

Is the strength of the relation between early parent follow-in input and later child vocabulary size
in infant siblings of children with ASD conditional on engagement state or communication
disorders?

By

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CHAPTER 1

INTRODUCTION

Younger biological siblings of children with autism spectrum disorder (ASD) are at a heightened risk for social communication deficits. In this paper, these younger siblings will be referred to as Sibs-ASD. Recurrence rates of ASD diagnoses have been estimated to be between 10-20%, which is up to 12 times higher the risk than in the general population (e.g., Ozonoff et al., 2011; Zwaigenbaum et al., 2009). Sibs-ASD who do go on to receive an ASD diagnosis have been shown to exhibit delays in communicative behaviors and language development as early as 12 months of age (e.g., Landa & Garret-Mayer, 2006; Rogers, 2009; Yirmiya et al., 2006; Yoder, Stone, Walden, & Malesa, 2009; Zwaigenbaum et al., 2005). Additionally, many sibs-ASD go on to exhibit language delays as development progresses (Messinger et al., 2013). In sum, sibs-ASD are at a heightened risk for developing some kind of communication disorder, including language delay or ASD.

Language Support Strategies for Language Development in Sibs-ASD

Because sibs-ASD are at risk for developing a communication disorder, recent research efforts have focused on identifying strategies that may facilitate early language development. By identifying strategies that facilitate early language development, treatments using these strategies might alter the trajectory of future adaptive development (Green et al., 2017). Two potential language support strategies that may facilitate language development in the early developmental stages are parent use of follow-in comments and increased high quality episodes of engagement.

Parent Follow-in Comments

Follow-in input is comprised of utterances that relate to the child's current focus of attention (i.e., that "sync up" to the child's attentional lead) and do not require a change in the child's attention (Siller & Sigman, 2002). While follow-in input can be a directive or comment, in this study, the focus will be follow-in comments. Theoretically, the links between referents and follow-in comments may be more salient to children with attention-shifting difficulties (like children with ASD and potentially sibs-ASD) than follow-in directives because they refer to the child's present, ongoing action or focus rather than requiring a change in activity for the input to most closely match the intended referent (Venker, McDuffie, Ellis-Weismer, & Abbeduto, 2012). There is evidence demonstrating that follow-in comments that do not require a change in the child's activity or attention are correlated with later child language and communication outcomes in at least children with ASD (McDuffie & Yoder, 2010; Siller & Sigman, 2002). Furthermore, some early communication-focused intervention packages for children at risk for communication disorders (like sibs-ASD) discourage the use of directives (e.g., Ingersoll & Dvortcsak, 2010; Sussman, 1999). Thus, this study will focus on follow-in utterances that are comments.

High-Quality Engagement

Many early communication-focused interventions also teach parents to introduce follow-in comments in episodes of high-quality engagement. Engagement states are commonly defined as exchanges or interactions between two people (herein, between parent and child) lasting at least three seconds. Different types of engagement states are distinguished based on the child's focus of attention and degree of participation with the other interaction partner and materials (Adamson, Bakeman, Deckner, & Ronski, 2009).

Encouraging linguistic input in engagement states in which the child demonstrates sustained attention to the referent and speaker of linguistic input is of particular interest for treating sibs-ASD (Adamson, et al., 2009; Bottema-Beutel, Yoder, Hochman, & Watson, 2014). This type of engagement state has been called *supported joint engagement (SJE)*. SJE is defined as a state in which the parent and child are actively involved with the same materials, and the adult influences the child's play in some way (Adamson et al., 2009). For example, a mother may drop beads into a bucket while her child runs his fingers over the beads in the bottom of the bucket for 30 seconds. Follow-in comments presented in SJE are particularly predictive for receptive and expressive language development for children with typical development, ASD, and other developmental disabilities (e.g. Adamson, Bakeman, & Deckner, 2004; Adamson et al., 2009; Bottema-Beutel et al., 2014).

Higher Order Supported Joint Engagement (HSJE). While the superordinate category of SJE is positively associated with language in a variety of populations of children, this may be driven by the potency of a subtype of SJE: *higher order supported joint engagement (HSJE)*. In HSJE, the child demonstrates behavioral evidence that he or she is aware of the adult's presence through reciprocal engagement (Bottema-Beutel et al., 2014). Child behaviors that constitute evidence of reciprocal engagement are imitating an adult behavior, complying with an adult directive, turn-taking, or forms of intentional communication that show attention to object and person without gaze shifting (Bottema-Beutel et al.). Child imitation of adult action, compliance, and intentional communication are all ways the child can take his "turn" in social exchanges with adults. For example, imagine a child and her mother manipulating train track pieces and a train set together. The child might push the train along a track piece, wait for her mother to lay down the next track piece (the mother's "turn"), and then push the train along that track piece (the

child's "turn"). This exchange might continue for several "turns," lasting several minutes. Both the mother and the child are manipulating the same materials, and the mother's actions are influencing the child's actions. By waiting for the mother's turn before taking her turn of pushing the train on the track, the child explicitly demonstrates that she is aware of and receptive to her mother as an interaction partner.

HSJE may be particularly important for children who have difficulty balancing the attentional demands of interaction with the difficult task of attending to and learning from linguistic input, like those with ASD (Bottema-Beutel et al., 2014). In a study of children with ASD, follow-in input in HSJE better predicted later receptive vocabulary (a probable predecessor of expressive vocabulary) than did follow-in input in other engagement states. Additionally, total time spent in HSJE predicted later social communication and expressive language outcomes (Bottema-Beutel et al.). The aspect of language learning likely affected by follow-in input in HSJE is vocabulary size due to the repeated high-quality exposures to words at times the child is attending to their referents (Bottema-Beutel et al.).

HSJE is in contrast to two engagement states that theoretically offer less support for language learning for children with attention-shifting difficulties. The first is *lower order supported joint engagement (LSJE)*. In LSJE, there is shared attention to the same object or event and influence of parent action on child action, but there is no evidence of reciprocal exchanges or collaboration (Bottema-Beutel et al., 2014). Returning to the train track example, the child might push the toy train along a track while the adult builds the track, but the child does not wait for her mother to lay down a new track piece before pushing further (i.e., there is no explicit evidence of the child's awareness of the importance of the parent's turn). HSJE is also in contrast to *object engagement (OE)*. Many children who exhibit the repetitive and restricted patterns of

behavior indicative of ASD spend a majority of their time in OE (Bottema-Beutel et al., 2014). In OE, the child plays with and attends to objects alone without any evidence of influence by the adult's actions (Adamson et al., 2004). The absence of evidence of awareness of the adult in LSJE and OE may mean that the child is not attending to, and is thus, for children with attention-shifting difficulties, less likely to learn from the adult's linguistic input in these engagement states.

There is not yet a test of whether HSJE improves the probability that parent follow-in comments are associated with language outcomes in sibs-ASD. But, like children with ASD, at least some sibs-ASD also exhibit difficulties with social attentional and interactional behavior that become apparent during the second year of life (Jones, Gliga, Bedford, Charman, & Johnson, 2014). Sibs-ASD who later received ASD diagnoses have been shown to exhibit reduced gaze shifting to adults and attentiveness to caregivers during naturalistic interactions at 12 months (Feldman et al., 2012; Wan et al., 2012; 2013). Because of these interactional challenges, sibs-ASD may benefit from follow-in comments provided in episodes of HSJE more so than follow-in comments provided in lower support states.

Communication Disorder as a Hypothesized Moderator of the Association Between Follow-in Comments in HSJE and Later Vocabulary

Because HSJE is hypothesized to be particularly helpful in aiding attention to input in children with attention shifting difficulties, and because sibs-ASD who go on to have ASD have been shown to have attention shifting difficulties, it is possible that the relation between follow-in comments in HSJE and expressive vocabulary size could be stronger in sibs-ASD who have communication disorders. We recognize that no one has yet shown that sibs-ASD without eventual ASD, but with language delays, have attention-shifting difficulties. However, it is

hypothesized here that children who eventually show evidence of ASD and those who show language delays share attention-shifting and interactional difficulties, and that this is one of the reasons they share a difficulty in learning language.

The sibs-ASD population is heterogeneous in language outcomes and presence of additional communication disorders. Therefore, sibs-ASD who do not go on to be diagnosed with ASD or a language delay may not be as dependent on HSJE to process follow-in comments. Indeed, these non-disordered sibs-ASD may not be as dependent on follow-in comments regardless of engagement state to acquire language. No study has yet tested whether the association between follow-in comments in HSJE and later vocabulary size is conditional on eventual presence of a communication disorder.

For this study, participants were obtained from a larger study testing the effects of a communication-focused intervention package for sibs-ASD on later language and communication outcomes. This sample is advantageous for testing if the relation between follow-in comments in HSJE and later vocabulary outcomes varies as a function of diagnostic category because the larger study collected diagnostic information at the final time point. This information can be used to retroactively identify participants as having a communication disorder. In this study, children who (a) received an ASD diagnosis at the final measurement point in the larger RCT based on administration of the Autism Diagnostic Observation Scale, version 2 (ADOS-2; Lord et al., 2012); and/or (b) tested in the tenth percentile or below for expressive language on the Mullen Scales of Early Learning (MSEL; Mullen, 1995) were considered as having a communication disorder.

Research Questions

This study will be guided by the following questions:

- 1) Is the relation between earlier frequency of follow-in comments in HSJE and later child expressive vocabulary size significant and positive?
- 2) Does the relation between earlier frequency of follow-in comments in HSJE and later child expressive vocabulary size vary as a function of communication disorder subgroup, with the stronger association occurring in sibs-ASD who go on to be diagnosed with communication disorders?
- 3) In the sample for which the association between follow-in comments in HJSE and later expressive vocabulary is significant, does the association remain significant after controlling for follow-in comments in lower support states (OE and LSJE)?
- 4) In the sample for which the association between follow-in comments in HSJE and later expressive vocabulary is significant, does the association remain significant after controlling for earlier expressive vocabulary size?

CHAPTER 2

METHOD

Participants and Research Design

A subset of sibs-ASD participants from the aforementioned larger study were used for this analysis. Only participants with extant data at both relevant measurement points were considered for inclusion. Thirty-six participants who were identified as having a communication disorder at the final time point of the larger RCT were included. To create a comparison group, 36 participants who were *not* identified as having a communication disorder were randomly selected from the remaining larger study sample. In total, 72 participants were included. A power analysis for a multiple regression model with two controlled variables and one predictor variable was conducted using PASS Software to confirm this sample size was sufficient for detecting a significant change in variance accounted for by the predictor variable in the dependent variable (NCSS, 2019). This sample size exceeds that needed to detect a significant R^2 change of 0.07 (a small to moderate effect size) with 0.80 power in a multiple regression model ($n = 63$).

Participant demographic information can be found in Tables 1 and 2.

The larger study was a treatment study. Before pooling across treatment groups, the statistical interaction between treatment group and follow-in comments in HSJE predicting expressive vocabulary size was tested. Thirty-eight of this project's participants were assigned to the treatment group, and 34 were assigned to the control group.

