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A Manual for the

EARLY SOCIAL COMMUNICATION SCALES (ESCS)

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I. BACKGROUND

The Early Social-Communication Scales (ESCS) is a videotaped structured observation measure that requires between 15 to 25 minutes to administer. The version described in this document has been designed to provide measures of individual differences in nonverbal communication skills that typically emerge in children between 8 and 30 months of age. It may be used with children with typical development within this age range or with children with developmental delays whose verbal age estimates fall within this range.

The ESCS was originally designed as a comprehensive clinical measure based on two organizing constructs: 1) a cognitive, Piagetian, stage-related orientation to early development which provided a means for analyzing specific behaviors' developmental complexity; and 2) a pragmatic-functional orientation which provided a means for analyzing specific behaviors' interpersonal or communicative goal (see Seibert, Hogan, & Mundy; 1982, 1984). A set of 25 semi-structured eliciting situations were developed to encourage interaction between an adult tester and the child; approximately 110 child behaviors were noted as possible occurrences. From videotaped records, behaviors were then coded, and summarized according to a) developmental stage (simple, complex, conventional, or symbolic); b) communicative goal (to achieve social interaction between partners, to achieve joint attention to an entity or event, or to regulate the partner's behavior for assistance or compliance); and c) whether the child initiated the interaction or responded to the tester's bid. Thus, a social-communicative profile resulted which indicated the child's highest levels across the various communicative functions.

By reducing the number of items in the ESCS, this abridged version has been designed as a more practical research instrument, as well as a clinical tool. Furthermore, the scoring of the abridged version emphasizes frequency data, rather than the ordinal or four-stage related measures of early social communication development emphasized in the original ESCS (Seibert et al. 1982). The complexity construct is now reflected by the designation of lower vs. higher level behaviors. Finally, the theoretical framework of the abridged ESCS has been broadened so that the measures of the ESCS are now viewed as reflecting self regulatory and affective process, as well as epistemological and basic process elements of early social cognition (see Mundy, 1995; Mundy & Willoughby, 1996; Mundy & Gomes, 1997; Mundy & Sheinkopf, 1998).

Behaviors of Interest

The videotape recordings of the ESCS enable observers to classify children's behaviors into one of three mutually exclusive categories of early social-communication behaviors. The function of these categories of behaviors may be briefly described as follows. Joint Attention Behaviors refer to the child's skill in using nonverbal behaviors to share the experience of objects or events with others. Behavioral Requests refer to the child's skill in using nonverbal behaviors to elicit aid in obtaining objects or events. Social Interaction Behaviors refer to the capacity of the child to engage in playful, affectively positive turn-taking interactions with others. (For additional description of these dimensions see Bates, 1979; Bruner & Sherwood, 1983; Mundy et al. 1988; Mundy, 1995; Seibert, et al. 1982, 1984).

Behaviors are also classified as to whether they are child initiated bids or responses on the part of the child to a tester's bid. Thus, Initiating Joint Attention (IJA) refers to the frequency with which a child uses eye contact, pointing and showing to initiate shared attention to objects or events. Responding to Joint Attention (RJA) refers to the child's skill in following the tester's line of regard and pointing gestures.

Initiating Behavioral Requests (IBR) refers to the child's skill in using eye contact, reaching, giving or pointing to elicit aid in obtaining an object, or object related event. Responding to Behavioral Requests (RBR) refers to the child's skill in responding to the tester's gestural or verbal simple commands to obtain an object or action from the child. Initiating Social Interaction (ISI) refers to the child's skill at initiating turn-taking sequences and the tendency to tease the tester. Responding to Social Interaction (RSI) refers to the frequency of eye contact, gestures, and turns-taking exhibited by a child in response to turn-taking interactions initiated by the tester. Finally, a measure of social communication imitation may also be obtained from the ESCS by summing the number of times the child imitates the pointing and/or clapping gestures displayed by the tester.

The toys and other materials used in the ESCS have been selected because of their potential to elicit social interaction, joint attention, and/or behavioral request. The toys included: a) three small wind-up mechanical toys, b) three hand-operated toys, including a balloon, c) a small car and a ball that will roll easily across the table, d) a book with large distinct pictures on its pages, e) a toy comb, hat, and glasses, and e) colorful posters positioned on the walls to the left, right and behind the child. These should be at least two feet beyond the arm's length of the tester during ESCS administration. All toys used in the ESCS are positioned within view but out of reach of the child and the toys are presented one at a time during the administration of this measure. Examples of the toys, their positioning, and the posters are provided in the accompanying reliability tapes.

II. ROOM SET-UP

The optimal room configuration for the ESCS is displayed in Figure 1. Furniture should be arranged so that the tester is across the table from the child and slightly to the side to allow for video recording of the child. The tester should kneel on the floor rather than sit in a chair to remain at the child's level during testing. The objects used during the assessment should be placed on a small table or chair within the child's view, but out of his/her reach.

Four large, colorful posters (approximately 24 by 36 inches) should be hung on the walls. Two posters should be placed to each side of the child. One poster on each side should be within the child's view (at approximately 60 degrees from the child's midline) and the other poster should be slightly behind the child, outside his/her view (at approximately 150 degrees from the child's midline).

A video camera should be oriented to enable the recording of a three-quarter to full-face view of the child, while also capturing a profile view of the tester.

Children may be tested with or without their parents present and may be tested seated in the parent's lap, or seated in a chair. To maintain appropriate attention to the tester, the latter is preferred for children older than 12 months (younger children will need to sit in the parent's lap). Table height should be appropriate for the testing situation. If the child will be sitting on the parent's lap, the table should be high enough for the child to comfortably fit under the table. If the child will be sitting alone, the table should be low enough that the child can reach across the table for toys (low child chairs and low child tables are recommended).

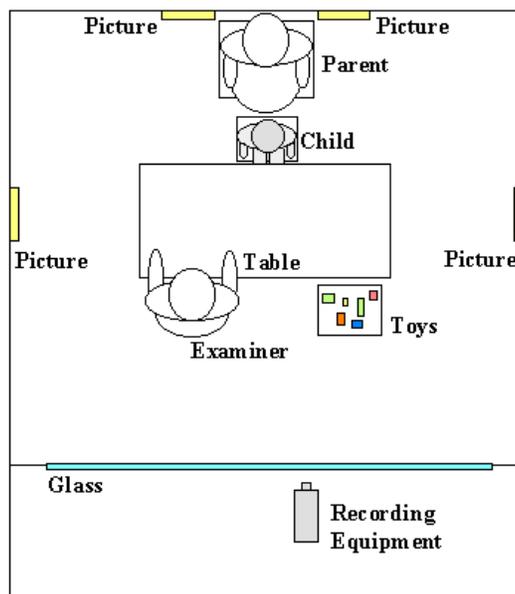


Figure 1: Room Set-Up for the Early Social Communication Scales

III. GENERAL ADMINISTRATION GUIDELINES

During ESCS administration, the tester performs a variety of tasks with natural but minimized verbal interaction with the child. A reduction in tester verbalization allows for clearer differentiation of communicative bids that are initiated by the child. The tester should feel free to speak to and interact with the child during transitions in the testing procedure (e.g., while activating an object, while selecting a new object) but should keep verbal interaction to a minimum during actual task administration.

The tester presents a variety of objects and tasks to the child that have been designed to elicit social and communicative bids with the tester as well as to respond to the tester's social and communicative bids.

Specific task situations are presented in the ESCS and there is a recommended order of task presentation (see below). **However, it is most important to keep in mind that a valid and optimal assessment of social communication skill development is dependent on the responsiveness of the tester to the communicative bids of the child.**

The ESCS begins with the tester referring with an open hand gesture to the toys that are out of the child's reach. The tester then states to the child "What do you want to play with?" The tester should then wait for a silent count of three seconds. If the child does not initiate a bid, the tester chooses a toy to present (see below). If the child does indicate interest in an object, the tester should try to identify the object of interest and give that object to the child. When the tester presents an item, she may state something like "here it is" but should not label the item or request that the child do something with it. In addition, the tester should avoid using words like "see" or "look". Throughout the testing session, only one toy should be present on the table at a time.

In the course of the administration, the tester should be ready to put aside his or her own order of task presentation to follow the lead of the child. This is especially important in the first half (ten minutes) of testing, while rapport is being built. In the second half of testing, the need to present the remainder of all items may lead the tester to redirect the child more persistently and quickly back to the remaining items requiring presentation, while maintaining a responsive testing posture.

Throughout the specific task guidelines provided below, inter-task or task presentation interval estimates are provided. The tester **should not** attempt to rigidly adhere to these time estimates using a watch or clock. Rather, the tester should simply use a silent time count (e.g., subvocalizing "one second, two seconds, three seconds") to approximate times. After numerous ESCS presentations, this will allow the tester to develop the appropriate sense of pacing for all tasks. Strict measurement of times of presentation would likely interfere with the validity of the social interactive nature of ESCS presentation. For example, some children may be particularly hesitant or "shy" in interaction with unfamiliar adults; we have seen this type of behavior in children with and without developmental delays. In such circumstances, the tester may need to provide slightly longer pauses initially.

Parent Instructions

If the parent is present in the testing room, the tester should provide him or her with instructions similar to the following: "We will be showing your child a variety of toys and we want to see how he uses gestures, eye contact, and language to communicate with me. We recognize that your child would rather interact with you than with a less familiar person; however, it is important to try to keep your child's attention on me. If your child tries to interact with you, acknowledge him/her by nodding or saying something like 'I see it,' and then direct his attention back to me. It is also

important that you do not help your child operate the toys. We do not expect your child to be able to operate the toys on his own. This is not a test and there is no right or wrong way to act. You can assist me by keeping your child in the chair and by picking up toys if they fall onto the floor.”

IV. ITEMS NECESSARY FOR ESCS ADMINISTRATION

5 wind-up mechanical toys (3 toys for the Object Spectacle Task and 2 for the Plastic Jar Task; numerous mechanical toys should be purchased as they wear out or break relatively quickly)

3 hand-held mechanical toys (e.g., pop-up puppet, jack-in-the-box, objects activated by a pull cord)

Ball (approximately 4-6 inches in diameter)

Car (medium-sized plastic car, 4-6 inches long)

Picture book (large with distinct pictures)

Hat

Comb

Glasses

Clear plastic jar with screw-on lid (approximately 6 inches tall)

V. SPECIFIC TASK ADMINISTRATION GUIDELINES

An attempt is made in the ESCS to follow specific task administration guidelines. However, unlike other experimental or clinical tasks, absolute standardization of presentation may violate the ecological validity of a social interaction measure such as the ESCS. Thus, some variation from the guidelines may be expected in the administration of the ESCS for a given child. For example, children may develop a preference for certain items and demonstrate high frequencies of communicative bids with these items. Consequently, preferred items may be presented more frequently or for longer durations than is indicated in the guidelines. This is an acceptable variation in the presentation of the ESCS. Variation in presentation is acceptable providing that **all** the ESCS items are presented appropriately during the course of an administration. Numerous examples of testing with children from multiple testing contexts have been provided on the reliability tapes so that you may develop an appreciation of the variability in ESCS presentation that is typical and acceptable across children.

Simplified flow charts of the administration guidelines for each task are provided in Appendix A. These charts may be used as a quick reference for testers during the assessment.

THE TASKS

A. Follows Commands.

Target behaviors: Responding to Behavioral Requests

Object(s): Any of the objects

Administration: Can be administered during tasks involving objects.

The ability of the child to follow the commands of the tester should be assessed at least 8 times throughout the protocol. Generally, a good guide is to administer a Follows Commands trial at least once for each toy presented. Follows Commands trials should not be administered on the first presentation of a toy, however, to provide the child with an opportunity to give the toy spontaneously (and receive credit for Initiating a Behavioral Request such as a *Give*). If the child does not give the toy spontaneously on the second or third presentation of the object, the tester verbally requests the toy three times ("Give it to me!"). Then, if necessary, the tester uses both a palm-up 'give it to me' gesture while stating, "Give it to me!" three times. If the child does not respond, the tester gently retrieves the toy. The tester should give the child 3 seconds to respond after stating the command.

