infant. The first dependent variable was the infant's frequency of looking to the target object. This was coded by measuring the degree of the infant's head orientation in relation to the target object. The infant's head orientation was recorded by using the overhead camera and then by using a plastic disc that was marked with 10° increments and was mounted on the video monitor. The center of the disc was oriented over the top of the infant's head where 0° corresponded to the infant's midline when the infant looked straight ahead at the parent. The infant's head orientation was then measured for each fixation (>0.5 s) within each trial. Each fixation within 15° of the designated target was coded as a "hit." Previous research in our lab (e.g., [Deák et al., 2000](#)) demonstrates that 12- and 18-month-olds' average visual fixations toward a target object is 13° (SD = 7°) and given that nearest distractor object and target are separated by 40°, we wanted to select a fixation range that does not overlap with any of the distractor objects as such 15° is a reasonable criterion.

The second dependent variable was the proportion of time each infant looked toward the target object, hereafter referred to as PTLT. This was accomplished by using the imprinted stopwatch and recording the amount of time each infant looked toward the correct target object on each trial divided by the total duration of the infant's looking to the target object and the other objects. Thus we calculated a mean proportion of total looking time (PTLT) to the correct target object across all eight trials for each infant. A second observer, blind to experimental hypotheses, recoded 25% of the final sample (i.e., 15 infants) to assess observer reliability. Interobserver reliability for the duration of looking to the target was 0.91. A [Cohen's \(1960\)](#) kappa was used for the frequency of joint visual attention. Kappa for the infants' frequency of looking toward the correct target was 0.86.

2. Results

The two dependent variables infants' frequency of establishing joint attention, expressed as a difference score, and the proportion of time infants engaged in joint attention are presented in [Figs. 2 and 3](#), respectively. The total number of correct looks across conditions of attention-directing action and target familiarity is shown in [Fig. 2](#). Infants' proportion of time spent in joint attention (PTLT) across conditions of attention-directing action and target familiarity is shown in [Fig. 3](#). The hypothesis of the current experiment (based on the results of [Deák et al., 2000](#) and those of [Baldwin & Markman, 1989](#)) was that the addition of the verbal encouragement, to the parents' looking and pointing action would increase the

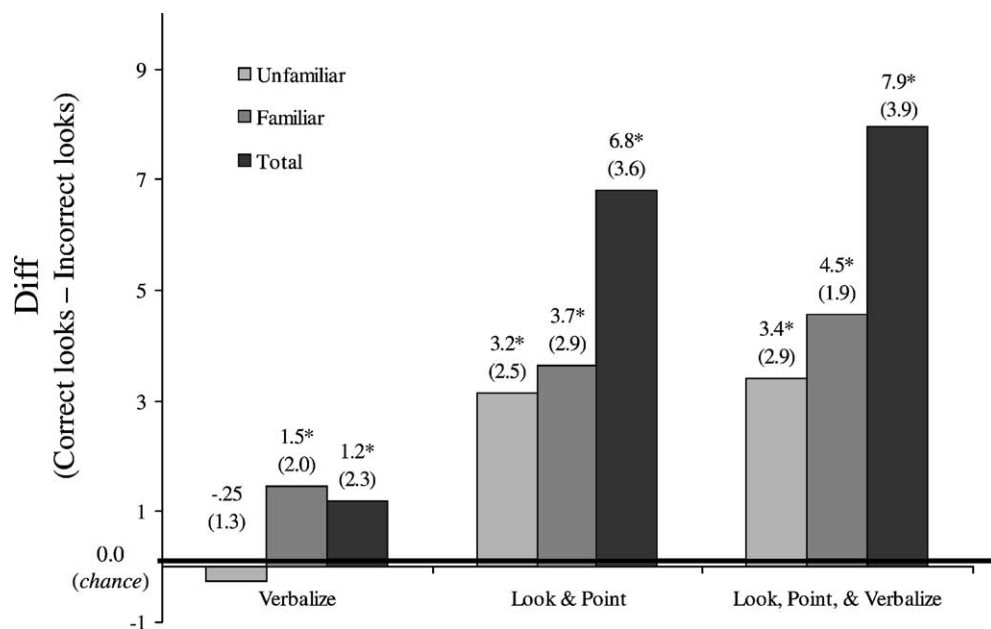
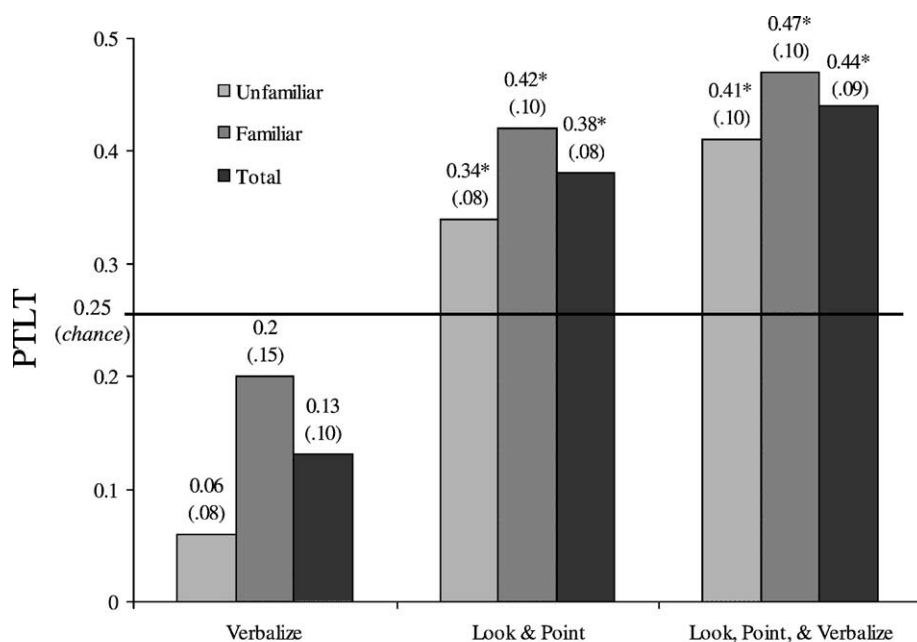