Table 1
Participant Demographic Information by Communication Disorder Subgroup

| Variable | CD ^a Subgroup (n = 36) | Non-CD ^b Subgroup (n = 36) |
|---|--------------------------------------|--|
| Group Assignment | | |
| Treatment Group | 22 (61.1%) | 16 (44.4%) |
| Control Group | 14 (38.9%) | 20 (55.6%) |
| Mean chronological age (in months) at present study start (SD) | 17.5 (2.1) | 17.1 (1.9) |
| Gender | | |
| Male | 23 (63.9%) | 20 (55.6%) |
| Female | 13 (36.1%) | 16 (44.4%) |
| Race | | |
| African American | 3 (8.3%) | 0 (0%) |
| Asian | 3 (8.3%) | 3 (8.3%) |
| White | 28 (77.8%) | 28 (77.8%) |
| Multi-racial | 2 (5.6%) | 5 (13.9%) |
| Highest level of parent implementer education | | |
| GED | 5 (13.9%) | 1 (2.8%) |
| 1-2 years college/technical school | 8 (22.2%) | 4 (11.1%) |
| 3-4 years college/technical school | 16 (44.4%) | 16 (44.4%) |
| 1-2 years of graduate/professional school | 1 (2.8%) | 9 (25.0%) |
| 3+ years of graduate/professional school | 6 (16.7%) | 6 (16.7%) |
| Children in the family with ASD | | |
| 1 | 32 (88.9%) | 35 (97.2%) |
| 2+ | 4 (11.1%) | 1 (2.8%) |
| Mean mental age (in months) at larger study start ^c | 12.1 (2.5) | 13.3 (2.2) |
| Mean expressive vocabulary size at present study start ^d | 18.1 (17.7) | 62.8 (80.4) |
| Mean total ADOS diagnostic score at larger study end point ^e | 14.81 (6.8) | 6.70 (4.2) |
| Final diagnosis at larger study end point | | |
| ASD only | 7 (19.4%) | |
| Language Delay only | 15 (41.7%) | |
| Both ASD and Language Delay | 14 (38.9%) | |

^a Communication disorder subgroup

^b Non-communication disorder subgroup

^c Obtained from the Mullen Scales of Early Learning three months prior to current study start. Standard deviation of group mean is in parentheses.

^d Obtained from the MCDI. Standard deviation of group mean is in parentheses.

^e Standard deviation of group mean is in parentheses.

Table 2
Participant Demographic Information by Treatment Group

| Variable | Treatment Group (n = 38) | Control Group (n = 34) |
|---|-----------------------------|---------------------------|
| Mean chronological age (in months) at present study start (SD) | 17.0 (2.1) | 17.5 (1.9) |
| Gender | | |
| Male | 21 (55.3%) | 22 (64.7%) |
| Female | 17 (44.7%) | 12 (35.3%) |
| Race | | |
| African American | 1 (2.6%) | 2 (5.9%) |
| Asian | 4 (10.5%) | 2 (5.9%) |
| White | 30 (78.9%) | 26 (76.5%) |
| Multi-racial | 3 (7.9%) | 4 (11.8%) |
| Highest level of parent implementer education | | |
| GED | 3 (7.9%) | 3 (8.8%) |
| 1-2 years college/technical school | 6 (15.8%) | 6 (17.6%) |
| 3-4 years college/technical school | 17 (44.7%) | 15 (44.1%) |
| 1-2 years of graduate/professional school | 5 (13.2%) | 5 (14.7%) |
| 3+ years of graduate/professional school | 7 (18.4%) | 5 (14.7%) |
| Children in the family with ASD | | |
| 1 | 36 (94.7%) | 31 (91.2%) |
| 2+ | 2 (5.3%) | 3 (9.8%) |
| Mean mental age (in months) at larger study start ^c | 12.3 (2.4) | 13.2 (2.4) |
| Mean expressive vocabulary size at present study start ^d | 44.8 (77.8) | 35.6 (37.9) |
| Mean total ADOS diagnostic score at larger study end point ^e | 12.0 (7.6) | 9.4 (5.9) |
| Final diagnosis at larger study end point | | |
| ASD only | 4 (10.5%) | 3 (8.8%) |
| Language Delay only | 8 (21.1%) | 7 (20.6%) |
| Both ASD and Language Delay | 10 (26.3%) | 4 (11.8%) |
| No diagnosis | 16 (42.1%) | 20 (58.8%) |

^a Communication disorder subgroup

^b Non-communication disorder subgroup

^c Obtained from the Mullen Scales of Early Learning three months prior to current study start. Standard deviation of group mean is in parentheses.

^d Obtained from the MCDI. Standard deviation of group mean is in parentheses.

^e Standard deviation of group mean is in parentheses.

Measures

There were two relevant measurement points spanning six months. This project's Time 1 occurred immediately after the larger study's treatment phase concluded. This project's Time 2 occurred six months after this project's Time 1. This time point was selected to theoretically allow sufficient developmental time for follow-in comments in HSJE to influence expressive vocabulary size. See Table 3 for descriptive information about each variable obtained from these measures.

Table 3
Descriptive Information for Analyzed Variables

| Procedure | Time Point | Variable | Role | Total Sample Mean (SD) | CD ^a Subgroup Mean (SD) | Non-CD ^b Subgroup Mean (SD) |
|--|------------|---|----------------------|------------------------|------------------------------------|--|
| 15-minute Parent-Child Free Play Session | 1 | Number of intervals with follow-in comments in HSJE | Independent variable | 8.03 (7.70) | 7.22 (8.53) | 8.83 (6.73) |
| | | Number of intervals with follow-in comments in lower support states (LSJE and OE) | Covariate | 39.60 (20.80) | 39.72 (20.44) | 39.47 (21.42) |
| MCDI Words & Gestures Form ^c | 1 | Total words reported as said and understood | Covariate | 40.47 (62.02) | 18.11 (17.72) | 62.83 (80.38) |
| MCDI Words & Sentences Form ^c | 2 | Total words reported as said and understood | Dependent variable | 140.00 (148.66) | 67.39 (92.70) | 212.58 (159.35) |

^a Communication disorder subgroup

^b Non-communication disorder subgroup

^c MacArthur-Bates Developmental Inventories

Dependent Variable: Expressive Vocabulary

Expressive vocabulary size measures were obtained at Times 1 and 2. The McArthur-Bates Communicative Development Inventory (MCDI; Fenson et al., 2007) was administered to obtain estimates of total expressive vocabulary size. Due to differences in the sibs-ASD's chronological ages and appropriate age spans for different versions of the MCDI, the infant (words and gestures) form of the MCDI was used at Time 1, and the toddler (words and sentences) form of the MCDI was used at Time 2.

In the present study, total raw score of number of words parents reported children said was used to estimate total expressive vocabulary size. The instructions of the MCDI require that words reported as said must also be understood. MCDI expressive vocabulary size from Time 1 was used as a covariate to eliminate the most common alternative explanation to longitudinal correlations (i.e., stability in individual differences in the dependent variable [i.e., expressive vocabulary] over time and covariation of the predictor [i.e., follow-in comments in HSJE] with the early measure of the criterion variable). MCDI expressive vocabulary size from Time 2 was used as the dependent variable.

Independent Variable: Parent Follow-in Comments in HSJE

Parent follow-in comments in HSJE were obtained from parent-child free play sessions from Time 1. The free play procedure was a 15-minute play session with a standard set of toys without specifying positioning of parent or child. Parents were instructed to play as they normally would at home with their child. This procedure is intended to be an unstructured measurement procedure that estimates how parents and their children generally interact outside of the measurement procedure.

In the larger study, trained observers used a video coding software (ProCoderDV; Tapp, 2003) to obtain estimates of quantity of parent follow-in comments in the free play sessions. A parent follow-in comment was defined as a label, description, or comment on what the child was attending to (i.e., looking at, touching, communicating about, or doing). A five-second partial interval behavioral coding system was used. Twenty percent of sessions were coded by two independent trained observers.

Timed event coding was used to code for engagement states in the ProCoder Program (Tapp, 2003). Start and stop times for each state were coded. A modified version of Bottema-Beutel and colleagues' unpublished manuals for engagement state and sub-state coding were used (see Appendix A). States had to last for at least three seconds to be coded. Coders coded for four states: HSJE, LSJE, OE, and other.

To obtain a measure of the number of intervals with follow-in comments that co-occurred in each engagement state, the ProCoder Merger Program was used (Tapp, 2013). The program merges the file coded using partial interval sampling (the file coded for follow-in comments) with the file coded using timed event sampling (the file coded for engagement state) for each participant. The program assigns an engagement state code to each interval based on the engagement state with the longest duration in that interval. Thus, from these merged files, estimates of the quantity of follow-in comments in each engagement state of interest can be obtained.

Reliability

Parent Follow-in Comments in HSJE. Twenty-one percent of all parent-child free play sessions ($n = 15$) were coded for parent follow-in comments in each engagement state by a

second trained independent coder. In order to account for the compounding effects of inter-observer disagreements on unitizing, which can have effects on classifying, sessions that were coded for reliability for follow-in comments in the primary data collection phase of the larger study were also coded for reliability in the present study.

Formatively, small-over-large agreement was calculated for every video file coded for reliability. Small-over-large agreement of 70% was used as the retraining threshold. Retraining never occurred. Regardless of agreement calculations, discrepancy discussions were held after each video coded for reliability to prevent observer drift.

Summatively, an intra-class correlation coefficient (ICC) value was calculated for all coded variables used in the present analysis. SPSS statistical software was used to calculate ICC values using the absolute agreement and participant and observer as random factors. The ICC value for follow-in comments in HSJE was 0.92, and the ICC value for follow-in comments in lower support states was 0.86.

Expressive Vocabulary. Inter-observer reliability was not calculated for expressive vocabulary measures obtained from the MCDI because it is a parent-completed checklist. However, test-retest reliability analyses for both the infant and toddler forms of the MCDI have demonstrated acceptable temporal stability for expressive vocabulary measures for children older than 10 months old (correlation coefficients above 0.80 for all sections on both forms; Fenson et al., 2007). Strong temporal stability improves the validity of the MCDI as a measure of expressive vocabulary in this project.

CHAPTER 3

RESULTS

Statistical Analysis Approach

Generalized linear models using maximum likelihood estimates of the coefficients and robust standard errors was used to test the research questions. This approach was chosen because it does not assume normality of residuals or homoskedasticity (Erceg-Hurn & Mirosevich, 2008). There was no evidence of undue influence (i.e., Cook's D values less than one for all analyses).

Preparatory Analysis

First, the significance of the statistical interaction between follow-in input in HSJE measures at Time 1 and treatment group predicting Time 2 expressive vocabulary was tested. As predicted, the interaction term was nonsignificant (Likelihood Ratio $X^2 = 0.00(1)$, $p = 0.99$). The full results of this analysis are displayed in Table 4. Because of the non-significant interaction term, the remaining analyses were conducted with the full sample pooling across treatment groups.

Table 4
Preparatory Analysis Confirming a Non-Significant Interaction Between Treatment Group and Follow-in Comments in HSJE Predicting Later Expressive Vocabulary

| | Likelihood Ratio $X^2(df)$ |
|----------------------------|----------------------------|
| Follow-in comments in HSJE | 7.44(1)* |
| Treatment group | 0.47(1) |
| Interaction term | 0.00(1) |

* $p < 0.05$

Is the Relation Between Earlier Frequency of Follow-in Comments in HSJE and Later Child Expressive Vocabulary Size Significant and Positive?

A generalized linear model demonstrated that the relation between follow-in comments in HSJE at Time 1 and child expressive vocabulary at Time 2 was significant and positive. A small amount of variance in later expressive vocabulary was accounted for by follow-in comments in HSJE. The results are displayed in Table 5 (Model 1).

Does the Relation Between Earlier Frequency of Follow-in Comments in HSJE and Later Child Expressive Vocabulary Size Vary as a Function of Communication Disorder Subgroup?