The tester should be careful to use a clear "command" tone of voice when making these requests (rather than a polite or playful tone). The use of a more directive tone of voice is important to convey the imperative function. The phrase, "Give it to me," should be used consistently. Do not use elaborations such as "Please give it to me" or "Can you give it to me?"

B. Object Spectacle Tasks.

Target behaviors: Initiating Joint Attention; Initiating Behavioral Requests; Responding to Behavioral Requests

Object(s): 3 wind-up mechanical toys and 3 hand-held mechanical toys

Administration: Present each toy 3 times

Three wind-up mechanical toys and three hand-held mechanical toys (balloon, squeeze toy, cone toy, bellows toy - see video examples; for balloon, see additional note below) are presented. In each presentation the tester activates the toy on the table in front of, but out of reach of the child. Toys should be wound up enough to remain active for at least 6 seconds but not so long that the child loses interest.

The tester remains silent but attentive to the child while the toy is active to allow the child to initiate joint attention bids vis-à-vis the spectacle. However, if the child initiates a bid (e.g., alternates eye contact between the active object and tester), the tester should provide a natural but brief response (e.g., by smiling and nodding or by saying "mmm hmmm", or "Yes, I see!"). The child may also make a bid to obtain the toy and the tester should respond to that bid by moving the toy within reach. If the toy ceases and the child has not bid for the toy, the tester should place the toy within reach of the child. The child is then allowed to play with the toy for approximately 10 seconds or until the child gives the toy to the tester.

Each object spectacle, whether it is a wind-up mechanical toy or hand held mechanical toy, is activated and presented to the child three times in a row. If the child shows particular interest in one toy it may be presented up to two additional times; however, no toy should be presented more than five times. The tester should tell the child, "We'll play with that more later," and move on to the next task.

Balloon task: The balloon should be inflated and then held to the tester's side, in front of but out of reach of the child. The air should be let out of the balloon slowly with several pauses. The tester should attempt to release the air from the balloon in such a way as to make a light squeak, not a loud aversive sound. Once the balloon is deflated, it should be given to the child. For hygienic purposes the child should be given a different balloon of the same color, not the balloon the tester inflated. Allow the child to attempt to inflate the balloon himself/herself. **The child's behavior should be monitored very closely as balloons are a choking hazard for young children.** The tester should be prepared to quickly remove the balloon from the child if the child attempts to put the balloon in his/her mouth without attempting to inflate it. Note that some children may be afraid of balloons, in which case presentation of the balloon should be stopped immediately and not repeated three times.

C. Turn-Taking Tasks.

Target behaviors: Initiating & Responding to Social Interaction

Object(s): Ball, Car

Administration: Maximum of 12 turns

Two turn-taking tasks are presented in the ESCS. In these tasks the tester places either the toy car or ball within the child's easy reach and then the tester places his or her hands apart on the table in a posture ready to catch the ball or car if the child throws or rolls it to the tester (see video examples). The tester should remain in this posture for about 10 seconds.

If the child responds by throwing or rolling the ball or car to or away from the tester, the tester retrieves the ball and again rolls it to the child. This turn-taking activity continues until the child stops throwing or rolling the ball or car or the child has taken 12 turns.

If the child does not initiate a turn-taking game the tester should request and/or retrieve the toy and roll it to the child while making an appropriate playful sound (e.g., "Brrrrrm," "Wheeeee," or "Zoom").

If the child fails to throw or roll the ball or car to the tester, the tester retrieves the toy and rolls it to the child again. If the child still does not respond, the tester should request the object using a Follows Commands trial (see description of trial above). If the child still does not return the ball, the tester should slowly bring the ball back in front of her and roll it to the child again. If the child does not respond to this turn-taking bid two times in a row, then the turn-taking trial is discontinued.

D. Social Interaction Task.

Target behaviors: Initiating & Responding to Social Interaction

Object(s): None

Administration: Twice during session. 3 tickles/touches with each administration.

This task is presented at two different times during testing, near the mid-point and towards the end. Here the tester removes all toys from the table and begins the task by saying to the child "Let's play a game" or "Let's sing a song." Then the tester sings a few bars of a simple child song (e.g., "Baby bumble bee," or "Itsy-bitsy spider"). Regardless of the tester's vocal talent, an attempt is made to sing with some gusto and humor. After approximately 10 seconds of song the tester gently runs his or her fingers across the table while softly saying "Whee," "Zipp," or "Bzzzz" (appropriate for bumble bee song) and touches or tickles the child. (A decision with regard to touching or tickling should be made on the basis of how tolerant the child may be for this slightly invasive task. The object here is to engage in a song and physical interaction game that the child enjoys. Saying, "Gotcha," or another sound effect upon touching the child is appropriate if the child is engaged. The tester then returns his or her hand to the tester's side of the table and pauses, attending to the child for approximately 5 seconds. This allows the child time to bid for the tester to "do it again" by hitting the table, making eye contact, wiggling his/her fingers on the table, etc. After the five second interval, or a child bid, the tester repeats the procedure of running his/her fingers across the table and touching or tickling the child and returning to a rest

position. After a five second interval, or a child bid, this procedure is repeated a third time. Hence, three trials are conducted at two different times during the ESCS.

E. Gaze Following Task.

Target behaviors: Responding to Joint Attention

Object(s): None

Administration: Twice during session. Points to 4 targets for each administration.

This task is typically presented immediately after the Social Interaction Task to ensure that the child is engaged with the tester at the beginning of the trials. These trials must begin with the tester bringing the child's attention to her face. The child's attention can usually be directed by calling the child's name, tapping the table or gently touching the child, and then touching one's own nose.

The Gaze Following Task involves a sequence of the tester looking and pointing to the posters on the wall while emphatically stating the child's name. The four posters are located to the left, right, behind left, and behind right of the child (see Figure 1). The tester attempts to direct the child's attention to each poster in the following order: to the tester's Left, Left-Behind, Right, Right-Behind.

On all trials the tester obtains the child's attention, then turns her entire torso (not just her head and arm) and visually orients to a poster while pointing at it. To reduce the likelihood that arm movement will affect the child's behavior or block the camera's view of the child's face, the tester should always point with the elbow of the pointing arm in contact with his or her side. This forces the tester to display a "short-arm point." During the pointing trial the tester says the child's name three times increasingly emphatically ("John, John!, JOHN!!") and the tester does not look back at the child until after stating the child's name for the third time and pausing. Allow approximately 2 seconds between each enunciation of the child's name. Hence, each pointing episode is maintained for at least 6 seconds. This is to ensure that developmentally immature children have enough time to process the social information presented to them. Finally, on the Behind Trials, the tester should lean slightly forward and to the left or right of the child as if he/she sees something interesting directly behind the child. However, the pointing finger of the tester should always be at least two feet in front of the child. Each of the two sets of four pointing trials is presented at different times during the ESCS, one near the midpoint and the other near the end of the assessment.

Following each trial the tester may make a statement related to the target (e.g., "There's Mickey," "Did you see Pooh?") to either acknowledge that the child turned and would have seen the poster or to further engage the child if he or she did not turn.

F. Response to Invitation Task.

Target behaviors: Initiating and Responding to Social Interaction

Object(s): Hat, Comb, Glasses

Administration: One presentation for each object.

In this task the tester presents either the hat, comb or glasses to the child. Each object is presented at different times throughout the ESCS. Hence, the three trials in this task are distributed throughout the ESCS presentation.

In this task the object is placed directly in front of the child and the child is allowed to play with it for approximately 15 seconds. If the child uses the object in a socially conventional fashion (i.e., hat on head, glasses on face, comb to hair) the tester leans forward and shakes his or head gently while looking at the child's face and saying, "[child's name], Can I play?" This question is stated three times with a 2-second interval between repetitions, or until the child moves the hat, comb, or glasses toward the tester's head.

If the child does not spontaneously use the object in a conventional fashion the tester should place the hat or glasses on the child or comb the child's hair briefly (to demonstrate to the child what is socially expected) and then invite the child to play as stated above.

Some children will not tolerate the tester putting the hat, comb or glasses near or on their head. In this case, after attempting to place the object on the child's head, the invitation to play is stated three times. The tester should be extremely positive and engaged during administration of hat, comb, and glasses tasks.

G. Book Presentation Task.

Target behaviors: Initiating & Responding to Joint Attention

Object(s): Picture book

Administration: One presentation.

In this task the picture book is opened and presented on the table within the child's reach. Several distinct pictures should be displayed on the pages of the book. The tester asks, "What do you see?" The tester should allow the child to examine the book for approximately 20 seconds. If the child points to pictures spontaneously the tester should respond briefly, but naturally (e.g., "Yes, I see"). After a 20 second interval the tester should begin pointing to pictures in the book regardless of whether the child has pointed or not. The tester should maintain a steady pointing gesture for 3 seconds about two inches from each picture. The tester should not touch or tap the picture while pointing. The tester should say the child's name as he or she points to a picture on the left side of the book. The tester should then point to a new picture on the same open pages, but on the right side of the book. The page is then turned and this procedure is repeated twice, each time on a new set of open pages in the book. If the child rejects the book (e.g., pushes it away) or refuses to attend to the book, the book should be presented once again at a later time.

H. Plastic Jar Task.

Target behaviors: Initiating & Responding to Behavioral Requests

Object(s): Plastic jar and 2 wind-up mechanical toys

Administration: One presentation.

This task is presented once during the ESCS using the following procedure:

- 1) The tester shows the child a transparent plastic jar with a sealed lid and two novel wind-up mechanical toys inside. The tester then unscrews the lid and "pours" the toys onto the table. Before the child can play with the toys, the tester returns them to the jar and seals the lid sufficiently well to ensure that a small child will not be able to unscrew the lid.
- 2) The tester then gives the jar to the child and waits for approximately 10 seconds, or until the child gives the jar back to the tester. If the child does not give the jar, the tester requests the jar verbally and, if necessary, with a palm up gesture and verbal request. If the child does not respond, the tester gently retrieves the jar.
- 3) The tester then opens the jar and removes one of the wind-up toys. The jar should be set aside near the other toys. The wind-up toy that was removed from the jar should be wound up once and placed on the table. Once the toy becomes inactive, it should be given to the child.
- 4) If the child does not give the toy back after 10 seconds, the tester requests the toy verbally and, if necessary, with a palm up gesture and verbal request. If the child does not respond, the tester gently retrieves the toy. The toy should then be placed with the other toys.
- 5) Steps 1 through 4 should be repeated with only the second wind-up toy still in the jar.

I. Social Imitation Task.

Target behaviors: Point in Imitation

Object(s): None

Administration: Observation of behaviors occurring during other tasks.

During the presentation of the Book, Social Interaction, and Gaze Following Tasks the tester either points or claps her hands. Often children will respond by spontaneously imitating the tester's pointing or clapping behavior. Each display of imitative behavior may be observed and recorded. Little data is available on this potentially useful measure. However, reliability data on observations of Points in Imitation have been provided in Table 1.

VI. ORDER OF TASK PRESENTATION

While there is a suggested order in which the tasks can be presented, the main goal is to keep the child interested and engaged. Therefore, testers may deviate from this order depending upon the specific requests and interests of the child. For example, if a child voices or gestures a preference for a particular toy upon entering the room, that toy may then be introduced first. The suggested order is based on several considerations. First, one of the mechanical toys should be the first or second toy presented since they are attractive and, thus, typically effective in gaining the child's attention and interest. Another toy that may be presented first or second is the ball or car, since the turn-taking involved in its presentation may help to build rapport and cooperation with the child early on in the testing. Pointing, invitation, and tickling tasks may be more effective once rapport has been clearly established (e.g., after four or five other items have been successfully administered). It is also important to vary task demands to keep the child's interest, and to obtain a valid assessment. For example, it is necessary to present the ball and the car at two different moments in the testing in order to obtain two semi-independent samples of turn-taking behavior.