Fig. 2. Mean (SD) frequency of joint attention as a function of adult activity and target object familiarity.



* $p < .01$

Fig. 3. Mean (SD) proportion of total looking time (PTLT) to the intended referent as a function of adult activity and target object familiarity.

proportion of time infants engaged in joint attention but not infants' frequency of establishing joint attention.

2.1. *Infants' frequency of joint attention*

Infants' frequency of establishing joint attention was converted into a difference score by subtracting the average number of looks directed to the other objects from the number of looks the infant directed toward the target object. In other words we divided the total number of looks to distractor objects by three and subtracted this value from the total number of looks the infant directed toward the target object. Thus positive difference scores indicate a greater frequency of looking to the target object than to the other three objects; negative difference scores indicate more looking to objects other than the target object; and a difference score of zero, i.e., chance looking, represents equivalent looking to the target object and to the other objects. Infants' looking (i.e., difference scores) to the correct target as a function of adult activity and target familiarity is presented in Fig. 2.

Infants' frequency of establishing joint attention exceeded chance ($p < .05$) in all conditions except when the parent provided only verbal information about unfamiliar objects, e.g., "look at the pliers." This exception is not surprising; if, the child does not comprehend the adult's verbal referent, it is useless information for directing the infant's attention toward that object. More generally, though, the result demonstrates that 18-month-olds can use verbal information they comprehend to establish joint attention even in the absence of accompanying physical gestures.

In order to examine whether the addition of verbal information promoted an increase in infants' frequency of establishing joint attention, we entered infants' frequency of joint attention (difference score) into a 3 (action: verbalization alone, look and point, and look, point, and verbalize) \times 2 (familiarity: familiar, unfamiliar) repeated measures ANOVA, with target familiarity as the repeated measure and attention-directing behavior as the between subjects factor. Infants' frequency of joint attention significantly differed across conditions of adult activity, $F(2, 57) = 23.5$, $p < .01$. Infants produced more correct looks to the target object when their parent looked and pointed ($M = 6.8$, $SD = 3.6$) compared to only verbally encouraging their child to look toward the target object ($M = 1.2$, $SD = 2.3$), $p < .01$. Critically, infants' frequency of joint attention did not differ reliably when the adult only looked and pointed ($M = 6.8$, $SD = 3.6$) from when the adult looked, pointed, and verbally encouraged their child ($M = 7.95$, $SD = 3.9$), $p > .1$. This replicates previous work of Deák et al. (2000), who similarly failed to find a reliable difference between their look and point condition and their look, point, and verbalize condition with 18-month-olds. Thus the addition of verbal behaviors to gestures, such as looking and pointing, does not reliably increase 18-month-olds' frequency of joint attention, even when the child and adult possess a shared meaning regarding the object and its verbal referent.