The generalized linear model used to test this research question implicitly involved *disorder subgroup* (a dichotomous variable), *Time 1 follow-in comments in HSJE*, and a *product term* of disorder subgroup and follow-in comments in HSJE as predictors. Time 2 expressive vocabulary was the dependent variable. Follow-in comments in HSJE at Time 1, as well as the product term of disorder subgroup and follow-in comments in HSJE at Time 1 were significant predictors of Time 2 expressive vocabulary. A small-to-moderate amount of variance in later expressive vocabulary was accounted for by follow-in comments in HSJE, and a small amount of variance was accounted for by the interaction term. The relation between follow-in comments in HSJE at Time 1 and Time 2 expressive vocabulary was only significant within the non-communication disorder subgroup (Likelihood Ratio $X^2 = 9.08(1)$, $p < 0.005$). These results are displayed in Table 5 (Model 2). A visual representation of the statistical interaction between communication disorder subgroup and Time 1 follow-in comments in HSJE is found in Figure 1.

Table 5

Results from Primary Analyses Predicting Later Expressive Vocabulary

| | Model 1 | | Model 2 | |
|------------------------------------|-------------------------------|--------------|-------------------------------|--------------|
| | Likelihood Ratio $X^2(df)$ | R^2 change | Likelihood Ratio $X^2(df)$ | R^2 change |
| Follow-in comments in HSJE | 9.62(1)** | 0.05 | 12.93(1)** | 0.10 |
| Communication disorder subgroup | | | 2.48(1) | |
| Interaction term | | | 5.61(1)* | 0.04 |

* $p < 0.05$

** $p < 0.005$

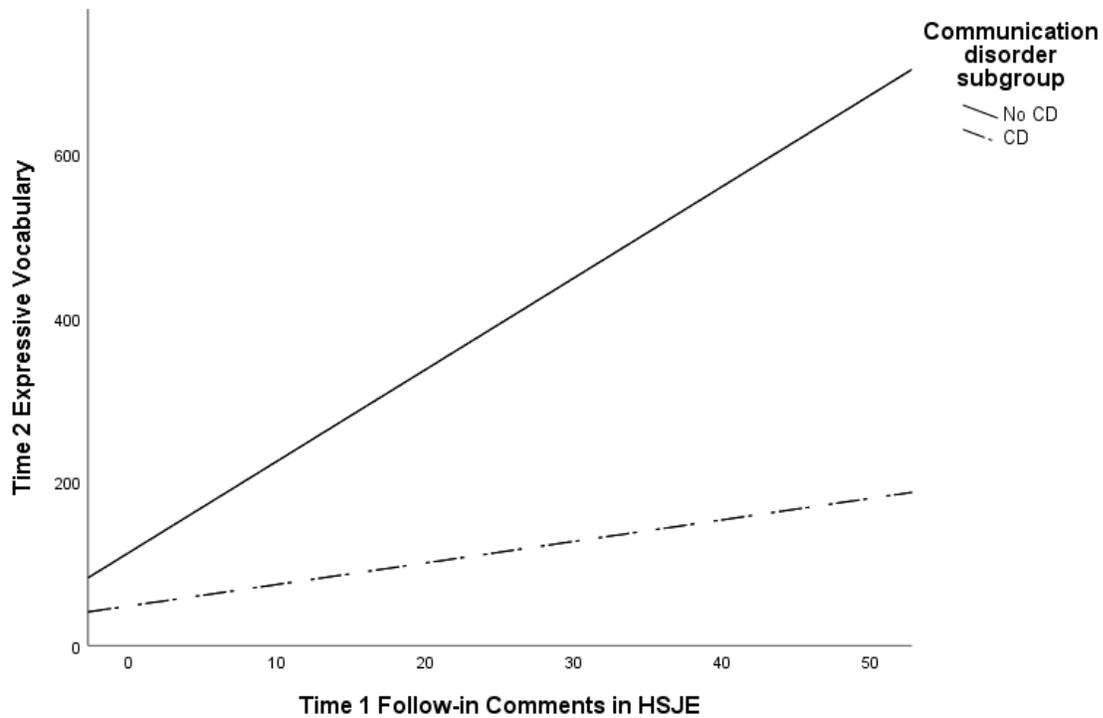


Figure 1. Statistical interaction between Time 1 follow-in comments in HSJE and communication disorder subgroup.

Addressing Alternative Explanations

Two more models were tested within the non-communication disorder subgroup to examine alternative explanations for the significant association between follow-in comments in HSJE and later expressive vocabulary.

Does the Association Between Follow-in Comments in HSJE and Later Expressive Vocabulary Remain Significant After Controlling for Follow-in Comments in Lower Support States (OE and LSJE) Within the Non-communication Disorder Subgroup?

The association between follow-in comments in HSJE at Time 1 predicting expressive vocabulary at Time 2 in the non-communication disorder subgroup remained positive and significant when controlling for follow-in comments in lower support states at Time 1. A moderate amount of variance in later expressive vocabulary was accounted for by follow-in comments in HSJE. Follow-in comments in lower support states was not a significant predictor of later expressive vocabulary. These results are displayed in Table 6 (Model 1).

Does the Association Between Follow-in Comments in HSJE and Later Expressive Vocabulary Remain Significant After Controlling for Early Expressive Vocabulary Within the Non-communication Disorder Subgroup?

The association between follow-in comments in HSJE at Time 1 predicting expressive vocabulary at Time 2 in the non-communication disorder subgroup became non-significant when controlling for expressive vocabulary at Time 1. However, a very large and significant amount of variance in later expressive vocabulary was accounted for by early expressive vocabulary. This was unsurprising, given that time 1 expressive vocabulary and time 1 follow-in comments in

HSJE were significantly and strongly correlated within this subgroup ($r = 0.44$). These results are displayed in Table 6 (Model 2).

Table 6

Results of Models with Potential Covariates Predicting Later Expressive Vocabulary Within the Non-Communication Disorder Subgroup Only

| | Model 1 | | Model 2 | |
|--|-------------------------------|--------------|-------------------------------|--------------|
| | Likelihood Ratio $X^2(df)$ | R^2 change | Likelihood Ratio $X^2(df)$ | R^2 change |
| Follow-in comments in HSJE | 8.40(1)** | 0.16 | 2.27(1) | |
| Follow-in comments in lower support States | 0.20(1) | | | |
| Early expressive vocabulary | | | 19.63(1)** | 0.65 |

** $p < 0.005$

CHAPTER 4

DISCUSSION

The results in this study confirmed many of the predicted relations. As predicted, follow-in comments in HSJE at Time 1 did significantly and positively predict later expressive vocabulary in the total sample. Furthermore, there was a statistically significant interaction between communication subgroup and follow-in comments in HSJE. But, contrary to *a priori* predictions, the relation between follow-in comments in HSJE and later expressive vocabulary was significant only in the *non-communication disorder* subgroup. In the non-communication disorder subgroup, this relation remained significant when controlling for follow-in comments in lower support states, but became non-significant when controlling for early expressive vocabulary.

A Potential Explanation for the Unexpected Results

It might be argued that these results can be explained by differences in HSJE engagement across the two subgroups. For example, perhaps children in the non-communication disorder subgroup receive more follow-in comments in HSJE because they are more likely to engage in HSJE than children in the communication disorder subgroup. However, this is not the case as there is a non-significant difference between mean follow-in comments in HSJE between the two subgroups ($t(70) = 0.90, p = 0.34$). Another possible explanation for the nonsignificant relation between follow-in comments in HSJE and later expressive vocabulary in the communication disorder subgroup might be insufficient variance in the predictor. However, Levene's Test for Equality of Variances indicated non-significantly different variances between the two subgroups. Thus, the observed results cannot be explained by compressed variance of follow-in comments in

HSJE in the communication disorder subgroup relative to the non-communication disorder subgroup.

A more plausible explanation for the statistical interaction between subgroup and follow-in comments in HSJE predicting expressive vocabulary is the compressed variance of later expressive vocabulary within the communication disorder subgroup. Levene's Test for Equality of Variances revealed that the communication disorder subgroup's variance was significantly lower than that of the non-communication disorder subgroup ($F = 8.99, p > 0.005$).

Importantly, the relation between Time 1 follow-in comments in HSJE and Time 2 expressive vocabulary is positive within the communication disorder subgroup, but it falls short of significance (Likelihood Ratio $X^2 = 2.17, p = 0.14$). The distributions of the two subgroups' Time 2 expressive vocabulary scores are visually displayed in Figure 2. The distribution in the communication disorder subgroup is highly positive skewed (skewness = 2.5). That is, several children in the communication disorder subgroup had zero or nearly zero words in their expressive vocabularies at Time 2. The combination of the compressed variance and inclusion of children with no or nearly no words at Time 2 may have reduced the sensitivity of the significance test of the relation between follow-in comments in HSJE and later expressive vocabulary in the communication disorder subgroup.

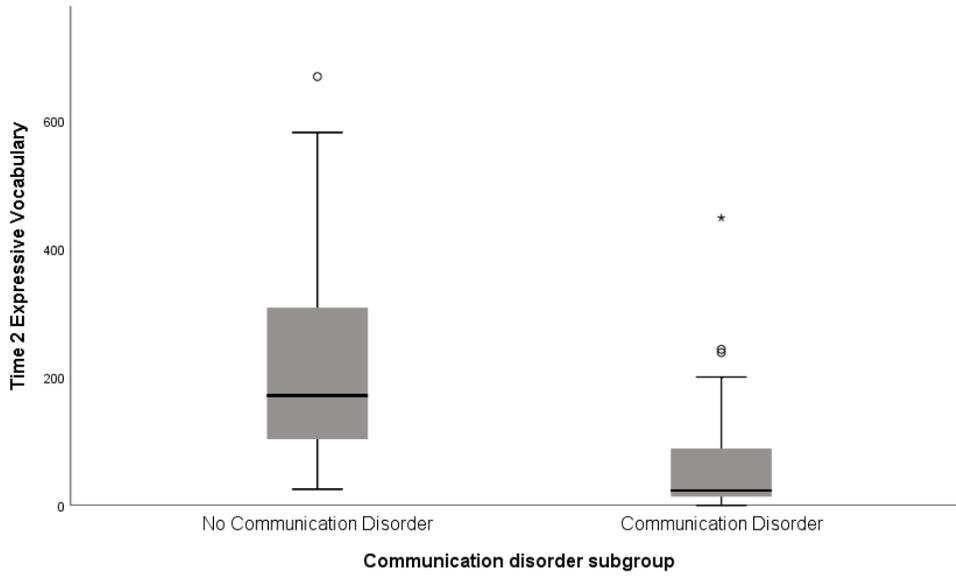


Figure 2. Time 2 mean expressive vocabulary by communication disorder subgroup.

Post-Hoc Analysis

The hypothesis that inclusion criteria should be restricted to children with at least some words in their expressive vocabularies at Time 2 is supported by a post-hoc analysis that only included participants with expressive vocabulary scores on the MCDI at Time 2 greater than five ($n = 67$). Five participants with scores at or near-zero from the communication disorder subgroup were excluded. No children in the non-disordered subgroup were excluded using this new inclusion criterion. Using this inclusion criterion, the analyses were re-run. The results of those analyses are found in Table 7.

Like the full-sample model, the relation between follow-in comments in HSJE and later expressive vocabulary in the filtered sample remains significant (Table 7, Model 1). But, the statistical interaction between follow-in comments in HSJE and communication subgroup in the filtered sample was nonsignificant (Table 7, Model 2). One might be concerned that this now nonsignificant interaction is due to the reduced sample size, but this is not the probable cause of the now nonsignificant interaction. The filtered sample size ($n = 67$) still exceeds the sample

size needed ($n = 63$) to identify a significant interaction with a clinically important effect size. Additionally, the relation between follow-in comments in HSJE and later expressive vocabulary is significant in both subgroups (non-communication disorder subgroup: Likelihood Ratio $X^2 = 9.08$, $p < 0.005$; communication disorder subgroup: Likelihood Ratio $X^2 = 5.68$, $p < 0.05$). If reduced sample size had been the cause of the now nonsignificant interaction term, the association between input and vocabulary would have been nonsignificant in the communication disorders subgroup.