POSSIBLE ORDER OF PRESENTATION:

1. Ball (Turn-Taking Task)
2. Wind-Up Mechanical Toy (Object Spectacle Task #1)
3. Glasses (Response to Invitation Task)
4. Hand-Held Mechanical Toy (Object Spectacle Task #2)
5. Social Interaction Task #1
6. Gaze Following Task #1
7. Balloon (Object Spectacle Task #3)
8. Book Presentation Task

[ESCS Mid-point, half of all items presented in approximately 10 minutes]

9. Wind-Up Mechanical Toy (Object Spectacle Task #4)
10. Car (Turn-Taking Task)
11. Hat (Response to Invitation Task)
12. Wind-Up Mechanical Toy (Object Spectacle Task #5)
13. Hand-Held Mechanical Toy (Object Spectacle Task #6)
14. Comb (Response to Invitation Task)

- 15. Plastic Jar Task
- 16. Social Interaction Task #2
- 17. Gaze Following Task #2

ADDITIONAL PROCEDURAL COMMENTS:

- 1) All of the wind-up and hand-held toys, except for those present with the plastic jar should be presented at least three times to the child, so that the child has a chance to respond to them. The examiner may choose to present a toy more than three times if a child requests to see that toy again, although none of the toys should be presented more than 5 times. However, all the items of the ESCS need to be presented appropriately within the 15-20 minute testing session.
 - 2) If a child does not want to interact with an object, take it away and try it again later. An object can be presented several times in order to achieve a good trial.
 - 3) In all cases, the tester should reinforce effort, not necessarily success. In addition, the tester should ensure that she has the child's attention when she begins each new trial.
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VII. GENERAL CODING GUIDELINES

Coding is typically conducted via observations made from videotape. Basic coding consists of noting the frequency of occurrence of Joint Attention, Behavioral Requests, and Social Interaction behaviors that occur. These behaviors are defined below.

Although operational definitions have been provided, raters should attempt to classify behaviors on the basis of perceived function (see definitions below). Most people have had a lifetime of experience in observing and classifying the function of social-communicative bids, be these nonverbal or verbal. This well practiced ability should be capitalized on in order to yield adequate rater reliability. In looking at an interaction, the coder should, first, classify the function; second, decide who initiated the function (to establish if the child's behavior is Initiating or Responding); and third, identify the particular behavior code. This sequence of judgments is important to note as individual behavioral forms (e.g., "points") are rated by behavioral function rather than just behavioral topography.

In addition to frequency coding, the coding of duration of behaviors is possible with videotaped scoring, as is computer-integrated coding of ESCS behaviors with other behavior modalities (e.g., affect, vocal behavior). Finally, it is important that the total length of time involved in an ESCS presentation be recorded. In research application the length of presentation time must be carefully matched across children or groups. In clinical application very short (less than 15 minutes) or very long (more than 25 minute) presentations need to be considered in interpreting the ESCS. Rating of the state of the child throughout the ESCS is also advisable. Indeed, current work in our laboratory is beginning to move toward viewing the ESCS as a platform both for early social-communication skill observations and temperament observations (e.g., inhibited vs. noninhibited vs. impulsive/active children).

A number of coding tools are provided in the appendices. Pictures of many of the behaviors described below are provided in Appendix B. A table providing a summary of information relevant to coding is provided in Appendix C. A sample coding form is provided in Appendix D.

General Rules

- 1) If a gesture is not well-defined, it may not be ratable. It is better to not rate a gesture than to categorize it haphazardly without sufficient information.
 - 2) If there is ambiguity between whether a behavior should be considered Joint Attention or a Behavioral Request (e.g., *Point*), default to Behavioral Request.
 - 3) If the behavior changes forms, rate the highest level behavior (e.g., if the child points to toy and then, while pointing, looks up to tester), the behavior should be rated as a *Point* and *Eye Contact*, not as a *Point* and then a *Point and Eye Contact*. Code only one behavior per gesture.
 - 4) Do not code any behavior that is obscured (e.g., by the tester or parent blocking the camera's view of the child). Make a note on the coding sheet that a behavior was obscured and the timecode at which the behavior occurred if timecode is available.
-

Joint Attention

The function of Joint Attention behaviors is to share attention with the interactive partner or to monitor the partner's attention. They differ from Behavioral Requests in that they do not appear to serve an instrumental or imperative purpose (e.g., trying to get or activate an object or event). Rather, their function seems to be more to share experiences of objects or events with others. A "show" gesture is prototypical of this type of behavior. These behaviors are most often observed during the Object Spectacle, Book Presentation, and Gaze Following tasks, as well as during the child's examination of mechanical toys. However, they may also be observed when novel events spontaneously occur during testing (e.g., a sound is distinctly heard outside the testing room or a toy breaks).

Initiating Joint Attention (IJA)

Lower Level Behaviors:

1) *Eye Contact*: the child makes eye contact with the tester while manipulating or touching an **inactive** mechanical toy. Child must be touching the object to receive this code. If child is not touching the object code as *IBR-Eye Contact*.

Do not rate *Eye Contact* if the child's behavior may have been elicited by the tester's movement or talking, or if at least part of the tester cannot be seen on the monitor as a reference.

During Turn-Taking trials, as long as the tester remains unobtrusive, *Eye Contact* may be coded when the ball or car is first set in front of the child, but should not be coded once the turn-taking trials have started.

If the child drops an object other than the ball or the car off the table and then looks to the tester the behavior should be coded as *Eye Contact*. If the child continues to drop the object and look to the tester the behavior should only be rated once. Repetitions of this behavior should be rated as *Teases* under Initiating Social Interaction.

Eye contact may occur quickly and briefly. Therefore, vigilance and an alert state are required for reliable coding. Coders should monitor their mental status for fatigue and discontinue coding for a period of time if repeated lapses in attention occur.

Note: The video recording of the ESCS should enable coders to reference the general position of the tester's eyes and reliably determine when the child is looking at the upper orbital region of the tester's face (the definition of eye contact) as opposed to looking at the lower portion of the tester's face (see videotape examples). If the child's behavior is ambiguous, fault on the conservative side and do not count it as eye contact.

2) *Alternate*: the child alternates looking between an **active** object spectacle and the tester's eyes. To receive credit for this behavior, the child must shift his/her gaze from the object to the tester's eyes. The child does not need to then gaze back at the object to receive credit. Each example of this bid is recorded. When the child repeatedly shifts his/her gaze between an object and the tester's eyes count each gaze to the tester's eyes as an *Alternate*.

Alternate is typically recorded when an object is active on the table or in the tester's hand, but is also recorded if the child looks up to the tester after an object becomes active in his/her own hands. *Alternate* may be coded within two seconds of the time after the toy stops. If the child displays the behavior more than two seconds after the toy stops, the behavior should be coded as a Behavioral Request.

Higher level behaviors:

3) *Point*: With a clear articulation of the index finger the child points to an **active** toy, to pictures in the book (*before* the tester has pointed), to wall posters (*before* the tester has pointed), or to any other unobtainable object or event (e.g., video camera). *Point* should only be coded when the index finger is extended and adjacent fingers are noticeably inclined downward, or away from the index finger and toward the palm. Reaching with fingers extended and an upward inclination of the index finger should not be coded as a *Point*. Pushing or scratching a toy with one finger should not be considered a *Point*. However, touching a toy with an index finger with the hand in a pointing configuration should be considered a point.

Point may be rated as occurring with or without simultaneous eye contact with the tester. The eye contact may be a brief event superimposed on a longer period of pointing; however, the eye contact and point must be simultaneous at some point during the bid to be considered *Point & Eye Contact*. If the point and eye contact occur one after the other, they should be coded as two distinct behaviors.

Points to objects beyond the frame of view of the camera should be coded under Initiating Joint Attention unless additional information (e.g., reaching or verbalization) is indicative of a request.

4) *Show*: The child raises a toy upward toward the tester's face while looking at the tester. The object should be presented relatively still for a second or two. Waving or shaking objects with a hand raised or extended toward the tester does not constitute a show.

Shows may be confused with *Gives* (see Behavioral Requests). *Shows* are usually directed to the face, whereas *Gives* are usually directed to the tester's hands or body. *Shows* are typically brief bids with the child retracting the proffered object. *Gives* usually involve maintained gestures until the tester retrieves the object. If the child resists when the tester attempts to retrieve the object, the behavior should be coded as a *Show*.

Other behaviors:

5) *Bid to Caregiver*: Any Joint Attention behavior directed toward the caregiver (e.g., showing a toy to the mother), as long as the behavior was not prompted by the caregiver.

Responding to Joint Attention (RJA)

Lower level behavior:

1) *Following Proximal Point*: In the Book Presentation task, the tester points to 6 pictures in the book. The child gets credit if he/she clearly follows the tester's pointing gesture by immediately turning his/her head and eyes to the appropriate area of the book.

Higher level behavior:

2) Following Line of Regard: On Left and Right look trials the child gets credit if he/she turns his/her eyes or head sufficiently to indicate that he/she is looking in the correct direction and beyond the end of the index finger of the tester, approximately 45-90 degrees off midline. This rule has been established because when the tester points past the toys that are visible during the ESCS, young children will often not follow the point beyond the toys. In some situations the tester's index finger may not be observable, in which case a definitive head and eye turn toward the poster is necessary to receive credit. If the examiner's index finger cannot be seen for Left or Right trials, rate conservatively, such that the child needs to produce a marked head turn (45 to 90 degrees) or shift of eye gaze to rate the behavior as a pass in order to be certain that the child's gaze came off the tester's index finger.

On Behind-Left and Behind-Right trials the child must look beyond the plane of their shoulders or more than 90 degrees off midline in the direction of the poster.

If the child's eyes were not at midline before the trial began, code the child's response as either a pass or fail as long as the child was not looking in the direction of the point when the trial began.

Do not code the trial if any of the following occur: a) the tester says, "Look," rather than the child's name; b) the tester labels the poster while pointing at it; c) the child is off midline and looking in the direction of the point at the beginning of the trial; d) the child is out of sight; e) the direction of the tester's point cannot be determined because the tester is not visible. However, if the child does not follow a pointing trial, rate the trial as a failure even if the tester's hand is not visible.

If the child looks to the target after the tester's point has ended (tester put finger or hand down), but before that poster is labeled or the next poster is pointed to, give the child credit for the look but note that the response was 'delayed'. If the child's look to the poster is delayed but the tester has already labeled the picture, do not give the child credit for the look. Child should receive credit for a delayed look.

Behavioral Requests

The function of these behaviors is to elicit supportive action or aid from the partner in obtaining objects and events. They differ from Joint Attention behaviors in that they serve more of an imperative or instrumental rather than social-sharing function. Giving in order to obtain aid in opening or activating an object is a prototypical behavior. The Initiating Behavioral Requests behaviors are most often observed when the child directs his or her attention to toys that are out of reach, after an object spectacle has ceased moving on the table, or after a child has attempted to reactivate a mechanical toy or open the plastic jar. However, they may also be observed during Gaze Following, Book Presentation, Social Interaction, or Response to Invitation trials when the child redirects attention away from the presented task to request some other object or event. Responding to Behavioral Requests may occur throughout the session when the tester asks the child to give a toy or the jar (i.e., the various Object Spectacle tasks and the Plastic Jar task).

Initiating Behavioral Requests (IBR)

Lower level behaviors:

1) Eye Contact: the child makes eye contact with the tester when an object is *inactive*. *Eye Contact* is often coded after the tester has removed an object from the child or greater than two seconds after an object spectacle has ceased. The child must not be touching the object during

the eye contact to receive this code. If child is touching the object, code the behavior as *IJA-Eye Contact*.

Do not rate *Eye Contact* if the child's behavior may have been elicited by the tester's movement or talking, or if at least part of the tester cannot be seen on the monitor as a reference.

