

**CODING MANUAL FOR CHILDREN'S INTERACTIONS WITH
AIBO, THE ROBOTIC DOG – THE PRESCHOOL STUDY**

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ABSTRACT

This technical report provides the coding manual used to code the behaviors and reasoning of preschool children interacting with a robotic dog (Sony's AIBO). By a coding manual we mean a philosophically and empirically grounded systematic means for coding behavioral and social-cognitive data. Part one contains our behavioral coding system. Part two contains our reasoning coding system. Our goal is to present this manual such that – as part of an on-going iterative scientific process – it can be used and modified by others interested in investigating the ontogenesis of the human-robotic relationship.

INTRODUCTION

Animals have long been an important part of children's lives, offering comfort and companionship, and promoting the development of moral reciprocity and responsibility (Beck & Katcher, 1996; Kahn, 1999; Kahn & Kellert, 2002; Melson, 2001; Myers, 1998). Yet in recent years there has been a movement to create technological substitutes for pets, such as the Tamagotchi, i-Cybie, Tekno, and Poo-Chi. Can such robotic counterparts (now or in the future) provide children with similar developmental outcomes?

In a current study (Kahn, Friedman, Perez-Granados, & Freier, 2003), we address this question by investigating preschool children's behavioral interactions with and reasoning about one of the most advanced robotic pets on the market today, Sony's robotic dog AIBO. Eighty children (equally divided between two age groups, 34-50 months and 58-74 months) participated in a session with AIBO. As a basis for comparison, all children participated in a comparable session with a stuffed dog. During each session, the child (a) had a short *introductory "play" period* with each artifact (AIBO and the stuffed dog), and (b) responded to a set of 8 questions about the artifact's *animacy* (e.g., Is AIBO alive or not alive? Can AIBO die? Is AIBO a real dog?). In addition, the child (c) responded either to a set of 30 questions about the artifact's *biological substrates* (e.g., Does AIBO have a stomach? Does AIBO breath?) and *mental states* (e.g., Can AIBO feel happy? Do you think AIBO will try to get the toy?) or to a set of 28 questions about *social rapport* (e.g., Can AIBO be your friend? Can you be a friend to AIBO?) and *moral standing* (e.g., Let's say you are going on vacation for a week with your family. Do you think it's OK to leave AIBO at home alone? If you decide you don't like AIBO any more, is it OK to throw AIBO in the garbage?). After the sessions with AIBO and the stuffed dog, each child completed a pair-wise card sort task about AIBO's similarity to a computer, a humanoid

robot, a stuffed dog, and a real dog. Each session was video taped, allowing for analyses of on-going behavioral interactions. The dialog was also transcribed for analysis.

This technical report provides the coding manual used to code the behaviors and reasoning of preschool children in this study. By a coding manual we mean a philosophically and empirically grounded systematic means for coding behavioral and social-cognitive data. (See Kahn, 1999, chap. 5, for a detailed discussion of structural developmental methods in general, and generating a coding manual in particular. For an explanation of how this process fits within the iterative and integrative tripartite methodology of Value Sensitive Design, see Friedman, forthcoming; Friedman & Kahn, 2002; and Friedman, Kahn, & Borning, 2003.) Part one contains our behavioral coding system. Part two contains our reasoning coding system. Our goal is to present this manual such that – as part of an on-going iterative scientific process – it can be used and modified by others interested in investigating the ontogenesis of the human-robotic relationship.

In an earlier study, we investigated people's conceptions of AIBO in online AIBO discussion forums (Friedman, Kahn, & Hagman, 2003; Kahn, Friedman, & Hagman, 2002). We expected that by characterizing adults' relationships with their robotic dog, we would be tapping into – if not developmental endpoints – at least sophisticated forms of behaviors and reasoning that could help structure this developmental study with preschool children. Our expectation was met. Both coding manuals also drew on conceptualizations from social and moral development theory (e.g., Turiel, 1983) and to some extent theory of mind (e.g., Gopnik & Meltzoff, 1998). That said, this manual was also empirically derived from in-depth analysis of half the data, randomly pre-selected. Through this analysis, initial conceptual coding categories were refined, extended, and sometimes deleted, and many additional categories were added, so as to capture the nuanced meanings from the data.