Furthermore, when tested in the entire filtered sample ($n = 67$), follow-in comments in HSJE remains a significant predictor of later expressive vocabulary when controlling for follow-in comments in lower support states (Table 7, Model 3) and when controlling for earlier expressive vocabulary (Table 7, Model 4). These results are consistent with the hypothesis that the highly positive skewed nature and compressed variance of the dependent variable in the communication disorder subgroup is likely to account for the unpredicted finding that the relation between follow-in comments in HSJE predicting later expressive vocabulary was nonsignificant in the unfiltered, full sample. Inclusion of the five children in the communication disorder subgroup who generally could not make their word approximations intelligible even to their caregivers apparently weakened the association of interest.

Table 7

Results of Post-Hoc Analyses Including only Participants with Time 2 Expressive Vocabulary Scores Greater than Five

| | Model 1 | | Model 2 | | Model 3 | | Model 4 | |
|---|----------------------------|--------------|----------------------------|--------------|----------------------------|--------------|----------------------------|--------------|
| | Likelihood Ratio $X^2(df)$ | R^2 change |
| Follow-in comments in HSJE | 15.60(1)* | 0.12 | 14.43(1)** | 0.14 | 14.34(1)** | 0.11 | 7.03(1)* | 0.08 |
| Communication subgroup | | | 2.90(1) | | | | | |
| Subgroup-by-follow-in comments in HSJE interaction term | | | 2.30(1) | | | | | |
| Follow-in comments in lower support states | | | | | 0.07(1) | | | |
| Early expressive vocabulary | | | | | | | 37.84(1)** | 0.33 |

* $p < 0.05$ ** $p < 0.005$

Limitations

There are several limitations in the present study that inform interpretation of the results. First, because these analyses were post-hoc, they must be considered exploratory. Replication of the observed relations in a confirmatory study is needed before more definitive conclusions can be made.

Second, as in all correlational designs, there are potential unexplored third variable explanations for the observed relations. However, when two likely covariates were statistically controlled (early expressive vocabulary and follow-in comments in lower engagement states), the relation of interest continued to be significant in the sample of children who had at least five words in their expressive vocabularies at Time 2. An example of a class of third variable explanations that were not explored in this study is parent characteristics that might covary with both follow-in comments in HSJE and expressive vocabulary. The procedure used to estimate expressive vocabulary (the MCDI) is a parent report measure. Parent reports are likely influenced by parent characteristics, such as attentiveness or awareness of child behavior. Attentiveness to child behavior logically influences parents' awareness or recall of child word

approximations, and parents' probability of responding to children's attentional cues in interactions (i.e., one of the component behaviors in follow-in comments in HSJE).

Third, in the present study, the communication disorder subgroup was made up of children who had ASD only, language delay only, and co-existing ASD and language delay. The behavioral phenotypes and interactional needs of these three groups are not necessarily identical. Follow-in comments in HSJE may be differentially important for these three groups. But, there were not enough participants in the sample from which the participants in this study were taken who fell into these three diagnostic classifications to keep them separate. Future studies should intentionally recruit sufficiently large numbers of participants for the relation of interest to be examined within these separate subgroups (e.g., Adamson, Bakeman, Suma, & Robins, 2019). Alternatively, future studies may use a continuous variable to quantify social communication difficulties rather than the dichotomous variable used in this study.

Fourth, episodes of coordinated joint engagement with follow-in comments were not examined in this analysis. Because the children were so young, it was unlikely that episodes of coordinated joint engagement would occur in such brief interactions. Importantly, past work has established that duration of supported joint engagement with follow-in input predicts expressive and receptive language to a greater extent than coordinated joint engagement for children with and without developmental disabilities (Adamson et al., 2004; 2009; Bottema-Beutel et al., 2014). The heightened interactional and attentional demands of coordinated joint engagement may make its facilitative properties for word learning less than optimal for children with attention-shifting difficulties. However, future studies may also wish to evaluate the influence of follow-in comments in coordinated joint engagement in sibs-ASD.

Fifth, only intervals with follow-in *comments* were included in this analysis. As described in the introduction, follow-in input can also include directives. Future analyses could include both directives and comments to provide a fuller picture of the potential correlation between follow-in input in general in HSJE and later expressive vocabulary. Alternatively, future analyses could separately analyze the potential roles of follow-in comments versus follow-in directives in HSJE.

Future studies should include *a priori* tests of the relations of interest in a sample of children with at least *some* expressive language. Post hoc analysis results, like those included in this study, are more likely to be sample specific than are the results of confirmatory studies. Theoretically, follow-in input in HSJE may be related to later expressive vocabulary because HSJE provides an optimal balance of high-quality exposures to novel words and interactional demands that makes input highly processable, which in turn affects receptive vocabulary, which, in children who are able to talk intelligibly, affects expressive vocabulary.

Finally, a different dependent variable could be used that would allow for children who are not yet able to make themselves intelligible to be included. One potential dependent variable that might reveal confirmation of the all of the current study's predictions even in children who are not yet able to make their word attempts intelligible is diversity of key consonants used in communication (DKCC). DKCC is a measure obtained from the Communication and Symbolic Behavior Scales (CSBS; Wetherby & Prizant, 2002) that inventories the use of 13 consonants in communication acts (i.e., m, n, b, p, d, t, g, k, y, w, l, s, sh; Wetherby, Watt, Morgan, & Shumway, 2007). This variable is theoretically connected to expressive language development because it indicates a child's attempts to say many different words (demonstrated through the use of many different consonants) before they can make themselves fully intelligible (Woynaroski,

Watson, Gardner, Newsom, Keceli-Kaysili, & Yoder, 2016). Indeed, it has been shown to be a predictor of later expressive language in children with ASD (McDaniel, Yoder, & Watson, 2017; Woynaroski et al., 2016; Yoder, Watson, & Lambert, 2015). Interestingly, parent linguistic input is related to DKCC growth through a mediating relation with receptive vocabulary (Woynaroski, et al., 2016). This finding suggests that the amount of processable input may influence a child's receptive vocabulary, which in turn, for even children who cannot yet make themselves intelligible, may influence attempts to make themselves intelligible (DKCC), which in turn, influences expressive language development. Beyond supporting DKCC as a potential dependent variable, this set of findings also clearly points to using receptive vocabulary as another dependent variable that may enable confirmation of the predicted findings in children with communication disorders, even if the children are not yet able to make their word attempts intelligible.

Strengths

There are several strengths in the present study. First, the use of a longitudinal correlational design as opposed to a concurrent correlational design provides stronger evidence of a potentially causal relation between follow-in comments in HSJE and later expressive vocabulary. Two assumptions of a causal relation, temporal precedence and association, are present in a longitudinal correlation design (Beakley & Ludlow, 1992). Second, the use of a generalized linear model with maximum likelihood estimates of the coefficients and robust standard errors did not require adherence to typical assumptions of ordinary least squares regression models, which in turn improves our confidence that the current findings are not sample specific. Furthermore, statistical control of two likely alternative explanations of the observed results (early expressive vocabulary and follow-in comments in other states) improves

the strength of confidence that the observed relation may be causal. Finally, this study was the first to the author's knowledge to examine the influence of follow-in comments in various engagement states in sibs-ASD and to identify if those associations are conditional on eventual presence of a communication disorder.

Implications for Practice

These results, while exploratory, do provide some preliminary evidence that can inform communication intervention practice. First, the results suggest that early intervention strategies for sibs-ASD may support later expressive vocabulary skills, specifically for children who are “ready” to learn to talk. The results of the post-hoc filtered sample analyses (i.e., those conducted with only children who had at least five words in their expressive vocabularies by the final measurement point) suggest that follow-in comments in HSJE are facilitative of later expressive vocabulary for children with *at least some* language. However, future studies with *a priori* tests of this predicted relation are needed before more specific implications for practice can be defined.

Furthermore, the relation between the strategies examined here (follow-in comments in HSJE) were significantly related to later expressive vocabulary within the non-communication disorder subgroup and in the filtered pooled sample, even when controlling for follow-in comments in other support states. This finding may assuage concerns regarding the possible harmful effect of intervening early in children without a defined disorder.

These findings also support interventions that emphasize increasing episodes of high-quality engagement, but suggest the importance of carefully defining of what “high quality” means. Many intervention packages teach parents to use strategies that increase the likelihood of

supported joint engagement at large. However, these findings add to a growing literature base suggesting that the HSJE framework better specifies the type of interactional exchanges that balance processing demands with word learning opportunities than lower order supported joint engagement, or supported joint engagement in general, for children who are at risk for social-interactional challenges (like sibs-ASD).

If the suggested future studies confirm the predictions, interventions that encourage parents to use follow-in comments should couple that recommendation with *when* to provide follow-in comments (i.e., in episodes of HSJE). Future intervention packages should specifically encourage parents to use strategies that make episodes of HSJE specifically more likely to occur. Many naturalistic developmental behavior interventions encourage parents to imitate child actions in hopes of beginning turn-taking sequences that are a part of HSJE (e.g., Project ImPACT; Ingersoll & Wainer, 2013). Additionally, Bottema-Beutel and colleagues (2018) found that follow-in input is more likely to be followed by episodes of HSJE than non-follow-in input for both children with ASD and with typical development. Finally, Bottema-Beutel found that follow-in *directives* were more likely to be followed by episodes of HSJE than follow-in comments. Thus, parents could be taught to provide suggestions in the context of object play (i.e., follow-in directives) and then provide follow-in input about the child's focus of attention.

Conclusions

This study was the first to the author's knowledge to examine the potential differential relations between follow-in comments in various engagement states and later expressive vocabulary for sibs-ASD, and to test whether those relations were conditional on the presence of an eventual communication disorder in a sample of sibs-ASD. The significant and positive relation between follow-in comments in HSJE and later expressive vocabulary adds to a growing

literature base supporting the importance of not only using follow-in comments, but using them in high quality episodes of engagement.

Yet, replication is needed. Critically, confirmatory studies using an inclusion criterion of children with at least five reported words will improve the probability of including only children who are ready to talk in the analyzed sample or, alternatively, using a dependent variable, such as DKCC or receptive vocabulary, that can potentially reveal a relation between follow-in comments in HSJE and these dependent variables in children who vary in their readiness to use language expressively. With such replications, we can be more confident that the relation between follow-in input in HSJE and later expressive communication development in sibs-ASD is generalizable. Such correlational findings complement experiments involving interventions that include the use of follow-in comments in HSJE as part of the intervention package.

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APPENDIX A

Coding Manual

Parent-Child Engagement States Coding Manual

This manual is an adaptation of the coding procedures developed by Kristen Bottema-Beutel, Ariel Schwartz, Rebecca Louick, Elizabeth Stringer Keefe, Julia Hochman, Caitlin Malloy, So Yoon Kim, Shannon Crowley

Introduction: Definitions of Engagement States

The purpose of this coding scheme is to code parent-child free-play sessions from Project IMPACT for child engagement state. While many types of engagement episodes might occur in the session, the types of engagement that are of interest are (a) higher supported joint engagement, (b) lower supported joint engagement, and (c) object engagement. All other codable engagement state episodes will be coded as “other.”