During Turn-Taking trials, *Eye Contact* may be coded when the ball or car is first set in front of the child provided the tester is in an unobtrusive position, but should not be coded once the turn-taking trials have started.

Eye contact may occur quickly and briefly. Therefore, vigilance and an alert state are required for reliable coding. Coders should monitor their mental status for fatigue and discontinue coding for a period of time if repeated lapses in attention occur.

Note: The video recording of the ESCS should enable coders to reference the general position of the tester's eyes and reliably determine when the child is looking at the upper orbital region of the tester's face (the definition of eye contact) as opposed to looking at the lower portion of the tester's face (see videotape examples). If the child's behavior is ambiguous, fault on the conservative side and do not count it as eye contact.

2) Reach: the child extends his/her arm toward an out of reach object. This behavior is not rated if the child simply reaches and obtains a toy. If the child gets out of his/her seat to reach for a toy on the table, code this behavior only if the child is attempting to obtain an object from within the tester's grasp. A reach bid ends when the child retracts his/her arm or lays his/her arm on the table with hand closed. Interruptions and re-initiations of a reach gesture within less than two seconds should be coded as one bid.

If the child is handbanging, do not code the behavior as a *Reach* as it may only be an artifact of the handbanging or of viewing the video in slow motion.

3) Appeal: the child combines eye contact with reaching. The eye contact may be a brief event superimposed on a longer period of reaching; however, the eye contact and gesture must be simultaneous at some point during the bid.

An *Appeal* may also be coded for objects if the child makes eye contact with the tester simultaneously with a clear requesting action (e.g., blowing gesture combined with eye contact during presentation of the balloon) to get the tester to repeat an action.

Higher level behaviors:

4) Point: the child uses an extended index finger to indicate his/her desire for an object or event. In some instances a child may reach and then turn the reach into a point or vice-versa.

Points to request may be rated as occurring with or without simultaneous eye contact with the tester. The eye contact may be a brief event superimposed on a longer period of pointing; however, the eye contact and point must be simultaneous at some point during the bid to receive the code *Point and Eye Contact*. If the point and eye contact occur one after the other, they should be coded as two distinct behaviors.

Points to objects beyond the frame of view of the camera should be coded as *IJA Point* unless additional information (e.g., reaching or verbalization) indicates a request.

Credit is given only for the highest level behavior displayed within one bid (e.g., a *Point* versus a *Reach* or a *Point and Eye Contact* versus a *Point*). A more micro-analytic coding orientation, however, may allow for the exploration of these types of transitions from lower to higher level bids.

5) Give: the child pushes, throws, or hands an object to the tester in order to request that the tester repeat an action or to get rid of the object. The child may also hold an object out toward the tester. Typically the latter is toward the tester's hands or body as opposed to up toward the tester's face, as in an *IJA Show*.

Gives may be rated as occurring with or without simultaneous eye contact with the tester. The eye contact may be a brief event superimposed on a longer period of giving; however, the eye contact and give must be simultaneous at some point during the bid to receive the code *Give and Eye Contact*. If the give and eye contact occur one after the other, they should be coded as two distinct behaviors.

Other behaviors:

6) Bid to Caregiver: Any Behavioral Request behavior directed toward the caregiver (e.g., giving a toy to the mother), as long as the behavior was not prompted by the caregiver.

Responding to Behavioral Requests (RBR)

1) Follows Command: the child gives the requested object to the tester in response to the verbal command of, "Give it to me," or in response to the combined verbal command with palm-up gesture. The following codes are used:

Pass without Gesture: The child gave the object to the tester in response to verbal command only.

Fail without Gesture: The child did not give the object to the tester in response to verbal command only. The code *Fail without Gesture* should only be used when commands with gesture were not given.

Pass with Gesture: The child gave the object to the tester in response to both verbal command and gesture. The tester does not need to say, "Give it to me," for the child to receive the code *Pass with Gesture*; the palm-up gesture is sufficient. The trial should be coded as *Pass with Gesture* if the tester uses only a gesture and the child relinquishes the toy.

Fail with Gesture: The child did not give the object to the tester in response to both verbal command and gesture. The tester does not need to say, "Give it to me," for the child to receive the code *Fail with Gesture*; the palm-up gesture is sufficient. The trial should be coded as *Fail with Gesture* if the tester uses only a gesture and the child does not relinquish the toy.

Several commands may be administered consecutively, but each set of trials should receive only one code. A set of trials typically consists of three trials without the gesture and three trials with the gesture. Code the set of trials based on the highest-level behavior attempted/completed (trials with a gesture are considered to be at a higher level than trials without a gesture).

Do not code a trial if the tester does not give the child at least 3 seconds after the last command to respond.

The set of trials ends as soon as the tester reaches for the object. The child's highest-level response prior to the tester reaching for the object should be coded. Any attempt by the child to comply with the request after the tester reaches for the object should not be considered.

Coding should be based on comprehension, not compliance. A non-compliant response may be rated as a *Pass* if the child clearly pulls the toy back or says, "No."

Point in Imitation

1) *Point in Imitation* occurs when the child points to an object or event after having witnessed the tester point to something. This occurs most commonly during the Book Presentation and Gaze Following tasks. During the Book Presentation task the child should only receive credit for one *Point in Imitation* per page.

Social Interaction

The function of these behaviors is to elicit or maintain a physical or turn-taking game with the interactive partner. Communicative bids in this category refer to objects less than in Joint Attention or Behavioral Requests and instead focus on regulating face-to-face interaction that may involve objects but does not involve a focus on, or reference to, the objects. These behaviors are most often observed during the Social Interaction, Turn-Taking, or Response to Invitation tasks. *Teases* (see below), however, may occur any time during the ESCS administration. Lower versus Higher level behaviors are not differentiated for Initiating Social Interaction, but are differentiated for Responding to Social Interaction.

Initiating Social Interaction

1) *Initiates turn-taking*: Upon receipt of the car or ball the child rolls the car or ball back to the tester. This must occur before the child has witnessed the tester rolling the ball or car to the child. Tapping the ball to the child, however, does not invalidate this code.

2) *Tease*: The child engages in a prohibited act such as repeatedly getting out of his/her chair, pulling an object away from the tester after a "Give it to me" request, or dropping the ball to the floor rather than returning it to the tester during a Turn-Taking trial. *Tease* should be coded as one of two levels: *Low-Level Tease* (engaging in a prohibited act while making eye contact with the tester) and *High-Level Tease* (engaging in a prohibited act while making eye contact with the tester and smiling).

Teases may be coded at any time during the assessment but occur most often during Turn-Taking trials. Only one *Tease* should be coded for the period a child is continuously engaged in the act. A second *Tease* may be coded, however, if the child releases the object and then re-obtains it (e.g., gets the object back after throwing it across the room as a *Tease*) or obtains a new object.

Responding to Social Interaction

Lower Level Behaviors:

The following ratings are made during the pauses between trials during the Turn-Taking task, after the tester has withdrawn her hands. In general, do not code lower-level behaviors occurring during the Social Interaction Task while the tester is singing or tickling the child (exceptions are noted below).

1) Eye contact: The child makes eye contact with the tester after the tester has tickled the child and moved back to pause before the next tickle episode. Often the child will alternate between the tester's hands and eyes. If the child initiates eye contact during the song or the tickle and the eye contact is maintained for 2 or more seconds into the period where the tester has withdrawn, the behavior may be coded.

2) Act: The child makes an excited response after the tester has tickled the child. *Acts* can be vocal, gestural, or postural. Common acts include, but are not limited to, discrete behaviors like slapping the surface of the table, creeping fingers across the table, clapping, and making loud vocalizations.

3) Appeal: The child produces an *Act* with simultaneous *Eye Contact*. The eye contact may be a brief event superimposed on a longer act; however, the eye contact and act must be simultaneous at some point during the bid. If the *Act* and the *Eye Contact* occur separately, they should be coded as separate behaviors.

IJA or IBR *Eye Contact* may be coded only at the beginning of the Response to Invitation and Turn-Taking trials when the toy is first presented and the tester is unobtrusive. Once these trials begin, IJA or IBR *Eye Contact* should not be coded because the tester is active and engaged with the child. Higher-level behaviors such as *Reaches*, *Points* (both IJA and IBR), *Gives*, and *Follows Commands* can be coded, however.

Higher Level Behaviors:

4) Responds to Turn-Taking: Responds to turn-taking refers to the sequence of turns in which the child rolls/throws the car or ball to the tester. The number of turns the child takes by rolling or throwing the ball or car to the tester during a sequence should be coded. The sequence with the highest number of turns for each object (ball and car) should be used to determine the child's score for this item. A turn is considered to have ended when the toy is sent back to the tester.

If during a turn-taking sequence the child has a double turn (e.g., the tester rolls the ball to the child, the child throws the ball off the table, the mother returns the ball to the child, and then the child rolls the ball back to the tester) the entire behavioral sequence should be coded as one turn.

If the child throws the ball or car off the table and the turn-taking sequence is ended, do not code that behavior as a turn. If, however, the child throws the ball or car onto the floor and the tester picks it up and returns it to the child and the child throws it on the floor again, code the behavior as a turn for as long as the sequence continues, because this is the child's style of turn-taking.

If the child begins another play behavior within a turn-taking trial and then returns to turn-taking after completing the play behavior, the second set of turns must be coded as a new sequence.

5) Response to Invitation: The child receives a positive score for each item correctly placed on or toward the tester's head (hat, comb & glasses) in response to the tester's invitation ("Can I play?"). Thus, the child may receive a score of 0-3 on this item.

Language

Joint Attention: Child uses a word or words while holding an object or pointing at an object to direct parent's or tester's attention to the object (e.g., "see," "look," "there").

Behavioral Requests: Child uses a word or words while reaching to request an object (e.g., "No," "me," "give," "I want").

VIII. GENERAL SCORING GUIDELINES

Detailed scoring information is provided below. A scoring worksheet is provided in Appendix E. The number of occurrences of each behavior is used in determining the scores, unless otherwise noted.

Joint Attention

Initiating Joint Attention

Lower Level Behaviors: *Eye Contact, Alternates*

Higher Level Behaviors: *Point, Point and Eye Contact, Show*

Scoring: The following scores are typically obtained using the raw number of occurrences of each behavior:

- a) Frequency of Lower Level IJA = (*Eye Contact*) + (*Alternates*)
 - b) Frequency of Higher Level IJA = (*Point*) + (*Point and Eye Contact*) + (*Show*)
 - c) Frequency of Total IJA = (*Eye Contact*) + (*Alternates*) + (*Point*) + (*Point and Eye Contact*) + (*Show*)
OR Frequency of Lower Level IJA + Frequency of Higher Level IJA
 - d) Ratio of Higher Level IJA to Total IJA = Frequency of Higher Level IJA / Frequency of Total IJA
-

Responding to Joint Attention

Lower Level Behaviors: *Following Proximal Point/Touch*

Higher Level Behavior: *Following Line of Regard*

Scoring: The following scores are typically obtained:

- a) Lower Level RJA = % correct *Following Proximal Point/Touch*
(number of correct responses / total number of trials) * 100
- b) Higher Level RJA = % correct *Following Line of Regard*
(number of correct responses / total number of look trials) * 100
- c) Left/Right RJA = % correct *Following Line of Regard* on Left/Right trials
(number of correct responses for Left/Right trials / total number of Left/Right trials) * 100

d) Behind RJA = % correct *Following Line of Regard* on Left-Behind and Right-Behind trials
(number of correct responses for Behind trials / total number of Behind trials) * 100

Behavioral Requests

Initiating Behavioral Requests

Lower Level Behaviors: *Eye Contact, Reach, Appeal*

Higher Level Behaviors: *Point, Point and Eye Contact, Give, Give and Eye Contact*

Scoring: The following scores are typically obtained using the raw number of occurrences of each behavior:

a) Frequency of Lower Level IBR = (*Eye Contact*) + (*Reach*) + (*Appeal*)

b) Frequency of Higher Level IBR = (*Point*) + (*Point and Eye Contact*) + (*Give*) + (*Give and Eye Contact*)

c) Frequency of Total IBR = (*Eye Contact*) + (*Reach*) + (*Appeal*) + (*Point*) + (*Point and Eye Contact*) + (*Give*) + (*Give and Eye Contact*)
OR Frequency of Lower Level IBR + Frequency of Higher Level IBR

d) Ratio of Higher Level IBR to Total IBR = Frequency of Higher Level IBR / Frequency of Total IBR

Responding to Behavioral Requests

Behavior: *Follows Commands*

Scoring: The following scores are typically obtained:

a) Total RBR Passes = % correct *Follows Commands*
((number of correct responses without gesture + number of correct responses with gesture) / total number of trials, pass plus fail) * 100

b) Total RBR Fails = % incorrect *Follows Commands*
((number of incorrect responses without gesture + number of incorrect responses with gesture) / total number of trials, correct plus incorrect) * 100

Social Interaction

Initiating Social Interaction

Behaviors: *Initiates Turn-Taking, Tease, Initiates Song/Tickle*

Scoring: The child may get credit for *Initiates Turn-Taking* with the car and/or the ball. Hence the child may obtain a score of 0, 1, or 2 on this item. Therefore, a child who initiated turn-taking with the ball but did not initiate turn-taking with the car would receive a score of 1 for *Initiates Turn-Taking*. With regard to *Tease*, the child may obtain a score of 0 (no teases), 1 (one or more low-level teases), or 2 (one or more high-level teases). The child should receive the score based on the highest level behavior displayed (e.g., a child with 3 low-level teases and 1 high-level tease should receive a score of 2).