The hierarchical structure of the coding categories reflects the level of complexity of the child's interaction with and reasoning about the artifact. Within the hierarchy there is an

inclusion of less complex behaviors within a more complex system. Accordingly, this manual not only provides the conceptualization for coding data, but helps to structure the later analysis, as well.

PART ONE: BEHAVIORAL CODING SYSTEM

OVERVIEW

This section outlines the application of the coding manual, including the overarching structure of the behavioral manual, the rules of coding, and the coding process. We have provided several examples to assist in the comprehension of the use of this manual in coding behavioral data. Additionally we created a basic outline of the coding process in a step by step format.

To begin, we identified three categories of coding to capture the child's behavior: AIBO Initiated, Interviewer Initiated, and Open Coding. In order to handle these categories separately, we created three coding sheets that correspond to the categories outlined here (see Appendix A). The interviewer and AIBO initiated categories are designated as expected stimuli, in which the stimulus is initially identified, followed by the child's behavioral response. The open coding category is behaviorally-driven, in which the behavior is initially identified, followed by a review of the video to identify any potential stimulus or the lack of one. The categories are described below:

AIBO Initiated Stimuli. Expected AIBO actions, including approaching child, kicking ball, and head butting ball. These actions are within AIBO's range of capabilities and are of the sort that mimic agency. Consequently, we were interested in capturing the child's behavioral response, facial expression, and referencing following the end of the stimulus.

Interviewer Initiated Stimuli. Expected stimuli from the interview protocol, including first instances of the hit, hiding ball, placing in lap, feeding, petting, and offering toy. These stimuli were used to assess the children's behavioral response, facial expression, and referencing behavior following the end of the stimulus. We are interested only in the "first instance," which

is defined as the first time an event occurs during the interview while the camera is turned on. There should only be one first instance per category for each interview (e.g., If the interviewer first demonstrates an action, and then later in the interview gives verbal permission to do the same action, the first instance is only the demonstration of the action). Other instances of these stimuli have separate codes and are coded in the Open Coding category.

Open Coding. Codes are generated by the child's behavior, while the stimulus that preceded the behavior is identified using the Five-Second Rule (see below). Please note that some AIBO stimuli, as well as other instances of interviewer initiated stimuli, are designated with an asterisk (*). These are referred to as 'starred stimuli,' which *do not* initiate coding; rather a behavior initiates coding and the stimulus is identified secondly. All starred stimuli, as well as spontaneous behaviors (no stimuli), are coded in the open coding category. Additionally, two behaviors are starred, indicating that they should *only* be coded in response to an expected (non-starred) stimulus. In other words, do not code a starred stimulus with a starred behavior. Note that the non-starred stimuli refer to the AIBO initiated expected stimuli and the first instances of interviewer initiated expected stimuli, which are coded on their respective coding sheets.

RULES OF BEHAVIORAL CODING

In the development of this coding manual we created two overarching rules to address problems that arose in handling the data.

The Five-Second Rule

This rule was developed to address a problem in identifying stimulus-behavior dyads. In reviewing the data, we found that it was not always clear if a particular stimulus "caused" a particular behavior. For instance, if AIBO kicked the ball and 20 seconds later the child picks up the ball we could not say with certainty that the ball kick "caused" the behavior. Rather than attempt to assign causality between a stimulus and a behavior, we decided to code in terms of co-

occurrences of stimulus and behavior. This decision then led us to create the five-second rule, which from an empirical basis seemed to accurately capture the stimulus and behavior dyads. Thus, the five-second rule is applied to both expected stimuli and behaviors, although slightly differently to each.

Stimulus Application. The 5 seconds begin at the ‘end’ of an expected stimulus. An expected stimulus is “ended” by either the actual end of the stimulus or at the start of the child’s behavior. Code all behaviors that occur within the 5-seconds following the end of the expected stimulus. If no behavior occurs within 5 seconds, code ‘no response’ (7.1 in the Behaviors section). Note that if a new expected stimulus occurs within the 5 seconds, the five seconds are ended at the end of that stimulus.