Joint Engagement: The child is actively involved with an object or event with which the other person is also engaged. A key decision is **whether or not the other person is engaged with the same topic as the child**. Usually, the partner’s engagement with the object is evidenced by **active manipulation of the object**. However, the partner may be engaged without touching the object when, for example, he or she talks to the child about the object in a way that influences the child’s play with the object. If the other person is looking at or touching the object primarily to help the child gain access to an object (e.g., clearing away interfering toys, essentially “housekeeping”) but is not clearly changing the child’s experience with the object, code *Object* and not *Joint Engagement*. Also if the other person is merely talking about the event, essentially providing a background narrative of the child’s activity, do not code *Joint Engagement*.

Supported Joint Engagement (SJE): The child and parent are actively involved with the same object or event, but the child is not actively acknowledging the parent’s participation. The parent’s involvement influences the child’s activity with the object, but the child does not acknowledge this involvement. To be coded as *supported joint* rather than *object*, it must appear that the partner’s involvement with the object is in somehow influencing the child’s experience of the object or event in a way that could not be accomplished by an inanimate object. Higher supported joint engagement and lower supported joint engagement are subtypes of this engagement state.

- a) **Lower order supported joint engagement (LSJE):** In this substate, the child demonstrates little to no engagement with the parent. Evidence for this is normally characterized by passive interactions, and few to no reciprocal interactions. The child’s responses to adult behavior may suggest that the child does not differentiate the adult from objects. Children and parents often engage in this state when the adult facilitates the child’s play, when a

child and adult momentarily engage to accomplish a goal (i.e., open a container), and when the child and adult engage in parallel play. This type of engagement must last at least 3 seconds and can be punctuated by instances of disengagement from the partner and/or symbol-infusion.

- b) Higher Order Supported Joint Engagement (HSJE):** This substate indicates the child's active response to the parent's action and/or presence demonstrates an awareness of the parent as an entity capable of performing and controlling his/her actions. This often occurs during play that involves sequences, but a sequence of interactions alone is not sufficient evidence for HSJE. This substate must last at least 3 seconds and can be punctuated by instances of disengagement from the partner and/or symbol-infusion. **It is important to remember that this is a *state* and that single and brief reciprocal interactions that are goal-oriented are often insufficient evidence for HSJE due to their brevity.**

Object engagement: The child is exclusively engaged with objects by him/herself. The parent may attempt to engage the child during object play, but the child ignores her.

Note: Child engagement v. Adult engagement: Always remember that we are interested in the child's engagement. When choosing when to begin and end a state, decisions should be based on the child's behavior. If the child watches the parent bang on a drum and then the child bangs on the drum, and then the parent bangs again but the child walked away right after his turn, stop coding when the child abandons the activity, not when the parent finishes her turn. There may also be rare instances when it is the child who tries to elicit engagement, but the adult does not reciprocate. This should not be coded as a joint engagement state.

Step 1: Setting Up

Create a Folder for Files on Your Desktop

The first time you code files with the Engagement State coding system, create a new folder on your desktop.

Accessing and Downloading the Relevant Code File

1. The code file is titled "impact_engagement_date." Choose the code file with the most recent date at the end of the file name. Locate the code file on the secure text server (i.e., Yoder2) at: Madison Cloud -> Dissertation-> Code files.
2. Download the code file to the folder on your desktop. Do NOT open it directly from the server to link them to your ProCoderDV file as this could corrupt the code file. This step should be done once for the project. You should not delete it from your computer following each coding session because you will need it to code future videos.

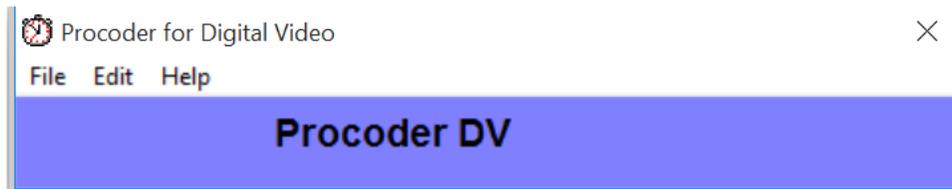
Accessing and Downloading Video Recorded Media Files

1. Locate the relevant video-recorded media file on the Vu1file server.
 - a. Open the 9-IMPACT Study folder.
 - b. Next select the appropriate site media folder (e.g., Vandy Media).

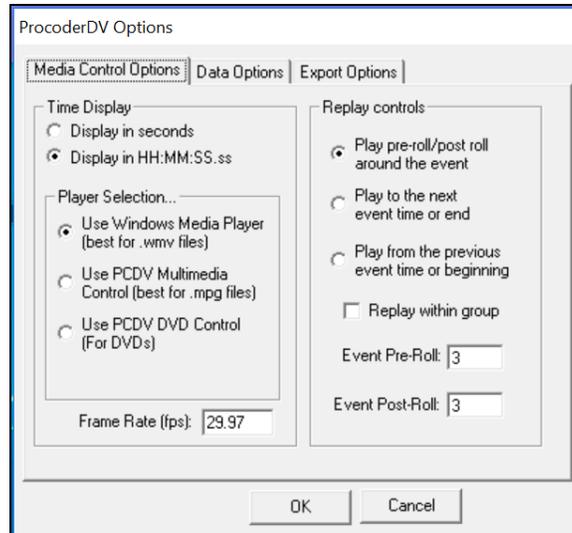
- c. Within this folder, you will find all media collected for the participants across time points and procedures.
 - d. The files you need are labeled using the following coding convention: "Participant number-T2-PCFP". Make sure you select the **Parent-child free play session (PCFP) from Time 2.**
 - i. e.g., V105-T2-PCFP.mp4
2. Download the media file that you will code to the folder on your desktop. Do NOT open it directly from the server to link them to your ProcoderDV file as this could corrupt the media file.

Setting Up ProcoderDV

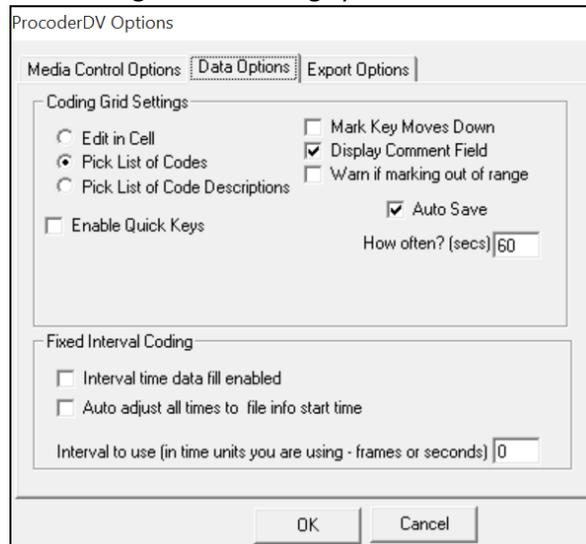
1. If you need to download ProcoderDV software, contact Paul Yoder (assuming you are working in his lab) or download from <http://vkc.mc.vanderbilt.edu/tapp/pcdv.exe>
 - a. Note that additional software is required for ProcoderDV to work on Mac computers.
2. Double-click on the ProcoderDV icon (i.e., analogue clock icon) to open ProcoderDV. You should see the following window open.



3. The first time that you use Procoder DV, you will need to activate it. Select "Help," then "Activate this copy," and enter your email and user number. The person who owns the license (e.g., Paul Yoder if you work in his lab) should provide you with the email and user number required.
4. Ensure that ProcoderDV Media Control Options match the following settings.
 - a. Media Control Options
 - i. Under "Time Display," select "Display in HH:MM:SS.ss."
 - ii. Under "Player Selection," select "Use Windows Media Play (best for .wmv files)."
 - iii. Under "Replay controls," select "Play pre-roll/post-roll around the event" and set the "Event Pre-Roll" and "Event Post-Roll" both to "3." This setting will play 3 seconds of the video before the event and 3 seconds of the video after the event.



- b. Data Options
- i. Under “Coding Grid Settings,” select the following:
 1. “Pick List of Codes”
 2. “Display Comment Field”
 3. “Auto Save”
 - ii. Fill in “60” for “How often? (secs)”
 - iii. All boxes under “Fixed Interval Coding” should be unchecked (i.e., empty). The box for “Interval to use” should be empty or display “0.” We are not using interval coding for this coding system.



- c. Select “OK” to end options set up.
- d. Once set, the options will remain set in this manner unless you edit them.

Using ProcoderDV to Code

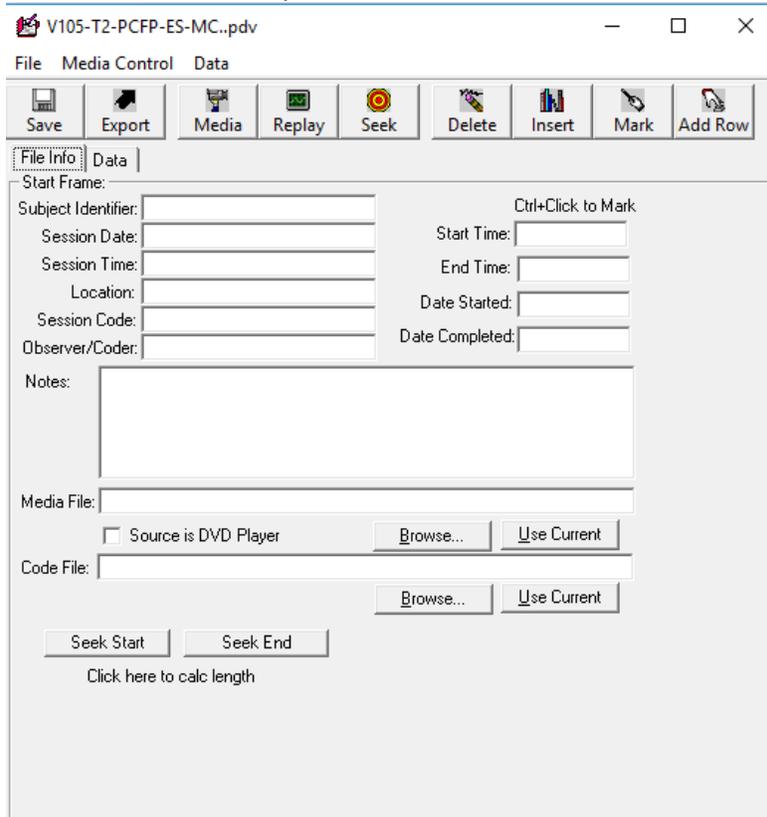
Once the ProcoderDV software options are set up, you will need to do the following 3 steps:

1. Open a new observation file (a file containing your record of the coding for each engagement state)

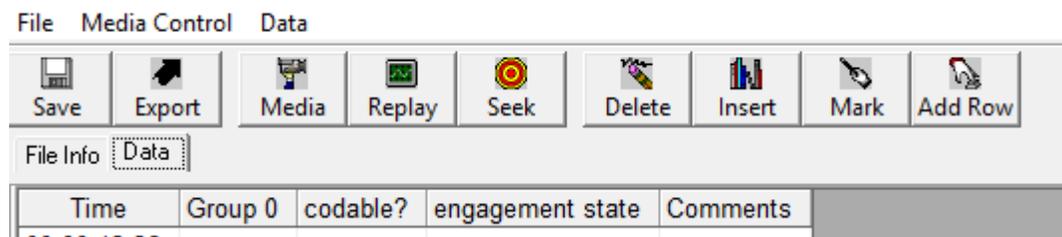
2. Open the media file (a digital record of the participant’s PCFP Behavior Sample)
3. Open the code file (a list of codes for each engagement state)

1. Open a new observation file

- a. On the ProCoderDV welcome bar, select “File,” then “New,” then “Observation Data File.”
- b. You will only create an observation file for a given participant for a specific time once. If you need to reopen the observation file later (e.g., to finish coding the video because you stopped before it was completed or to edit it), you will select “File,” then “Open,” then “Open a Data File...” or you may double click the file name in your SOS coding folder.
- c. You will see a window similar to the one below to create an observation file. Navigate to the folder you created on your desktop.
- d. In the “file name:” box, label the file using the following convention: “Research ID#-Time period number-Procedure Initials-Code-Coder’s initials” (e.g., “V105-T2-PCFP-ES-MC” for Vanderbilt participant 105 PCFP procedure at Time 2 coded by Madison Crandall). Note that PCFP (the procedure) and ES (“Engagement State;” the code) are included for the procedure initials.
 - i. If you are the secondary coder for a reliability check, end the file name with “-reliability” (e.g., V105-T2-PCFP-ES-MC-reliability).
 - ii. File names are not case sensitive.
 - iii. No extension is needed because ProCoderDV will attach “.pdv”.
 - iv. Click “Save.” Then you will see a screen similar to the following.