The following score is typically obtained:

$$\text{a) Total ISI: } \textit{Initiates Turn-Taking} \text{ score} + \textit{Tease} \text{ score} + \textit{Initiates Song/Tickle}$$

Responding to Social Interaction

Lower Level Behaviors: *Eye Contact, Act, Appeal*

Higher Level Behaviors: *Responds to Turn-Taking, Responds to Invitation*

Scoring: The child's score for the responding to turn-taking is determined based on the number of turns taken. This score should be coded separately for the ball and the car. The child receives a score of 0 for no turns, 1 for 1-3 turns, and 2 for 4 or more turns. Therefore, the child's score for the combined turn-taking trials may range from 0 to 4.

With regard to Response to Invitation task, the child receives a score of 1 for each correct response (placing the item on or near the tester's head) with the comb, hat, and glasses. The child's score for the combined trials may range from 0 to 3.

The following scores are typically obtained:

$$\text{a) Total Song/Tickle Response} = \textit{Eye Contact} + \textit{Act} + \textit{Appeal}$$

$$\text{b) Total Turn-Taking Response} = \textit{Ball score} + \textit{Car score}$$

$$\text{c) Total Response to Invitation} = \textit{Comb score} + \textit{Hat score} + \textit{Glasses score}$$

$$\text{d) Total RSI} = \textit{Total Song/Tickle Response} + \textit{Total Turn-Taking Response} + \textit{Total Response to Social Invitation}$$

IX. RELIABILITY AND VALIDITY

Much of the information on reliability and validity of the abbreviated ESCS is available in 4 papers that accompany this provisional procedures manual (Mundy et al. 1988, 1994, 1995, Mundy & Gomes, submitted). Additional information, including data on expected ages scores across the second year of life, will be available in the next 24 months with the conclusion of three ongoing longitudinal studies.

To provide some sense of ESCS scores the following mean, standard deviations and inter-rater reliability data are provided from 14 normally developing children between 14-17 months of age (Table 1). These children comprise a subsample of a high SES group who recently participated in a short term longitudinal study (Mundy & Gomes, submitted). Scores in Table 1 vary from those in the previous research articles with regard to the frequency of Behavioral Requests because the latter did not include a measure of Behavioral Request – Eye Contact in the relevant scores.

Table 1**Descriptive Statistics and Rater Reliability of ESCS Data for 14-17-Month-Old Children (N=14) ESCS Measure Rater #1 Rater #2**

Initiating Joint Attention: Total	18.30(08.30)	17.80(09.00)	00.84
IJA High	03.10(02.90)	03.60(03.60)	00.89
IJA High Ratio	00.19(00.17)	00.21(00.19)	00.91
Responding to Joint Attention	00.65(00.29)	00.71(00.29)	00.86
Points in Imitation	01.60(01.70)	01.30(01.70)	00.86
Initiating Behavioral Requests Total ^a	33.80(14.40)	31.60(11.90)	00.78
Behavioral Requests High	17.70(09.90)	17.60(08.70)	00.76
Behavioral Requests High Ratio	00.51(00.18)	00.56(00.20)	00.94
Responds to Behavioral Requests	05.60(02.10)	04.40(02.80)	00.61*
Initiates Social Interaction	01.40(00.85)	01.30(00.82)	00.91
Responds to Social Interaction	11.50(03.30)	11.90(03.50)	00.88

* The difference between rater mean scores approached significance for this variable ($p < .08$), but the reliability estimate was significant ($p < .02$). In all other cases the difference between mean rater scores was not significant and the reliability estimates were significant ($p < .002$).

X. REFERENCES ON NONVERBAL COMMUNICATION AND THE ESCS

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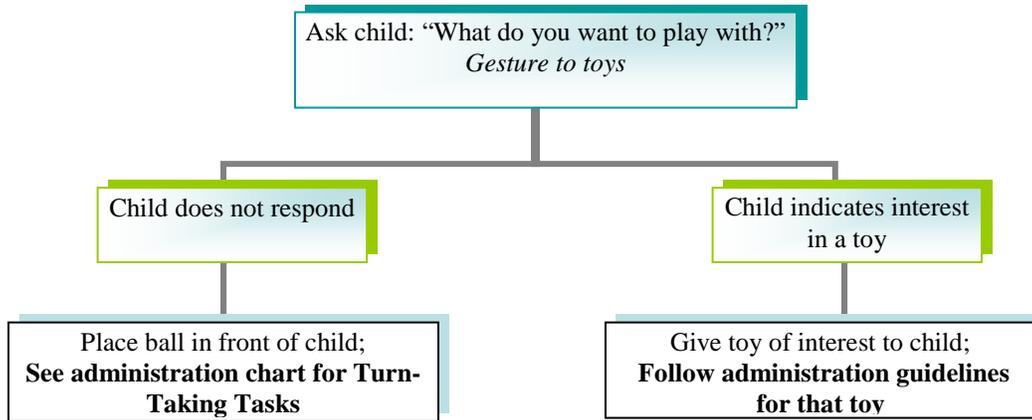
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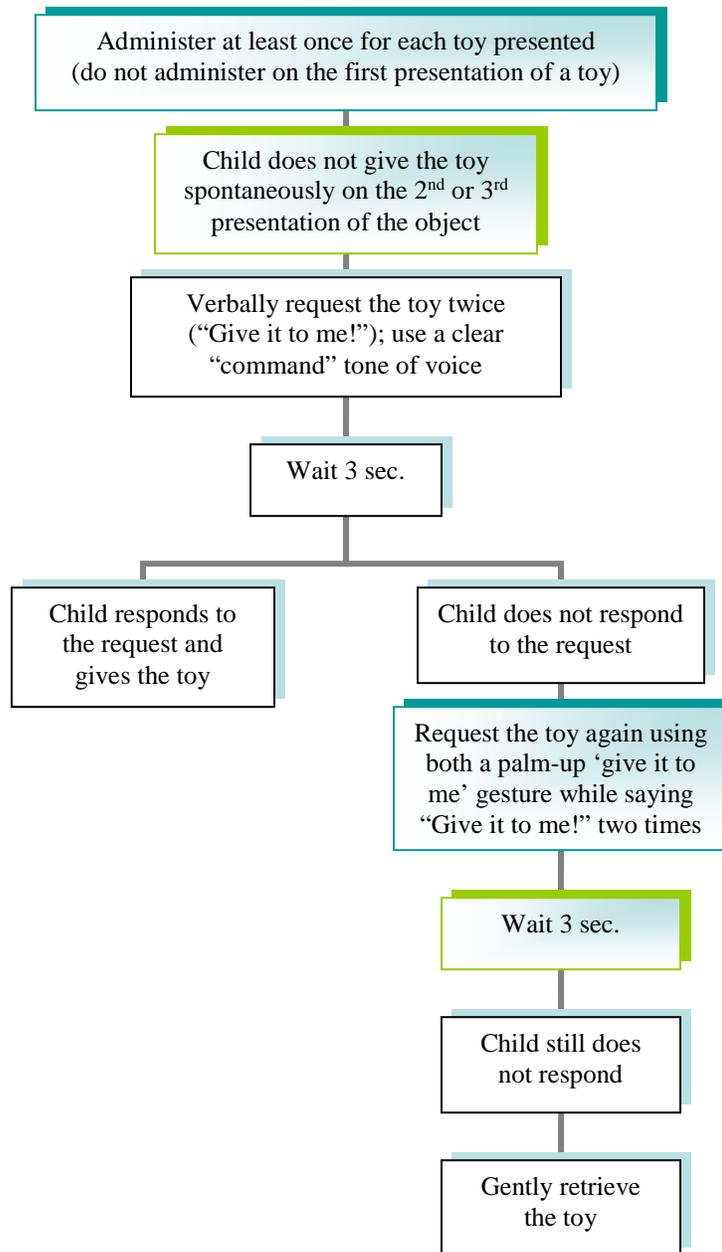
Appendix A:
Task Administration Flow Charts

Note: Task administration should be semi-structured, not rigid. The tester should use these charts as a guide to administration but should allow the child to direct administration to a reasonable extent.

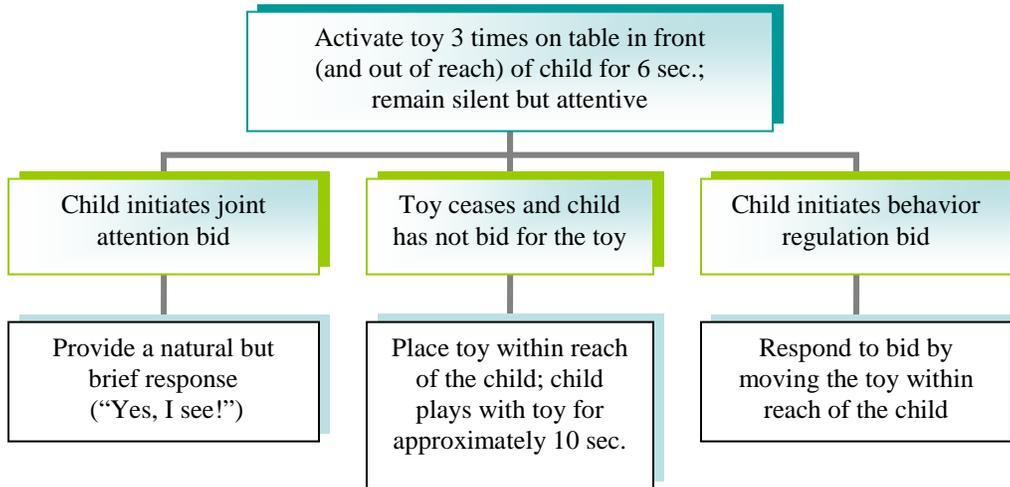
Begin ESCS



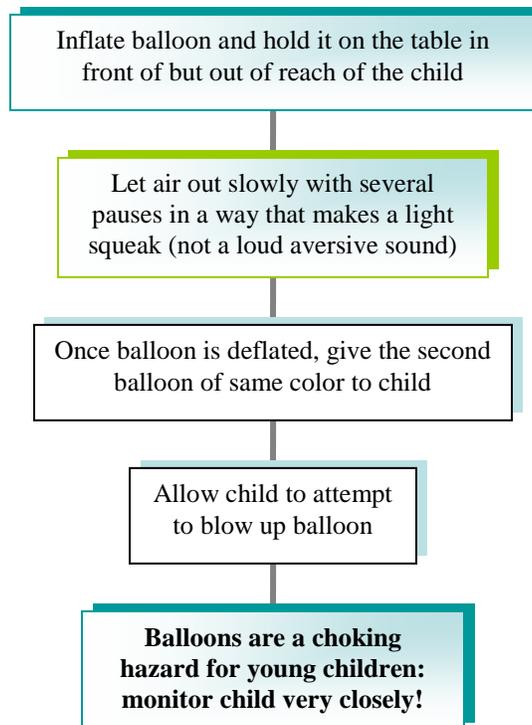
I. Follows Commands (any of the objects)