For example, AIBO head butts the ball (timestamp at 9:36), the child rolls the ball to AIBO, then AIBO kicks the ball (timestamp at 9:40). The five second rule applied to the head butt is ‘ended’ by the ball kick and a new application of the five second rule begins at the ball kick.

Behavior Application. Once a behavior has been identified, code the timestamp for the start of the behavior. Review the video for five seconds prior to the timestamp to identify any potential stimulus that might have preceded the behavior. If more than one stimulus occurs within the 5 seconds preceding the start of the behavior, choose (a) the stimulus that *clearly* corresponds to the behavior or (b) if the coder cannot identify a clear corresponding stimulus among multiple stimuli, choose the most recent stimulus. If no stimulus can be identified, use the ‘no stimulus’ code.

For example, the child shows the ball to AIBO and says, “Here it is, AIBO” at 9:06. Upon review of the five seconds preceding the timestamp, two potential stimuli are

identified: AIBO moving its head around as if “looking” and a protocol question, “Do you think AIBO has a stomach?” Here the AIBO “looking” action would be coded as the stimulus for the behavior, rather than the protocol question.

One Minute Rule

The rule states that an individual behavior can only be coded once within one minute of the start of the behavior. This rule was developed to limit micro-coding of behaviors, as well as to handle the issue of identifying when a repetitive behavior ends, so as to know when to code another incident of the said behavior:

For example, if a child pets AIBO at 2:14 and within one minute pets AIBO an additional 5 times, distinguishing the ‘end’ of one pet and the ‘beginning’ of another is too cumbersome for the coder. In this example, with the application of the rule, petting is coded once at 2:14 and would not be eligible for coding again until 3:14.

The one minute rule also allows the coding to reflect the relative duration of a given behavior if it extends beyond one-minute:

For example, if a child places AIBO in his lap at 5:43 and continues to have AIBO in lap for five minutes, code ‘in lap’ 5 times, at one-minute intervals (e.g., 6:43, 7:43, 8:43, etc.) from the start of the behavior.

Although the one minute rule causes the loss of some data, insofar as one loses an account of how often a behavior occurs within a minute, it addresses several difficult problems in coding – the problem of micro-coding and of identifying exactly when a behavior ends – while usually capturing what we believe to be the essential features of the behavioral data.

Application. Code a behavior only once within 1 minute of its occurrence. If the behavior is extended beyond one minute, code one instance of the behavior for each additional minute. Interviewer and AIBO initiated stimuli trump the one minute rule. That is, if the one minute rule is in effect for a behavior and that behavior occurs again in response to an expected stimulus, code the behavior again and restart the one minute rule:

For example, a child spontaneously offers AIBO the biscuit at 7:45, then the interviewer asks if the child would like to feed AIBO the biscuit in the first instance of interviewer initiated feeding (timestamp 8:20); the child responds by taking the biscuit from the interviewer and offering it to AIBO, in the same way as at 7:45. This second event of offering biscuit would be coded because it is in response to an expected stimulus, which trumps the one minute rule. The one minute rule would be restarted at the timestamp for the interviewer initiated feeding stimulus.

Furthermore, this rule is not always applied at the lowest level of the coding manual; these exceptions are noted in the category descriptions (for example, see 1.2. Touching or Moving Limbs/Parts).

THE BEHAVIORAL CODING PROCESS

A prototypical coding session includes the following process (please refer to Appendix A for sample coding sheets and specific examples):

- (a) Begin coding at the start of the tape (reset counter).
- (b) Designate whether AIBO or Shanti portion of interview on coding sheets. For the AIBO portion, use AIBO Initiated, Interviewer Initiated, and Open Coding sheets. For the Shanti portion, use Interviewer Initiated and Open Coding sheets.

(c) Identify either expected stimuli or behaviors; code appropriately always identifying the corresponding behavior, stimulus, timestamp, and/or other specified data (e.g., facial expression and referencing).

(d) Use a new set of coding sheets for the second portion of the interview; do not reset time, rather keep it continuous for both sessions of the interview.

(e) Do not code behavioral events during the card sorting tasks. The nature of the video during this section of the interview tends to focus specifically on the cards, and therefore does not adequately capture the child's behaviors. However, upon the completion of the card sort task begin the behavioral coding again in order to capture any behavior the child may have as she/he leaves the room.