- e. Click on “File Info Tab” if it is not already selected, and fill in the following information on the Start Frame.
 - i. Subject Identifier: e.g., V105 (Subject ID#)
 - ii. Session Time: e.g., 2 (assessment time period)
 - iii. Location: e.g., VU or UW (site at which procedure occurred)
 - iv. Session Code: “ES” for this coding scheme
 - v. Observer/Coder: e.g., MC (your first and last initials)
 - vi. Date Started: e.g., 1/30/20 (date you begin coding the video)
2. Open the media file
 - a. Click “Browse...” under the “Media File” box to locate the media file that you have downloaded onto your computer. A link is created to this file. Remember NOT to link to the media on the server.
3. Open the code file
 - a. Click “Browse...” under the “Code File” box to locate the engagement state code file that you have downloaded onto your computer. A link is created to this file. Remember NOT to link to the media on the server.
 - b. The links should now be displayed in the “Media File” and “Code File” boxes.
 - c. Click “Save.” By saving at this point, ProcoderDV will be able to “recall” the media and code file that you have linked. Otherwise the files will not remain linked for the next time you open the data file.
 - d. Select the “Data” tab to see a screen similar to the following.



Setting Up Data Page for Coding

1. Each column displays different information
 - a. Time: Shows the time of event you mark while coding
 - b. Ignore the first column titled “Group 0.”
 - c. Codable? Marks if the child is in a codable state or not.
 - d. Engagement State: Marks if an episode of a codable engagement state occurred
 - i. When you click within these columns, a drop down menu will appear with the list of codes for each column.
 - ii. Comments: For typing additional comments related the event
2. You may adjust the column widths by placing the cursor on the margins of the cells and hold down the left mouse button while you stretch the margin of the cells. For example, you may choose to widen the Time column for it to display to complete time rather than being cut off.

Opening Media File for Coding

1. Select the “Media” button. The media file will open on your screen.
 - a. If you are using two monitors, in the media window, select “Options,” then “Size,” then “Fit to Window” (not stretch to window).
 - b. If you are using one monitor, use the cursor in the corner of the media file window to resize it to retain its width-to-height ratio while filling half the width of the monitor. The data file should fill the other half of the monitor.
2. Now you are set up to begin viewing the video. Helpful shortcuts for viewing and coding the video are listed below:

ProCoderDV Quick-keys Summary

Key Function

Ctrl+ D Play

Ctrl+ F Stop

Ctrl+ G Go to Start

Ctrl+ E Mark time

Ctrl+B Back two seconds

Ctrl+X Pause and insert new row marking time

F7 Frame Back

F8 Frame Ahead

Step 2: Coding for Engagement State

Familiarize yourself with the supplemental document outlining specific examples and non-examples of each engagement state code.

Begin watching the video. Start coding when the cameraperson says “start coding here” OR, if the child is not in frame, start coding when the child comes into frame and when the cameraperson says “start coding here”, AND the assistant is no longer giving instructions to the parent. Mark the time (Ctrl+E; see shortcuts) and type “start coding” in the comments field.

Considering Codable/Not Codable Codes

View the video until a codable state event occurs. A codable state lasts for at least three seconds or at least three turns. If a child meets any of the following criteria at any point, code “not codable” in the codable group:

- a) Completely out of the camera frame, blocked by the parent or object.
- b) Engaged with a “Non-set up Object”: The only objects that can be counted for engagement states are the ones that are part of the assessment set up. If the parent or child brought in anything from outside, engagement with that object should be considered uncodable. Common examples include the parent’s phone or a water bottle. Note that there is no stuffed animal in the toy set.

- c) In segments where the child and/or parent is difficult to see (i.e., they are obstructed by the parent, or facing away from the camera), use the information available to make your best judgment about the state.
- d) Note: The three-second rule does not apply to not codable segments (they can be any duration).
- e) If a child leaves a not codable state and enters into another state for less than three seconds, keep the child in Not Codable until they enter into a state for three seconds, or into the state from which they entered Not Codable.
- f) If it is not possible to determine if the child is in a lower- order (object or other) vs. a higher- order state (SJE), code the segment as Not Codable.

Coding Engagement States

When you become convinced that a state change has occurred, back up the video and try to code an accurate time point where the shift is indicated. For example, this may be when the child turns his body away from the parent. To be considered an engagement state, the episode **must last for at least three seconds, or be composed of at least three turns.**

View the episode no more than three times. Determine which state the child is in using the definitions provided in the supplemental definitions document. Select the correct code for the engagement state in the pull-down menu in the “Engagement States” group. These codes are listed in the definitions table in the supplemental definitions document.

a. Rules for Changing States: When a clear state is less than 3 seconds, keep the child in the initial state until he or she transitions to the next state that lasts at least 3 seconds. There is an important caveat to this general rule of thumb; uncodable segments can be less than 3s as they are not engagement states.

If you notice that there are several short intervals that switch back and forth between states that are around the three-second mark, consider whether or not the segment is one extended sequence of a single state. The state may be made up of long turns, so that the child may appear to be cycling between onlooking and engaged, but is actually waiting for the parent to take a turn within an engaged state. In this case, you must be able to identify what constitutes a turn (i.e., filling up a bucket with beads) in order to consider the sequence as involving long turns. Conversely, a parent may make brief interjections (< 3 sec.) into the child’s activity that do not appear to go anywhere. This is not enough to take the child out of an object-focused state.

Once a state is established, less evidence is needed to maintain it than was required to begin it. Consider changing states if you can locate a clear seam in the engagement stream and the appropriate codes differ before and after the seam, even if you soon encounter another seam that takes you back to the initial state. For example, a child might be engaged in lower supported joint and then, for 5 seconds, clearly disengages and wanders off camera. Then, in response to the parent’s interactive efforts, engages again in lower supported joint engagement. This would be coded LSJE-U-LSJE if the seams between the states are clear. Or, the parent or child might move on to another activity instead of taking a turn in the established routine. If this period of ‘set up’ takes longer than five seconds, you should consider switching out of the joint engagement state. In other words, you need to balance the rule “don’t microcode” with the possibility that a new state has begun.

In any engagement state, the child and/or parent must engage with each object for at least three seconds. For example, If the child plays with an object for 3 seconds, then looks around for a second, then plays with another object for three seconds, keep the child in object the whole time. If the child plays with one object for less than three seconds, then looks around, then plays with a different object for three seconds, consider the child in unengaged and code “other” until he/she plays with the second toy.

b. Transition Rules:

Always code an engagement state from the moment you have an indication that it has begun. Sometimes you realize a state is beginning before the child is fully into that state. Sometimes the beginning is not clearly marked. In this case, wait until you have no doubts that the new state has emerged. This may mean that you include the former state for a few seconds when the child’s engagement is not completely characterized by the code you use.

- 2) Continue coding the observation file. Stop coding when the research assistant says “stop coding here.” Mark the time (Ctrl+E) and type “stop coding” in the comments field.

Special Considerations:

- (i) **Echolalia:** For children who exhibit echolalia, the coder must make a judgment about the intent of the utterance. If the child is using echolalia to confirm a parent’s utterance, the coder should consider symbolic communication. For example, if the parent says “that’s a duck on the bucket”, and the child says “duck”, the function of the response is likely to confirm the parent’s statement, and should be counted as symbol infusion.
- (ii) **Interactions that do not Constitute Engagement:** In instances where the child is manipulating the parent’s hands as an object and NOT as a part of an agentive person, the state should be coded as ‘object’. For example, if the child uses the hand as a ‘tool’ to push a toy out of the way, this should be coded as object. If the child manipulates the parent’s hand toward a toy that they would like the parent to perform some operation on, the child may be making a communicative request for help. This is usually evidence by the child letting go of the parent’s hand and waiting for the parent to perform an action (all other rules for the state must apply). If the parent manipulates the child in a way that does not change the child’s engagement with an object or person, the state does not change (i.e., the parent moves the child’s position, but the child’s engagement of the object does not change).

Special Considerations Specific to LSJE v. HSJE:

- (iii) For instances of ‘contingent action’ (imitation, following through on a request, turn taking), the substate should begin when the caregiver makes the first move (all other rules of the state apply). A child’s active response to a parent’s action includes shared affect.

(iv) **Uncodable:** There may be instances in which there was sufficient information to determine an initial state code, but more information is needed in order to determine the SJE substate. In these instances, the code '*uncodable SJE*' (u) will be chosen. When the child's back is turned to the camera, code the highest known state. So, even if there is possible eye contact, use all other available evidence to make a determination of high vs. low. Below are the criteria for use of this code.

1. Child or adult's body or toy blocks action, or action occurs off screen.
2. Example: The child and the parent are both playing with the beads, but their hands are obscured by the child's body, such that it is unclear whether or not they are taking turns.
3. Example: The child and the adult are playing with the animals in the barn, but the barn is positioned between the coder's field of vision and the surface on which the animals are being manipulated.
4. External noise is present that makes it difficult to interpret any utterances and subsequent responses.

(v) **Segmenting Rules:** If there is a long segment of SJ (>6 seconds) that you believe contains both a high and low SJE, it is acceptable to break up this segment. However, as with all other states, for high and low SJE substates must last at least 3 seconds. Be attentive to instances when a shift in the child's behavior is due to realizing the mechanisms of a toy rather than as a shift in social behavior.

(vi) **Demand characteristics:** It is important to distinguish between the child reciprocally responding to the parent and situations in which the demands of the setting (i.e., features of toys) create a situation in which the child's behavior may be consistent with a response to the parent, but is actually a response to the setting. For instance, there are some toys and play sequences that a parent can initiate in which even the child's uncoordinated actions appear to be a part of a reciprocal sequence at first glance. Be sure to differentiate between children actively taking opportunities for reciprocal responses, and children playing within a context that elicits a behavior sequence independent from the parent's behavior. Another way to think about this is that some toys "go with" particular actions or other toys, and that this pairing, rather than the parent, directs the child's action. This is also important to consider with regard to turn taking, as some toys have particular affordances that lend to turn taking without the child doing much "work" to initiate or continue the turn taking sequence.

1. Example: The parent is holding the baby and says, "Feed the baby." The child moves the bottle to the baby's mouth. The child may have performed this action in absence of the parent. One helpful guideline is timing of the

child's action versus the adult input. If the child's action begins before the parent's suggestion, (i.e., the child would have fed the baby regardless of parental input), code *LSJE*. If the child's action begins after the parent's suggestion begins, code *HSJE*. Ultimately it is the coder's discretion.