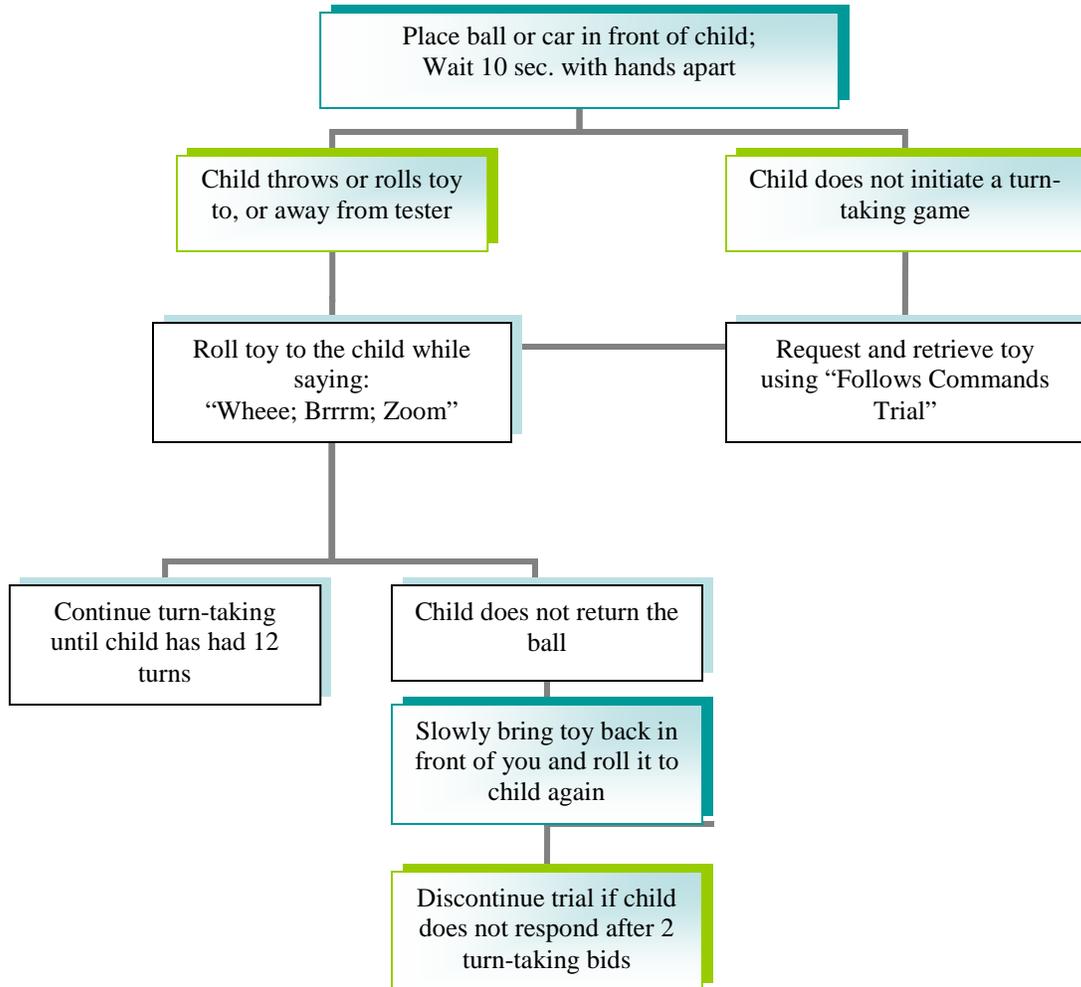
II. Object Spectacle Task (3 wind-up mechanical toys and 3 hand-held mechanical toys)



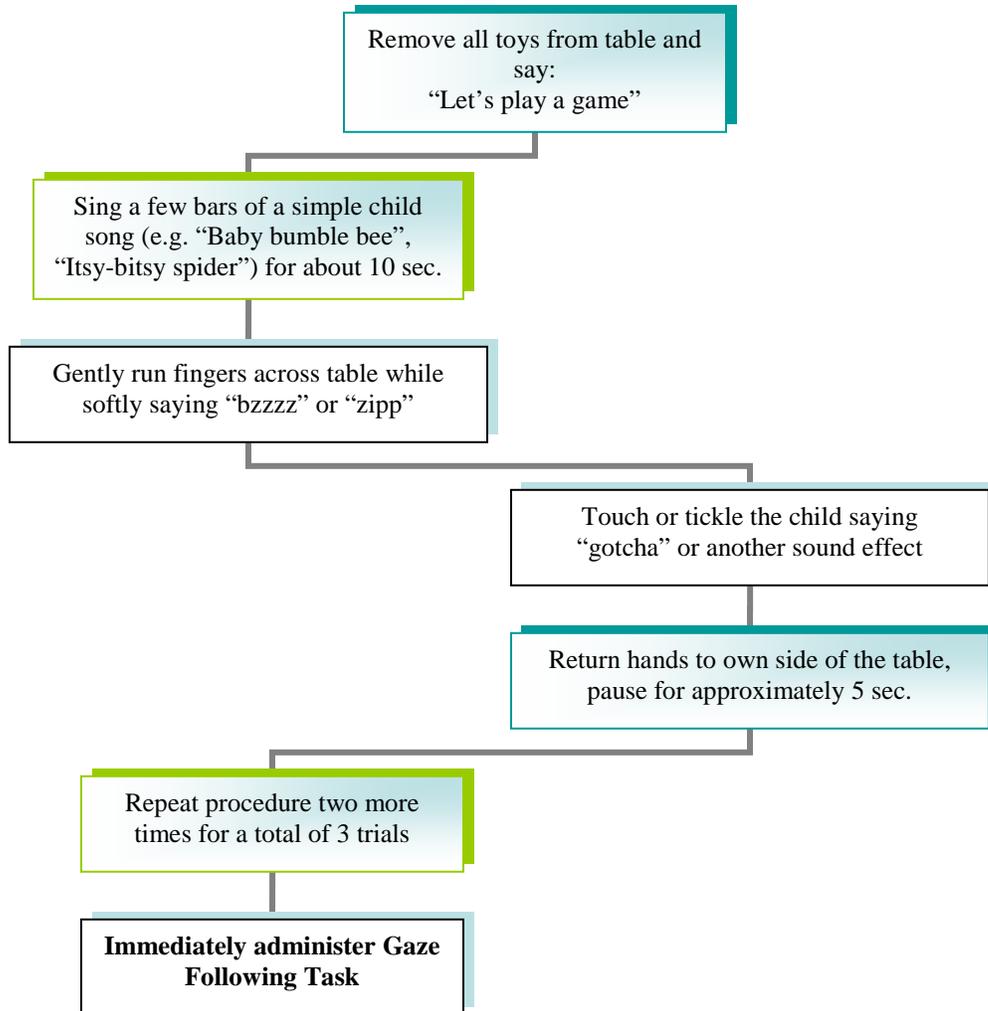
Balloon task (2 balloons of the same color)



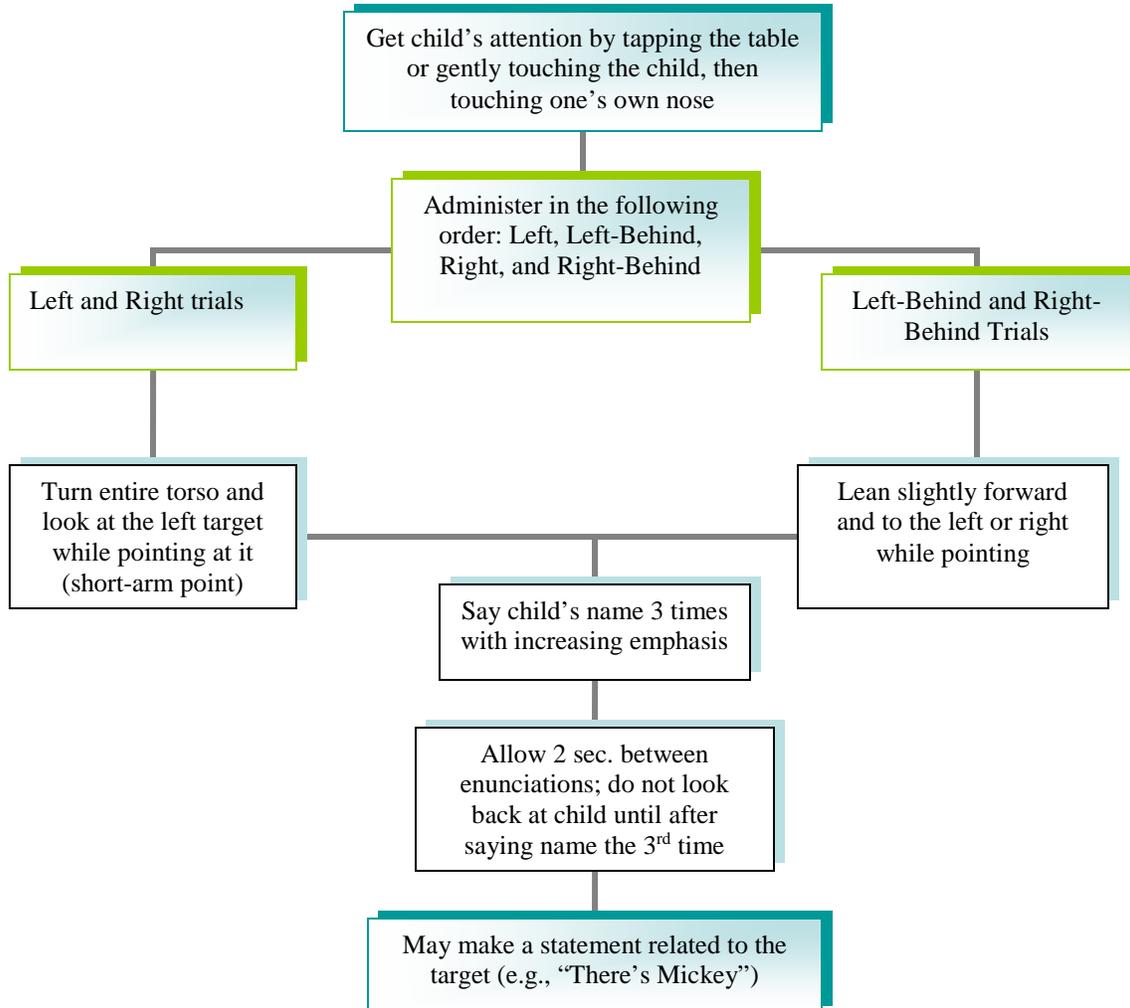
III. Turn-Taking Task (ball, car)