The effect of object familiarity and infants' frequency of establishing joint attention reliably differed across all conditions of adult action, $F(1, 57) = 7.4$, $p < .01$. Infants established more joint attention when the target object was familiar ($M = 3.2$; $SD = 2.6$) than when the target object was unfamiliar ($M = 2.1$, $SD = 2.8$). The interaction of gesture and familiarity did not reach significance, $p > .1$ and the within subjects factor of target configuration similarly did not reach significance, $p > .1$.

2.2. Infants' proportion of time spent in joint attention

While the addition of verbal information did not increase the frequency of joint attention when the parent was already looking and pointing toward the intended object, we also examined whether the addition of verbalizations affected the proportion of time infants engaged in joint attention. Chance looking to the correct target would be 0.25 given one target object and three distractor objects. Infants' proportion of looking to the correct target as a function of adult activity and target object familiarity is presented in Fig. 3.

As Fig. 3 indicates, infants' mean proportion of joint attention to the correct target in the looking and pointing condition ($M = 0.38$, $SD = 0.08$) differed reliably from chance ($t(19) = 7.75$, $p < .01$), as did infants' mean proportion of looking time in the look, point and verbally encourage condition ($M = 0.44$, $SD = 0.09$), $t(19) = 9.57$, $p < .01$. However, infants' mean proportion of looking to the target object in the verbalization alone condition ($M = 0.13$, $SD = 0.10$), averaged across both the familiar and unfamiliar objects, did not reliably differ from chance, $p > .1$.

In order to examine the hypothesis that the addition of verbal information promotes infants' continued participation in episodes of joint attention, infants' proportion of time engaged in joint attention was entered into a 3 (attention-directing action: verbalization alone, look and point, and look, point, and verbalize) \times 2 (target familiarity: familiar, unfamiliar) repeated measures ANOVA, with target familiarity as the within subjects repeated measure and gesture as the between subjects factor. Infants' proportion of time spent engaged in joint attention differed significantly as a function of the adult's attention-directing activity, $F(2, 57) = 68.2$, $p < .01$. Follow-up comparisons indicated that infants spent proportionally more time in joint visual attention when the adult looked and pointed ($M = 0.38$, $SD = 0.08$), $p < .05$, than when the adult only verbalized about the target object ($M = 0.13$, $SD = 0.10$). Critically, 18-month-olds also engaged in more joint attention when their parent looked, pointed, and verbally encouraged their child ($M = 0.44$, $SD = 0.09$) compared to looking and pointing alone ($M = 0.38$, $SD = 0.08$), $p < .05$. Thus the addition of verbal information to gestures reliably increased the proportion of time 18-month-olds engaged in joint attention.

The results of the repeated measure, i.e., target familiarity, also indicated that across all conditions of adult action, 18-month-olds spent a larger proportion of time engaged in joint attention when they were familiar with the target object and its verbal referent ($M = 0.44$, $SD = 0.11$) than when they were unfamiliar with the object and its verbal referent ($M = 0.37$, $SD = 0.09$), $F(1, 57) = 45.2$, $p < .01$. The results also revealed a significant interaction of adult attention-directing action and the repeated measure of target familiarity, $F(2, 57) = 3.2$, $p = .049$.