2. Example: A mom hands the child a bucket and he stacks it on top of another one. The child then stacks a jar lid on the buckets. The child turns away from the mom and when he turns back, the mom hands the child another bucket. This pattern repeats itself, but the child never reaches for a bucket, nor pauses in anticipation for the buckets. Here, the child was a recipient of the mom's giving, but did not contribute to the initiation and continuation of this routine (should be *LSJE*)
3. Non-example: The child is playing with the snap beads, signs "more", and waits for the parent to hand him or her another bead, all without looking at the parent (should be *HSJE*)

(vii) **Parent as Object:** There may be instances when the parent and child are *seemingly* taking turns or reciprocally engaged in other ways, but the child is not actively playing a role in establishing and/or maintaining this engagement. This has been described above as the adult "facilitating" play and is characterized by the *absence of child bids, expectant pauses, or symbolic requests for adult action*. This can often be observed when children interact with toys that "appear from nowhere" or that "magically" work (should be *LSJE*).

Step 3: Finishing Up

Uploading your Coded File

Upload the observation file on the secure server in the appropriate location (Yoder2>Madison>Dissertation> Engagement Coding>Your name >Primary or Reliability). Delete the observation file and the media file off of your desktop.

Engagement State Codes

| Engagement State Code | Engagement State(s) | Definition | Examples and Non-Examples |
|-----------------------|---------------------|--|--|
| Other | Unengaged | <ul style="list-style-type: none"> • The child appears uninvolved with people, objects, events, or symbols. • The child may be unoccupied, scanning the environment as though looking for something with which to be engaged, or flitting between foci without committing to any specific object. • Use this code until the child displays clear interest in a specific object, person, and/or symbol. • Include segments in which the child is involved with food or drink (such as a sippy-cup brought from home). Also include segments when the child is crying or having a tantrum and is not focused on any particular object or person. | <p>Example: The child puts down a toy, and moves to the other side of the room while scanning objects</p> <p>Example: The parent uses child’s hands to sign “help,” but child is scanning the ceiling</p> <p>Non-Example: The child puts down a toy, and moves to the other side of the room while watching the parent engage with a toy. (should be <i>Onlooker</i>)</p> |
| | Onlooker | <ul style="list-style-type: none"> • The child is looking at the partner’s actions, but is not a participant. The child is an audience or listener and is making no active commitment to being involved in the activity or interaction. • The child may be looking primarily at the other person, or at objects the other person is manipulating, or at both the person and object. | <p>Example: The child watches parent put beads into a cup, but does not interact with the beads or the parent.</p> <p>Example: During book reading, a parent handles the book without input from the child, and the child looks on (even with interest) but has no involvement (e.g., touching</p> |

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| | | <ul style="list-style-type: none"> • The state requires definite interest in whatever the child is watching, particularly since the state is maintained primarily by the child’s interest, not actions. • Include segments when the child is “onlooking” actions on themselves, such as when a parent puts beads around the child’s neck, or drives a car up the child’s arm. • Do not include segments when the child is animated as well as interested while involved with an object, person, and/or symbol. • This code includes segments in which a child stares directly at an adult while he/she is talking. • Note: A period of onlooking may occur as part of a period of joint activity (i.e., SJE). If a child watches a parent demonstrate how to use an object or take a turn with the object and then, as soon as the demonstration ends, the child proceeds to perform this act on the object or take his/her turn. In such cases, code the entire period as joint engagement. | <p>the pages or commenting) in the reading of the book</p> <p>Non-Example: The child watches the parent narrate a book, and touches the illustration of the objects that the parent is reading about (should be <i>SJE</i>)</p> |
| | Parent (p) | <ul style="list-style-type: none"> • The child is exclusively engaged in a dyadic interaction with the parent. • The child must be engaged actively with the other person, not merely onlooking. Typically, the other person is also engaged with the child, but the partner’s level of involvement may be minimal (e.g., only looking at the child). | <p>Example: The parent and child sit face to face, and the child waits expectantly for the parent to tickle her. When the parent tickles the child, she and the parent laugh</p> <p>Example: The child finishes with a toy, stands up, faces the parent.</p> |

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| | | <ul style="list-style-type: none"> • If objects are involved they play only a minor role (e.g., child holds on to a toy but seems to pay no attention to it). • This code is used if the partner is talking to the child during person engagement and the symbols are not referring to an object or even present in the room. • This code includes rough and tumble play, hugging, clapping games, singing (i.e., games that do not involve objects) • Use this code for back and forth verbal exchanges repeated in a routinized fashion (e.g., word plays) that don't have anything to do with the semantic content of the words | <p>Parent says "Yay". Parent and child clap together.</p> <p>Non-Example: The child laughs as he watches a car that the parent is pushing across the floor (should be <i>Onlooker</i>).</p> |
| b (Object) | Object | <ul style="list-style-type: none"> • The child is exclusively engaged with objects by him/herself. The parent may attempt to engage the child during object play, but the child ignores her. • This state starts when the child <i>touches</i> the object, not when he/she begins to pursue or visually attend to it. • The parent may be holding an object while the child plays with it (this can occur with very young children), but the parent is not actively influencing the way that the child plays with/explores the object. • Do not include segments in which the child is merely in contact with an object, as when he or she absent-mindedly holds a small toy while scanning the room. | <p>Example: The child is playing with beads while the parent narrates his actions</p> <p>Example: The child engages in solitary play with a slinky and says "slinky"; c) the child looks in a mirror engaged with himself as an object.</p> <p>Non-Example: The child is playing with beads, and following the parent's directions on where to put them (should be <i>SJE</i>)</p> |

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| | | <ul style="list-style-type: none"> If the child engages with a toy for at least three seconds, then switches focus to another object but plays with that object less than three seconds, the unengaged code should be used from the moment the child lost contact with the first object. | |
| N | Not codable | <ul style="list-style-type: none"> In segments where the child and/or parent is difficult to see (i.e., they are off-screen, occluded by the parent, or facing away from the camera), use the information available to make your best judgment about the state. If it is not possible to determine if the child is in a lower-order (other, object) vs. a higher-order state (LSJE, HSJE), code the segment as Not Codable. Note: The three-second rule does not apply to not codable segments (they can be any duration). As with other states, if a child leaves this state and enters into another state for less than three seconds, keep the child in Not Codable until they enter into a state for three seconds, or into the state from which they entered Not Codable. When an uncodable segment divides a single engagement state, the temporal sum of the same-state segments it divides must total at least 3 seconds (i.e., the preceding and succeeding segments do not have to independently last at least 3 seconds). | <p>Example: The child is playing with a toy while facing the parent and has his back to the camera. There is not enough information to determine if the child is looking back and forth to the parent while playing with the toy (should be <i>Not Codable</i> - the coding decision is between <i>Object</i> (a lower-order state) or <i>CJE</i> (a higher-order state)).</p> <p>Non-example: The child is holding the baby, facing the parent, back to camera. The child looks at the baby, says, “baby” and her head lifts up, apparently looking at the parent. (should be <i>CJE</i>- head movement provides enough evidence for this code)</p> <p>Non-example: Parent and child are taking turns with the pop-up toy, with the child’s back to the camera and the parent at the child’s eye level. The child’s head stays lowered over the toy. (should be <i>SJE</i> - turn taking and shared)</p> |

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| | | | engagement with the toy provide enough evidence to code, even though there is not enough evidence to determine if the child glances to the adult) |
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HSJE

| HSJE | Examples and Non-Examples |
|---|--|
| <p><u>Imitation of Parent’s Object Play</u></p> <ul style="list-style-type: none"> Requires attention (usually in the form of gaze) to adult’s demonstration Could take the form of the child listening to the adult; therefore, if narration of the object is present, code as HSJE unless there is clear evidence that the child is <i>not</i> attending to the narration, such as making noises over the adult’s speech) Code the entire sequence as HSJE, including the child watching the adult. The substate should begin when the parent makes the first move. Note that if the child stares at the toy for 3 seconds or longer before imitating the parent, it should have been coded as <i>object</i>. | <p>Example: The parent moves a horse across table while child watches. The child subsequently moves an animal across the table.</p> <p>Non-example: Adult moves horse across table, but child looks at a cow while the adult plays. The child then moves his/her cow across the table in the same way the parent just moved the horse, while the parent continues to play with animals from the same set. (Should have been coded <i>object</i>; the child did not watch the parent’s play)</p> |
| <p><u>Giving to Parent</u></p> <ul style="list-style-type: none"> Gives or holds out an object to parent in anticipation of adult action or collaboration | <p>Example: Child tries to open a jar, and then hands it to the adult. The child does not engage with other toys, but rather pauses in anticipation of the parent opening the jar and then continues to play with the jar and/or its contents.</p> <p>Example: The child holds out a chain of snap beads and holds onto it, supplying tension while the parent pulls individual beads off of the chain.</p> <p>Non-example: In the absence of an adult request, the child gives one necklace to the adult and then continues to play with the other necklaces, with the adult periodically supplying new necklaces. (Should be <i>LSJE</i>; the single give is only an instance of behavior, not a state of engagement)</p> |
| <p><u>Physically Prompting the Parent to Perform an Action</u></p> <ul style="list-style-type: none"> This action must be preceded by a child or parent bid, or followed by a child response as part of a reciprocal sequence. This generally takes the form of the child grabbing or reaching for the adult’s hand and then letting go of the hand, thus allowing the adult to perform an action independently. The child using the adult as a tool (as if the adult’s hand was an object) is not considered a prompt. | <p>Example: Child attempts to open jar and reaches for adult hand to request help. The adult helps child open jar and child continues engagement with the jar/its contents, occasionally sharing it with the adult.</p> <p>Example: The parent demonstrates an action on a toy and the child physically prompts a repetition or modification of that action.</p> |

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| | <p>Non-example: The child attempts to open the jar and reaches for the adult’s hand. The child uses adult hand as a tool to open jar. The adult and child both play with the jar’s contents, but do not engage in further exchanges (should have been <i>object</i>; the child does not reference the adult’s actions)</p> |
| <p>Direct Engagement with Parent’s Action</p> <ul style="list-style-type: none"> The child is engaging with the adult and <i>not</i> an object that the adult is manipulating. | <p>Example: Over the course of at least three seconds, the adult reaches for the child’s beads and the child thwarts this action by whacking away the adult’s hand.</p> <p>Example: The mother dangles the beads in front of the child while displaying a heightened affect, seemingly in attempt to elicit a response from the child. The child responds by laughing.</p> <p>Non-Example: The child touches the beads in the adult’s hand as the adult puts it on his/her head; the adult continues this action and the child neither protests nor shows evidence of approval (should be <i>LSJE</i>; the child does not make an affective response)</p> <p>Non-Example: The adult uses the baby to push down the pop-up animals and the child pushes the baby out of the way. (Should be <i>LSJE</i>; the child is attending to the object as the obstacle rather than the adult)</p> <p>Non-Example: The adult silently hands the child beads and the child laughs at the beads. The adult says “woo” with rising intonation. The child continues playing with the beads. (Should be <i>LSJE</i>; the child’s laugh is not in response to any adult affective displays, and the adult’s response to the laugh does not elicit a response from the child.)</p> <p>Non-example: The adult puts beads on the child’s head and the child removes them (Should be <i>LSJE</i>; only two turns occur—all without the child referencing the adult)</p> |
| <p>Turn-taking Sequence Involving an Object:</p> <ul style="list-style-type: none"> In order for turn taking to be considered HSJE the child must show evidence of propelling the turn taking sequence forward. This may take the form of an anticipatory wait, a communicative reach (the child’s goal should be that the adult performs an action on the object, not that they reach if | <p>Example: The parent and child are engaged in a puzzle, and take turns manipulating pieces. During the parent’s turn, the child maintains focus on the puzzle in anticipation of upcoming turn.</p> <p>Example: The parent is reading a book to the child and when the adult finishes the page, the child turns the page.</p> |