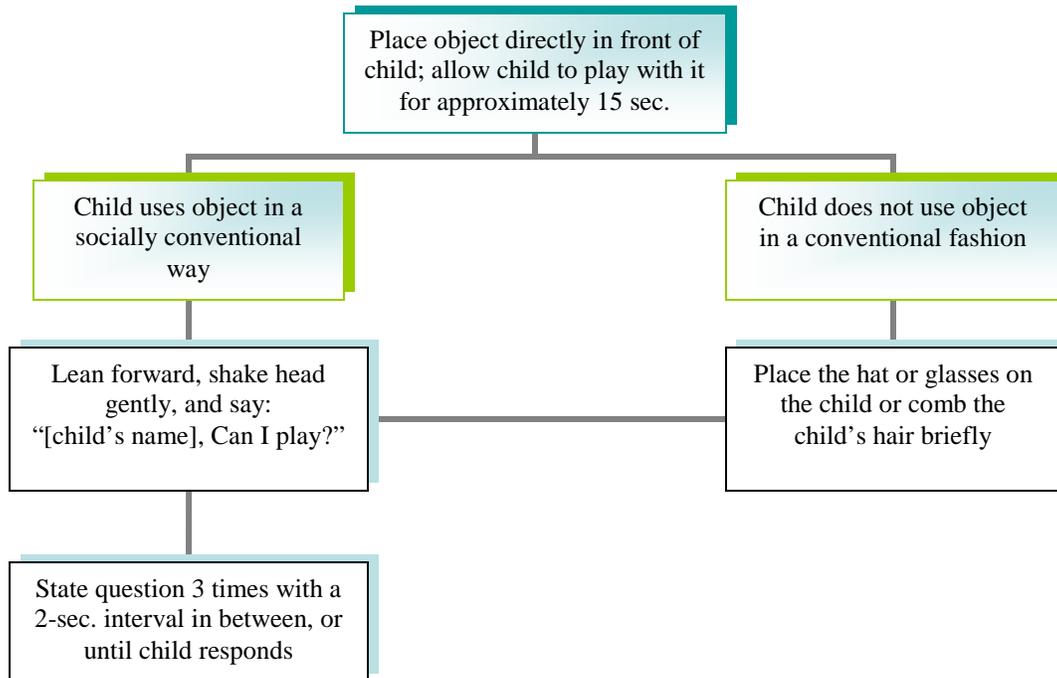
IV. Social Interaction Task (song-tickle game)



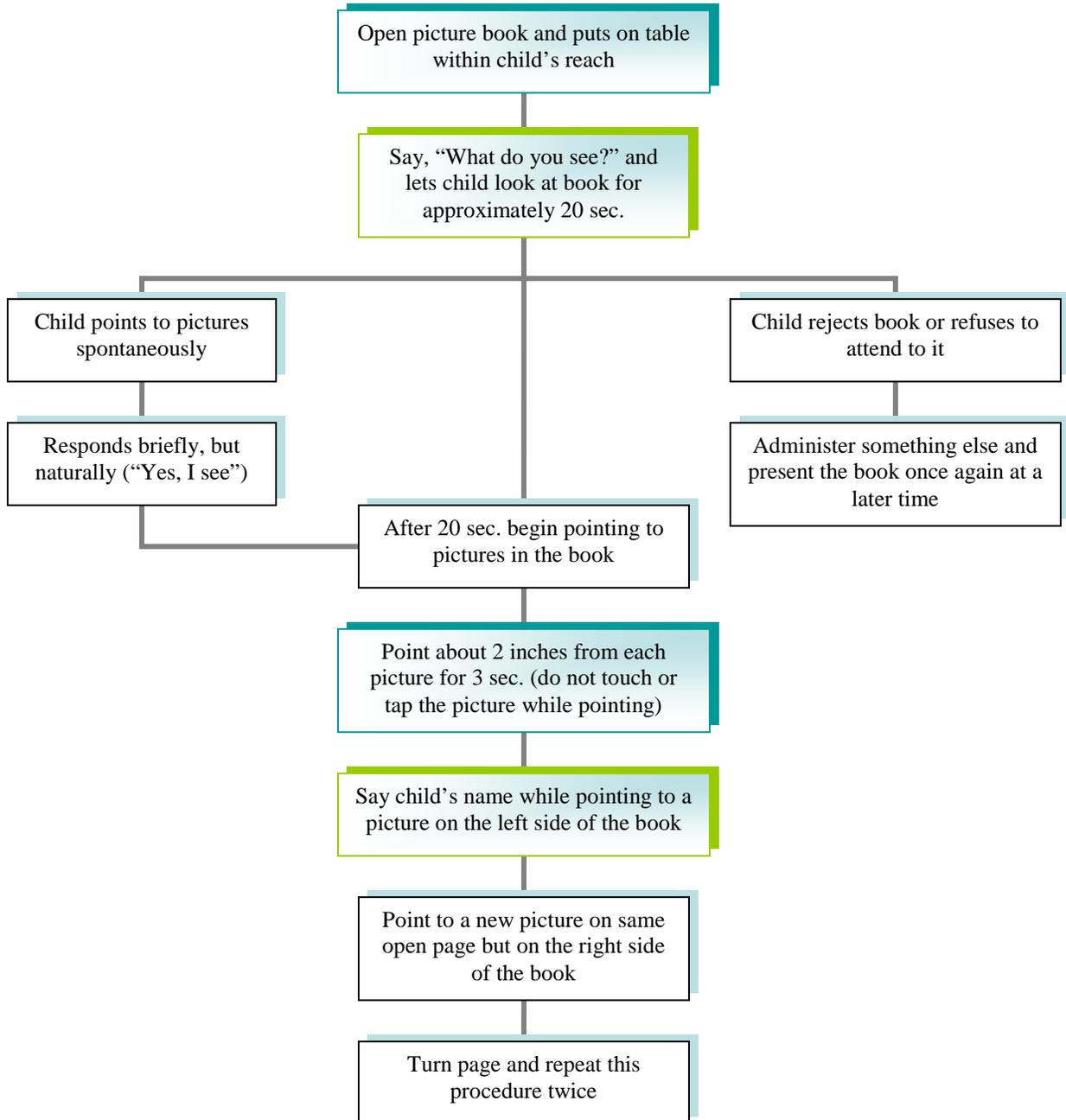
V. Gaze Following Task (pointing/look trials)



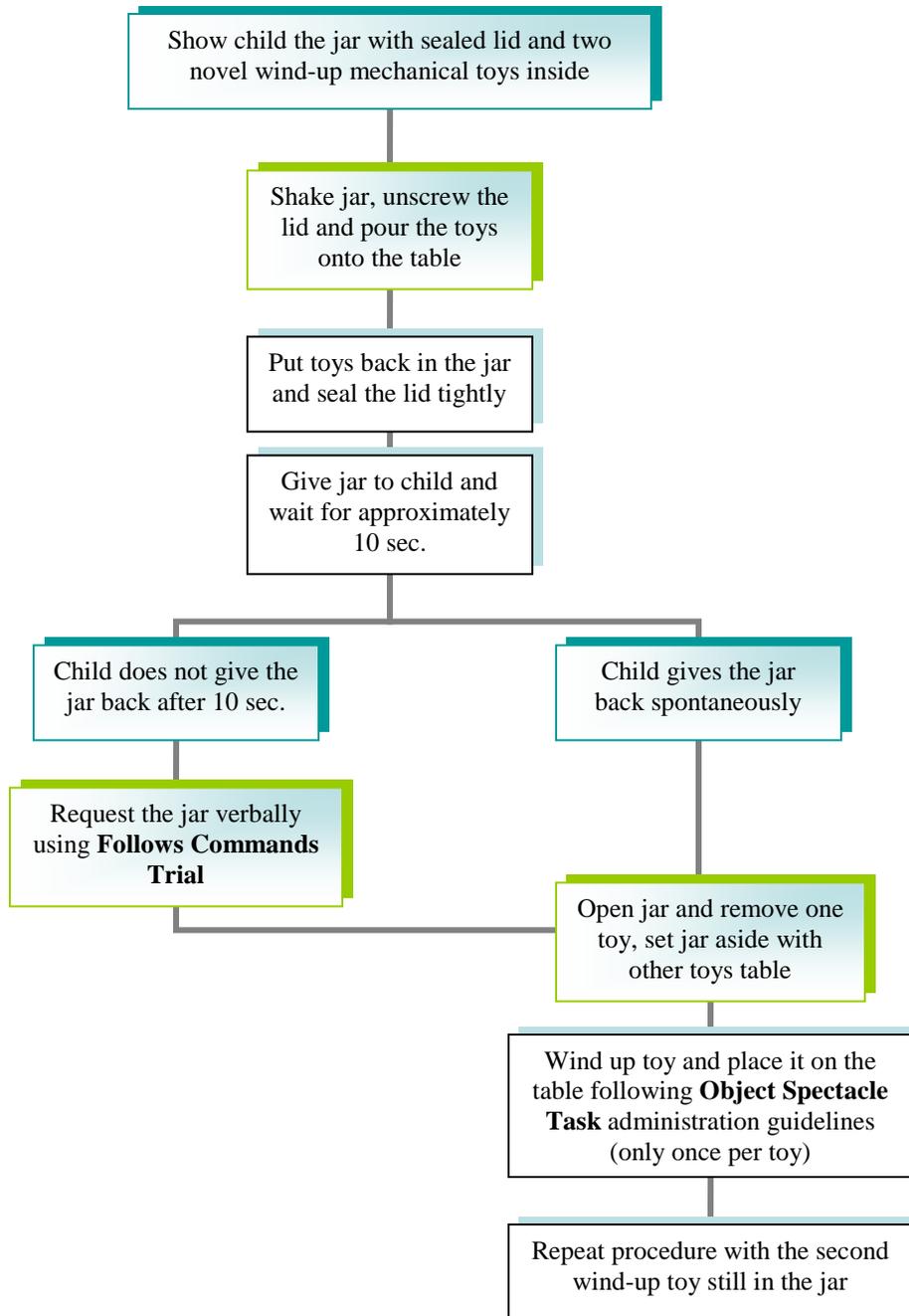
VI. Response to Invitation Task (hat, comb, glasses)



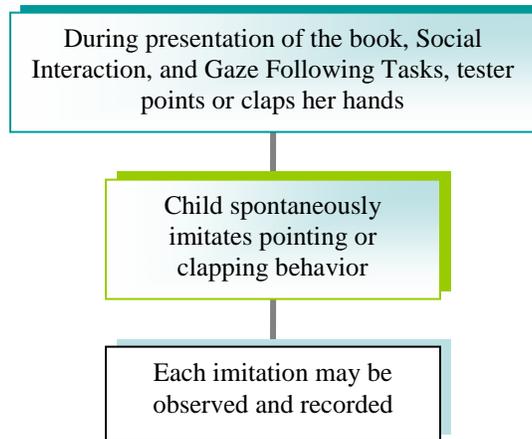
VII. Book Presentation Task (picture book)



VIII. Plastic Jar Task (plastic jar and two wind-up mechanical toys)



IX. Social Imitation Task



Appendix B:
Pictures of Coded Behaviors

Initiating Joint Attention

IJA Alternate



IJA Point



IJA Show



Responding to Joint Attention

RJA Left/Right



RJA Behind



Initiating Behavioral Requests

IBR Appeal



IBR Point



IBR Point & Eye Contact



IBR Give & Eye Contact



Appendix C:
ESCS Coding Summary Table

ESCS Code Summary

BEHAVIOR	LEVEL	CODE	TASKS	DESCRIPTION
IJA	Lower	EYE CONTACT	OBJECT SPECTACLE	<ul style="list-style-type: none"> child makes EC with tester while <i>manipulating or touching</i> an inactive mechanical toy don't code eye contact elicited by movement or noise made by tester
IJA	Lower	ALTERNATES (REFERENCES)	OBJECT SPECTACLE	<ul style="list-style-type: none"> child <i>alternates a look</i> between an active object spectacle and the tester's eyes typically when an object is active on the table or in the tester's hands but also recorded if child looks up to tester after an object becomes active in own hands
IJA	Higher	POINTS	OBJECT SPECTACLE; BOOK	<p><i>Before tester has pointed:</i></p> <ul style="list-style-type: none"> child points to an active toy OR child points to pictures in book OR child points to wall posters may occur with or without eye contact
IJA	Higher	SHOW	OBJECT SPECTACLE	<ul style="list-style-type: none"> child <i>raises a toy upward</i> toward tester's face typically brief bids with child quickly retracting the proffered object may be difficult to distinguish from GIVE (IBR) – if child resists when tester attempts to retrieve object coded as SHOW