In order to examine the nature of this interaction we compared infants' proportion of looking to the familiar and the unfamiliar target objects across each adult attention-directing action. Specifically we examined whether the addition of verbalization to the looking and pointing gesture promoted more looking to familiar objects as well as to the unfamiliar objects. For the familiar objects, the difference between the look and point condition ($M = 0.42$, $SD = 0.10$) and the look, point, and verbalize condition ($M = 0.47$, $SD = 0.10$) did not reach significance, $p > .1$. However, for the unfamiliar objects, the proportion of time spent in joint attention reliably differed between the look and point condition ($M = 0.34$, $SD = 0.08$) and the look,

point, and verbalize condition ($M = 0.41$, $SD = 0.10$), $t(38) = 2.64$, $p < .05$. Thus, the addition of verbal information promoted more time spent in joint attention when the child was unfamiliar with the label for a particular object but not when the child was familiar with verbal referent for the target object. This interaction in part replicates [Baldwin and Markman \(1989\)](#) who similarly found that duration of time spent in joint attention reliably increased when the adult added verbalizations to their looking and pointing gesture using unfamiliar target objects. One possible explanation for the interaction of verbal information across familiar and unfamiliar targets may involve how 18-month-olds perceive the function of verbal information. That is the current results, as well as those of [Baldwin and Markman \(1989\)](#), suggest that infants might view the addition of verbal information directed toward an unfamiliar object as providing new information, e.g., object label, and as such are willing to participate in longer instances of joint attention. However, given a familiar object and verbal referent that is understood, 18-month-olds may perceive the verbal information as redundant information that merely specifies where the adult is looking rather than providing new information and as such the addition of the verbal information does not promote longer episodes of joint attention.

While we predicted, and found evidence supporting our prediction, that the addition of verbalizations to the parent's looking and pointing gesture would promote longer instances of joint attention, but not more instances of joint attention, we examined whether the significance found in the case of infants' proportion of time spent in joint attention, and the non-significant result regarding 18-month-olds frequency of joint attention, represented statistical artifacts. In examining the possibility that the results in one group are carried by a few individuals showing either large positive proportions of looking (PTLTs), or difference scores, we performed a chi-square test on each attention-directing gesture using both the proportion of looking time and their difference scores. For the looking and pointing condition the results indicate when the difference score is used as the dependent variable 18 of 20 infants showed positive visual recoveries, $\chi^2(1, 20) = 12.8$, $p < .01$, similarly when the proportion of looking to correct object is used as the dependent variable 19 of 20 infants showed proportions that were greater than chance, $\chi^2(1, 20) = 16.2$, $p < .01$. In terms of the looking, pointing, and verbalizing condition, for both the measure of proportion of looking to the correct object (PTLT) and the difference score, 19 of 20 infants showed performance greater than chance, $\chi^2(1, 20) = 16.2$, $p < .01$. As such it seems unlikely that the results of either gesture condition, or dependent variable, are indicative of an artifact of a few infants showing large positive proportions of looking to the correct object or difference scores¹.

3. Discussion

The purpose of this experiment was to examine how verbal information by itself and accompanying an adult's gesture promotes joint attention in 18-month-olds. First, and not surprisingly, we found that 18-month-olds can establish joint attention when they are only given a label for a familiar object but not when they are given a label for an unfamiliar object. More important to our hypothesis, however, we found that when an adult's gesture is accompanied by a verbal label 18-month-olds spend proportionately more time engaging in joint attention toward unfamiliar but not toward familiar objects. The addition of verbal information to their parents

looking and pointing gesture did not promote a greater frequency of joint attention to either familiar or unfamiliar objects compared to looking and pointing alone.

What is the significance of these results in terms of 18-month-olds' proclivity for joint attention? In general the results provide information concerning how different adult behaviors promote joint attention. Specifically the results suggest that the concurrent presentation of verbal encouragement with various physical gestures does not lead to a "more is better" type of interpretation; rather the results suggest what Baldwin (Baldwin & Markman, 1989) have termed a "facilitation effect" of verbal information in the context of joint attention. In other words if an increase in cueing redundancy was all that was accomplished by the addition of verbal information then the concurrent presentation of verbal information should have promoted an increase in (1) infants' frequency and (2) the duration of their joint attentional episodes toward both familiar and unfamiliar objects. The results, however, demonstrate that verbal encouragement promoted only longer instances of joint attention but not more instances of joint attention and only toward objects with which the infant was unfamiliar. Thus it seems the infants are using physical gestures such as direction of head and eye-gaze and pointing to determine where another person's attention is directed and are perhaps using the verbal information to determine what about the target of shared attention the adult is describing, e.g., labeling, explaining, etc.