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| <p>themselves), a vocalization, a glance to the parent, handing the parent an object, etc.</p> <ul style="list-style-type: none"> • Segments of LSJE may punctuate a HSJE sequence, but the designation of the state as high should not be changed unless the low designation can be applied for a minimum of three seconds. • In general, if the turn taking sequence involves a parent turn being sandwiched between two child turns, code as HSJE. The child must take at least two turns (unless it is an imitative turn sequence, then see above). • Code wherever the first turn begins, whether it is parent or child. It is possible that the caregiver makes the first move (see examples and non-examples). • When making decisions about turn taking, consider the child’s body orientation and the coordination (or lack thereof) of child vocalizations and movements with that of the adult and the object play. • It is possible that turns may overlap slightly, but there must be clear evidence that the partners orient to the interaction as a turn-taking routine. | <p>Example: The parent puts the beads in the bucket, and the child dumps the beads out of the bucket. The child waits for a period of time after dumping the beads and holds the bucket in place. The parent uses this as an opportunity to take a turn and puts the beads in the bucket. The child dumps the beads.</p> <p>Non-example: The parent and child are both engaged with a puzzle, but the child puts pieces together without waiting for the parent (Should be <i>LSJE</i>; there is no evidence of a turn-taking sequence)</p> <p>Non-example: The dyad is engaged with the pop-up toy, and the child pushes the animals down, with the parent immediately popping them up. This proceeds for several turns without the child demonstrating an anticipatory wait. (Should be <i>LSJE</i>; there is no evidence that the child acknowledges the parent’s role in the sequence)</p> |
| <p><u>Turn-taking with Vocalizations:</u></p> <ul style="list-style-type: none"> • Vocalizations should align with the structure of conversation. • In these instances, use prosody, pitch, and the child’s physical orientation in order to determine if the child’s non-symbolic vocalization is part of a turn taking sequence. • In these cases, the caregiver makes the first move. | <p>Example: The parent asks the child “what is that a picture of?” and points to the book. The makes a non-symbolic vocalization with falling intonation, turns and faces the book. The parent then says “a dog,” and the child produces another vocalization after the parent finishes talking.</p> <p>Non-Example: The parent asks the child “what is that a picture of?” while the child plays with beads. The child produces a long vocalization with series of rising and falling intonation, as if talking to him/herself, and remains focused on the beads. (Should be <i>LSJE</i>; the timing of the vocalization is the only evidence that the child is attending to the adult’s symbols)</p> |
| <p><u>Communicative Exchanges:</u></p> <ul style="list-style-type: none"> • The child complies with the adult’s instructions, imitates adult symbols, or intentionally communicates with the adult using either symbols or non-verbal communication. • Non-verbal communication includes canonical gestures, pointing (not tapping), showing, giving an object, or extending an arm out for an object to | <p>Example: The parent and the child are playing with the farm animals, with the horse in the control of the parent, and the child manipulating the pig. The parent says, “The horse wants to play with the pig,” and the child moves the pig to the horse, and they continue playing with the horse and pig interacting.</p> |

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| <p>communication that the child would like to have the object.</p> <ul style="list-style-type: none"> • There must be discernible words for a child vocalization to count as an imitation of adult symbol. | <p>Non-example: The parent hands the child a necklace and when the child drops a necklace he or she says “uh-oh” to space. (Should be <i>LSJE</i>; Here there is no evidence that this symbol was intended to be “received.”)</p> <p>Non-example: The child is playing with the beads and says “goodnight” without looking at the adult in an <i>LSJE</i> play segment. (Should be <i>LSJE</i>; this utterance is uncoordinated with the object play, the symbol usage cannot “bump” this segment to <i>HSJE</i>)</p> |
| <p><u>Collaboration with Parent toward a Shared Goal:</u></p> <ul style="list-style-type: none"> • The parent establishes an action plan with objects, and the child acknowledges and participates in this plan. • There must be evidence that the child is willingly and actively following the parent’s suggestions for action, and the adult must maintain participation in the activity. • In these cases, the caregiver makes the first move. | <p>Example: The parent suggests that the child take the beads off the parent’s neck and put them into a bucket. The child begins to carry out this plan, while the adult assists and helps coordinate their joint efforts.</p> <p>Non-Example: The child is playing with the pop-up toy, and the parent comes over and begins to assist the child. The parent has not communicated an action plan that changes the child’s course of action.</p> |

LSJE

| Type of LSJE | Examples and Non-Examples |
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| <p><u>Parent Facilitates Play</u></p> <ul style="list-style-type: none"> • The parent provides materials or a means for the child to play, but does not provide information or suggestions about how to play. • This includes occasions where the parent uses hand-over hand-to help the child do something that the child was already trying to do. • This does not include Instances where the caregiver momentarily influences the child’s play and then quickly disengages while the child ‘deals’ with whatever the caregiver has done | <p>Example: The child is stacking the buckets and the adult hands the buckets to the child in the absence of a request from the child.</p> <p>Example: The adult holds the barn and applies pressure to it to help the child click the door into place. The adult only gets the credit for facilitation, and then it becomes object if the mom is just holding the barn.</p> <p>Example: When parent performs hands-on-hands action with child.</p> <p>Example: A turn taking sequence in which two child turns sandwich one parent turn.</p> <p>Non-example: The child is trying to make the pop-up toy work and reaches for the adult’s hand. The adult helps the child pop-up one character. This sequence is repeated. (Should be <i>HSJE</i>; the is child</p> |

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| | <p>requesting the parent’s help and the parent is responding each “turn.”)</p> <p>Non-example: The child reaches for the adult’s hand, the adult pushes the car and releases it. The child reaches for the adult’s hand, and the adult pushes the car again. (Should be <i>HSJE</i>; although the child did not manipulate the toy, the reach can be considered a child turn.)</p> <p>Non-example: The adult holds the jar of beads while the child takes the beads out without acknowledging the adult’s involvement. (Should be <i>object</i>; the adult is acting as a prop.)</p> <p>Non-example: The parent puts a toy in the way of the child rolling the car (should have been <i>object</i>; caregiver does not continue to engage and therefore the joint engagement does not last 3 seconds).</p> |
| <p><u>Parent Demonstrates Play</u></p> <ul style="list-style-type: none"> • The parent provides a demonstration of how to play with an object. • The child does not display a reciprocal response or the child does <i>not</i> attend to the demonstration, yet displays a seemingly reciprocal response. • The criteria of attending to the demonstration in the presence of a reciprocal response mitigates conflation with child responding to the demand characteristics of a toy rather than to the parent’s action. | <p>Example: Adult feeds the baby with the bottle and does not narrate this action while the child is looking away. The adult continues to hold the baby and gives the child the bottle. The child then feeds the baby with the bottle.</p> <p>Non-example: Child expectantly watches adult stack buckets and then knocks down the bucket-tower. Parent then restacks blocks while child expectantly waits and again, knocks down the completed tower. (Should be <i>HSJE</i>; child is demonstrating anticipation)</p> |
| <p><u>Parent Shapes Play</u></p> <ul style="list-style-type: none"> • The parent plays a role in shaping the child’s play • The child does not reciprocally respond. | <p>Example: The adult and child are playing with beads and the adult directs his/her attention to the rattle. The adult comments on or manipulates the rattle and the child plays for the rattle for three seconds, and then continues on to another toy without referencing the adult.</p> <p>Example: The adult gives a cow toy to the child, and the child plays with the cow. The adult then gives a horse toy to the child, and the child plays with the horse. The child does not acknowledge the adult’s involvement in the play. This is considered a series of give.</p> <p>Example: The child is playing with the beads as the adult begins to put them away.</p> |

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| | <p>The child does not protest or try to thwart this clean up activity.</p> <p>Non-example: The child and the adult are playing with the beads and the child directs his/her own attention to the rattle without referencing the adult. The adult continues to play with and/or comment upon the beads. Should have been <i>object</i> (at the point where the child becomes engaged with the rattle); there is no evidence of engagement with the parent)</p> |
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Occasionally, a child may engage in coordinated joint engagement, a higher order state. If this occurs, code “other.”

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| <p>C</p> | <p>Coordinated joint engagement</p> | <ul style="list-style-type: none"> • The child’s engagement includes elements of <i>Parent</i> engagement and <i>Supported Joint Engagement</i> that occur in an alternating and/or integrated fashion; i.e., coordination of attention to objects and people. The child indicates his or her attention to the other person by glancing toward the other person’s face. • Unlike in <i>Supported Joint Engagement</i>, the child acknowledges the partner’s involvement. Thus, while the parent’s involvement with the shared object during <i>SJE</i> is always evidenced by active manipulation, in <i>CJE</i>, her level of activity directly on the object may be quite minimal because the child is taking a more active role in balancing attention between the shared object and the social exchange. <p>There are two ways that a parent and child can be in <i>CJE</i>: coordinated attention while engaging with objects, and coordinated</p> | <p>Example: The child pushes the truck that the parent is also pushing and then looks back and forth between the parent’s face and the truck</p> <p>Example: The child bangs his or her hand onto the same toy that the parent is manipulating and then looks at the parent, bangs the toy, and then looks back at the parent</p> <p>Example: The child holds up a toy plane, shows it to the parent while looking at her, and then moves it through the air while the parent acknowledges their shared focus by laughing and saying “zoom.”</p> <p>Non-example: The parent and child are putting a puzzle together,</p> |
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| | | <p>attention while conversing. There are separate rules for each state.</p> <p><u>CJE with objects:</u> Parent and child are engaged with the same toys, and the child looks to the parent for either a three second span while engaging, or coordinates looks while engaging at least twice during the engagement sequence (Parent – Object – Parent).</p> <p>This state has special start/stop rules: The state begins on the child’s first look, and ends 7 seconds after the child’s last look OR when the parent and child stop joint engagement in an activity.</p> <p><u>CJE with conversation:</u> Parent and child are actively communicating with words; They may or may not also be engaged with an object.</p> <p>Use this code If parent and child are in a conversational sequence that lasts 3 seconds or involves 3 turns (2 from the child) and there is at least one glance to the parent’s face. If the child uses the parent’s name (“mom, look at this”), no glance is required.</p> <p>For this code, words must be recognizable words or word approximations, not just babble.</p> <p>This state has special start/stop rules:</p> <p>If the look occurs within 7 seconds of the start of conversation. the state begins when the conversation starts.</p> <p>If the conversation starts more than 7 seconds prior to the first look, the state starts 7 seconds prior to the look. The state ends 7 seconds after the child disengages from the last</p> | <p>focusing on the puzzle pieces. During the episode, the child looks to the parent once and smiles; the look lasts less than three seconds (should be <i>SJE</i>)</p> <p>Non-Example: The parent and child engage in a communicative exchange where the child is periodically looking at the caregiver, then an object and then the caregiver (i.e., establishing Person-Object-Person joint <i>attention</i>) but if the caregiver is not actively engaged with the object and is just narrating (i.e., the caregiver is not actively engaged) (should be <i>Object</i>)</p> |
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| | | <p>look OR when the child disengages from the conversation.</p> <p>If the child stops responding to parent conversational moves (or if there are no further parent conversational moves), the state ends at the last child utterance.</p> <p>Some things to consider:</p> <ul style="list-style-type: none">• Use changes in head-direction as an aide to determine looks to the parent• Be mindful when using parent actions to help determine what a child is doing. Parents may 'over-interpret' a child's intentions.• Pay attention to sounds; they may indicate when a child is playing with a toy• Words need to be transcribable. | |
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