BEHAVIOR	LEVEL	CODE	TASKS	DESCRIPTION
RJA	Lower	FOLLOWING PROXIMAL POINT/TOUCH	BOOK	<ul style="list-style-type: none"> • tester points to 6 pictures • credit given if s/he orients head & eyes to picture
RJA	Higher	FOLLOWING LINE OF REGARD	LOOK	<ul style="list-style-type: none"> • <i>for left & right trials:</i> child receives credit if they turn eyes or head sufficiently to indicate they are looking in correct direction AND beyond end of tester's index finger • <i>for behind trials:</i> child receives credit if they display a head turn of >90 degrees to indicate looking in general vicinity behind the child • a definitive head turn is necessary in cases where the tester's index finger is not observable

BEHAVIOR	LEVEL	CODE	TASKS	DESCRIPTION
IBR	Lower	EYE CONTACT	OBJECT SPECTACLE	<ul style="list-style-type: none"> child makes EC with tester <i>after an object spectacle has ceased</i> OR child makes EC after the tester <i>has removed an object</i> from the child don't code eye contact elicited by movement or noise made by tester
IBR	Lower	REACH	OBJECT SPECTACLE	<ul style="list-style-type: none"> child <i>extends arm</i> toward an out of reach toy behavior is NOT scored if child simply reaches & obtains a toy if child gets out of seat to get a toy, a REACH is only scored if child attempts to obtain a toy <i>from within tester's grasp</i> a REACH bid <i>ends</i> when child retracts arm OR lays arm on table with hand closed for more than 2 seconds interruptions & re-initiations of a REACH gesture with less than a 2 second interval are coded as <i>one bid</i>
IBR	Lower	APPEAL	OBJECT SPECTACLE	<ul style="list-style-type: none"> child combines EC with REACHING EC may be a <i>brief</i> event superimposed on a longer period of reaching EC & REACH must be <i>simultaneous</i> at some point during bid
IBR	Higher	GIVE	OBJECT SPECTACLE; JAR	<ul style="list-style-type: none"> child <i>pushes</i> object toward tester OR child <i>holds</i> an object out toward tester (typically towards tester's hands or body) may be rated as occurring <i>with or w/out EC</i>

BEHAVIOR	LEVEL	CODE	TASKS	DESCRIPTION
IBR	Higher	POINTS	OBJECT SPECTACLE	<ul style="list-style-type: none"> child uses <i>an extended</i> index finger to indicate a desired inactive object or event if a POINT turns into a REACH or vice-versa, only give credit for the <i>higher</i> level behavior (e.g. POINT) may be rated as occurring with or w/out EC

BEHAVIOR	LEVEL	CODE	TASKS	DESCRIPTION
RBR	None	FOLLOWS COMMANDS	OBJECT SPECTACLE; JAR	<ul style="list-style-type: none"> • responds to “give it to me” • child gives requested object <i>with or without gesture</i> or shows comprehension with shaking of head or by saying “no” • make sure tester uses directive (and not playful) tone when requesting

BEHAVIOR	LEVEL	CODE	TASKS	DESCRIPTION
ISI	None	INITIATES TURN-TAKING	TURN-TAKING	<ul style="list-style-type: none"> upon receipt of car or ball, child <i>rolls object back to tester</i> this must occur before child has witnessed tester rolling object
ISI	None	TEASE		<ul style="list-style-type: none"> child engages in a <i>prohibited</i> act while displaying positive affect toward tester e.g., holding an object away from tester after a “give it to me” request; purposely throwing object across room only one tease is recorded for a period the child is continuously engaged in the act BUT if the child releases & then re-obtains the object OR obtains a new object, another tease may be recorded
ISI	None	INITIATES SONG/TICKLE	TICKLE/SONG	<ul style="list-style-type: none"> child makes EC & runs his/her fingers across table OR child makes tickle gesture OR child claps OR child sings OR behavior may be ONLY be rated after the 1st SONG/TICKLE task has been presented AND at least one additional task has been presented

BEHAVIOR	LEVEL	CODE	TASKS	DESCRIPTION
RSI	Lower	EYE CONTACT	TICKLE	<ul style="list-style-type: none"> child makes EC with tester after tester has tickled the child & paused before next tickle episode
RSI	Lower	ACT	TICKLE	<ul style="list-style-type: none"> child vocalizes or bangs the table OR child reaches to tester after tester has tickled the child
RSI	Lower	APPEAL	TICKLE	<ul style="list-style-type: none"> child combines ACT with EC
RSI	Higher	RESPONDS (MAINTAINS) TURN-TAKING	TURN-TAKING	<ul style="list-style-type: none"> child takes turns with tester throwing the ball or rolling the car score based on code determined by highest number of consecutive turns with tester
RSI	Higher	RESPONDS TO INVITATION	RESPONSE TO INVITATION (HAT, GLASSES, or COMB)	<ul style="list-style-type: none"> child receives a positive score for each item correctly placed on or toward the adult's head in response to invitation "can I play?" child may receive a score of 0-3 on this item

Appendix D:
ESCS Coding Sheet

Early Social Communication Scales - Coding Sheet

Mundy et al., 2003, University of Miami

Subject Number: _____ Date Administered: _____
 Age: _____ Tester: _____

Date Scored: _____ Tape Number: _____
 Rater: _____ Counter: _____

Initiating Joint Attention

	1	5	10	15	20	<i>Sum</i>
Eye Contact (EC)	<input type="checkbox"/>					
Alternate	<input type="checkbox"/>					
Lower-Level Total:						<input type="checkbox"/>
Point	<input type="checkbox"/>					
Point & EC	<input type="checkbox"/>					
Show	<input type="checkbox"/>					
Higher-Level Total:						<input type="checkbox"/>
IJA Total:						<input type="checkbox"/>

Bid to Caregiver

Responding to Joint Attention

	1	5	10	15	20
Follows Point	<input type="checkbox"/>				
Line of Regard					
	Left	Back Left	Right	Back Right	
Trial 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<i>Delayed</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Trial 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<i>Delayed</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
					% Correct: _____
RJA Total:					<input type="checkbox"/>

Initiating Behavioral Requests

	1	5	10	15	20	<i>Sum</i>
Eye Contact (EC)	<input type="checkbox"/>					
Reach	<input type="checkbox"/>					
Appeal	<input type="checkbox"/>					
Lower-Level Total:						<input type="checkbox"/>
Point	<input type="checkbox"/>					
Point & EC	<input type="checkbox"/>					
Give	<input type="checkbox"/>					
Give & EC	<input type="checkbox"/>					
Higher-Level Total:						<input type="checkbox"/>
IBR Total:						<input type="checkbox"/>

Bid to Caregiver

Responding to Behavioral Requests

	1	5	10	15	20
<i>Without Gesture</i>					
Pass	<input type="checkbox"/>				
Fail	<input type="checkbox"/>				
<i>With Gesture</i>					
Pass	<input type="checkbox"/>				
Fail	<input type="checkbox"/>				
					% Correct: _____
RBR Total:					<input type="checkbox"/>

Point in Imitation

Notes:

Appendix E:
ESCS Scoring Summary Worksheet

ESCS Summary Scores Worksheet

Initiating Joint Attention (IJA)

$$\begin{aligned} \text{Lower Level IJA} &= \frac{\text{EC} + \text{Alt}}{\text{EC} + \text{Alt}} \\ \text{Higher Level IJA} &= \frac{\text{Pt} + \text{PtEC} + \text{Show}}{\text{Pt} + \text{PtEC} + \text{Show}} \\ \text{Total IJA} &= \frac{\text{Lower Level IJA} + \text{Higher Level IJA}}{(\text{EC} + \text{Alt}) + (\text{Pt} + \text{PtEC} + \text{Show})} \\ \text{Ratio Higher/Total IJA} &= \frac{\text{Higher Level IJA}}{(\text{Pt} + \text{PtEC} + \text{Show})} \div \frac{\text{Total IJA}}{(\text{EC} + \text{Alt} + \text{Pt} + \text{PtEC} + \text{Show})} \\ \text{IJA Bids to Mom} &= \text{_____} \end{aligned}$$

Responding to Joint Attention (RJA)

$$\begin{aligned} \text{Lower Level RJA} &= \left(\frac{\text{_____}}{\text{\# correct follow prox. Pt/Tch}} \div \frac{\text{_____}}{\text{total \# trials}} \right) * 100 \\ \text{Higher Level RJA} &= \left(\frac{\text{_____}}{\text{\# correct follow line of regard}} \div \frac{\text{_____}}{\text{total \# trials}} \right) * 100 \\ \text{Left/Right RJA} &= \left(\frac{\text{_____}}{\text{\# correct follow line of regard Left/Right trials}} \div \frac{\text{_____}}{\text{total \# trials}} \right) * 100 \\ \text{Behind RJA} &= \left(\frac{\text{_____}}{\text{\# correct follow line of regard Behind trials}} \div \frac{\text{_____}}{\text{total \# trials}} \right) * 100 \\ \text{Total RJA} &= \frac{\text{Lower Level RJA} + \text{Higher Level RJA}}{(\text{Prox Pt/Tch}) + (\text{Line of Regard})} \end{aligned}$$

Initiating Behavioral Requests (IBR)

$$\begin{aligned} \text{Lower Level IBR} &= \overline{\text{EC}} + \overline{\text{Rch}} + \overline{\text{App}} \\ \text{Higher Level IBR} &= \overline{\text{Pt}} + \overline{\text{PtEC}} + \overline{\text{Gv}} + \overline{\text{GvEc}} \\ \text{Total IBR} &= \overline{\text{Lower Level IBR}} + \overline{\text{Higher Level IBR}} \\ &= (\overline{\text{EC}} + \overline{\text{Rch}} + \overline{\text{App}}) + (\overline{\text{Pt}} + \overline{\text{PtEC}} + \overline{\text{Gv}} + \overline{\text{GvEc}}) \\ \text{Ratio Higher/Total IBR} &= \frac{\overline{\text{Higher Level IBR}}}{\overline{\text{Total IBR}}} \\ &= \frac{(\overline{\text{Pt}} + \overline{\text{PtEC}} + \overline{\text{Gv}} + \overline{\text{GvEc}})}{(\overline{\text{EC}} + \overline{\text{Rch}} + \overline{\text{App}} + \overline{\text{Pt}} + \overline{\text{PtEC}} + \overline{\text{Gv}} + \overline{\text{GvEc}})} \\ \text{IBR Bid to Mom} &= \text{_____} \end{aligned}$$

Responding to Behavioral Requests (RBR)

$$\begin{aligned} \text{Total RBR Passes} &= \frac{(\# \text{ Pass without Gesture} + \# \text{ Pass with Gesture})}{(\text{Total \# of Trials, including Pass \& Fail})} * 100 \\ \text{Total RBR Fails} &= \frac{(\# \text{ Fail without Gesture} + \# \text{ Fail with Gesture})}{(\text{Total \# of Trials, including Pass \& Fail})} * 100 \end{aligned}$$

Initiating Social Interaction (ISI)

$$\text{ISI} = \overline{\text{Init. TT with car/ball}} + \overline{\text{Tease}} + \overline{\text{Initiates Song/Tickle}}$$

Responding to Social Interaction (RSI)

$$\begin{aligned} \text{RSI} &= \overline{\text{Total Song/Tickle Resp.}} + \overline{\text{Total TT Resp.}} + \overline{\text{Total Resp. to Invitation}} \\ &= (\overline{\text{EC}} + \overline{\text{Act}} + \overline{\text{Appeal}}) + (\overline{\text{car}} + \overline{\text{ball resp.}}) + (\overline{\text{comb}} + \overline{\text{hat}} + \overline{\text{glasses resp.}}) \end{aligned}$$