The results of this experiment also demonstrate that 18-month-olds' frequency, and proportion of time spent in joint attention, was reliably greater across all gesture conditions when the target object was familiar to the infant. While many possible explanations exist for why infants preferred familiar targets compared to unfamiliar targets such as infants' overall interest in the object, their frequency of using the object in the home, and other knowledge of the object and its function, the current experiment cannot discern among these possible explanations. We do believe, however, that infants' preference for familiar target objects is pertinent to the argument that adults' verbal encouragement is "about" the object of shared attention and that physical gestures are used in determining the location of an object of shared attention. For example, when an object and its label are both familiar to the child the adult's verbal label and the adult's physical gestures convey the same information to the child regarding the adult's intended focus of attention, e.g., "Look at the ball." Where the imperative "look" captures the infant's attention, the outstretched arm, direction of gaze along with the familiar label "ball" redundantly specify to the child which object is to be of shared attention. Thus verbal information, in the case of a familiar object, does not provide any new or additional information regarding where to look; rather the verbalizations are redundant with the attention-directing gesture(s). Given an unfamiliar target object however, the verbal information and physical gestures provide different information, e.g., "Look at the pliers." Where the physical cues provide information specifying the location of the target object, yet the unfamiliar verbal referent cannot be used to specify the location of attention and as such it is useless in directing infants' attention.

While the results of the current experiment are suggestive that verbal information may provide new or at least different information regarding the object of shared or joint attention when that object is unfamiliar, and verbal information may promote longer rather than more instances of joint attention, some cautions are necessary. An alternative explanation for why the addition of verbal information to the parent's looking and pointing gesture failed to reliably increase infants' frequency of joint attention could be that infants were at ceiling when

the parent was looking and pointing toward an object. While our results cannot rule out this potential alternative, a more definitive demonstration of this possible ceiling effect could examine whether addition of verbal encouragement to less redundant physical actions such as looking or gazing alone with and without adult verbal encouragement promotes longer and more frequent episodes of joint attention. Finally it is worth noting that when an adult and child engage in joint attention in situ the adult rarely turns, points and exclaims “look at X” and ceases the interaction, rather the adult will describe, point-out new information such the function of the object “Wow, look at X, that’s neat look at its X, let’s see what we can do with this thing.” The current experiment maintained this “openness” of dialogue between the parent and their infant by allowing the parent to “verbalize as they would naturally when interacting with their child,” yet given the true complexity of such a naturalistic interaction of gesture and verbal encouragement it becomes difficult to empirically untangle how a parent’s verbalization promote the establishment or maintenance of joint attention. Thus future research may be of benefit that constrains what is stated such that more microanalytic conclusions may be drawn regarding precisely how verbal encouragement promotes joint attention in young children.

To conclude, the results of our experiment suggest 18-month-olds are able, in some circumstances, to use verbal information alone in establishing joint attention that does not involve coordinated looking provided the infant is familiar with the verbal referent. Importantly the results demonstrate that the concurrent presentation of verbal encouragement and looking and pointing toward an unfamiliar object promotes 18-month-olds’ time spent in joint attention but does not reliably increase their frequency of establishing joint attention. Thus it seems to be the case that ostensive physical gestures are possibly more adept at directing, or redirecting infants’ focus of attention, and non-ostensive actions such as verbal encouragement promote infants’ continued attention toward a particular object or event and this tendency of longer instances of joint attention may serve infants by promoting their learning about the objects and events of shared attention.

Note

1. We also examined the distribution of scores for the looking and pointing condition and the look, point and verbalize condition using the difference score and the proportion of looking (PTLT) values. The purpose of this evaluation was to again examine whether one or more groups deviated significantly from a normal distribution. For all conditions skewness values were less than $2 \times$ their standard errors; thus it seems none of the groups violated a normal distribution.

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Appendix A. Potential target objects

Familiar objects	Unfamiliar objects
Book	Bolt
Bowl	Flashlight
Brush	Funnel
Crayon (large plastic replica)	Mixer (egg beater)
Flower	Pliers
Hat	Sifter
Shoe	Snorkel
Spoon	Sponge

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