(f) Code until the end of the tape.

THE BEHAVIORAL CODING CATEGORIES

A. Stimuli – Actions Initiated by the Interviewer or AIBO/Shanti

NOTES:

(1) Missing Data (99) – Used when the camera does not capture a behavior, stimulus, or response.

(NOTE: This can be used as the stimulus code when the child is engaging in a behavior as the camera is turned on but the stimulus is not captured.)

(2) Code the time stamp that signifies the end of the stimulus. An Expected Stimuli 'ends' (a) at the end of the stimulus, or (b) at the start of the child's behavior, whichever happens first.

(3) DO NOT code stimulus if child does not recognize event occurring. Be conservative here.

Child might be peripherally aware, in which case you would code that event.

1. AIBO/Shanti Initiated (NOTES: (1) Shanti probably won't initiate anything; (2) in the case where the stimulus is 'ended' with the start of a behavior and the stimulus action continues beyond the five seconds following the timestamp, apply all the normal rules of stimulus identification as if it were a new stimulus; and (3) all timestamps should reflect the ending of the stimulus (or the start of the behavior). For example, AIBO approach is ended by child's petting at 3:05, the approach stimulus continues beyond 3:10. The continued approach ends when AIBO stops walking at 3:14 (which is the timestamp for the end of the stimulus) and within 5 seconds the child has had no response. This would be coded as two stimulus and behavior dyads.)

Prototypical examples of AIBO/Shanti Initiated events:

- AIBO inadvertently kicks the ball. The child picks the ball up and places it at AIBO's feet and says, "Here, AIBO."
- AIBO "intentionally" kicks the ball. In response, the child grasps the ball and holds onto it without any further reaction.
- The child "wags" AIBO's tail in what appears to be a direct response to a presentation of sounds and lights by AIBO.

*1.1. Stationary movement – AIBO moving, standing up, sitting down, or turning in circles, but not walking.

1.2. Walk – AIBO moving in a horizontal fashion, not turning around in circles – AIBO must take at least two steps in the given direction to constitute a "walk".

*1.2.1. General walk

1.2.2. Approach – AIBO's continued and direct movement would touch the child. (NOTE: Approach ends when (a) AIBO stops, (b) the behavior begins, or (c) the interviewer moves AIBO, thereby ending AIBO's approach.)

*1.3. Attempt at action – AIBO attempts to kick or head butt the ball, but does not make contact with the ball (e.g., misses). (NOTE: Each attempt is a separate stimulus. For instance, if AIBO attempts to kick the ball three times, each separate ball kick attempt is a potential new stimulus.)

*1.3.1. Ball Kick – 'intentional' kick of the ball

*1.3.2. Head Butt – Includes straight on head butt with front of head and sideways head butt with either side of head.

1.4. Successful action – AIBO makes physical contact with ball in ball kick, head butt, or inadvertent action, successfully moving the ball, however slight. (NOTE: Each

attempt is a separate stimulus. For instance, if AIBO kicks the ball three times, each separate ball kick attempt is a new stimulus.)

1.4.1. Ball Kick – ‘intentional’ kick of the ball

1.4.2. Head Butt – Includes straight on head butt with front of head and sideways head butt with either side of head.

*1.4.3. Inadvertent ball kick or head butt (e.g. bumping into the ball)

*1.5. Other AIBO movement or sounds – Includes tail wagging, head moving, lights flashing, musical sounds, or ‘dancing’. (NOTE: Such movements can occur when AIBO is moving or attempting to walk in the lap.)

2. Interviewer Initiated – Actions or verbal cues on the part of the interviewer that may or may not be part of the interview protocol and act as a potential stimulus of the child’s behavior. (NOTES: (1) When in doubt as to whether or not to double code, focus on the action rather than the verbal cue; (2) ‘Permission’ is a question or statement in reference to child’s ability or desire to perform action; and (3) ‘Modeling’ is performance of action by interviewer that may or may not involve verbal queues that are NOT of a ‘permission’ nature (e.g., interviewer pets AIBO and says, “AIBO likes to be pet.”).)

Prototypical examples of Interviewer Initiated events:

- In response to the interviewer hitting Shanti on the head, the child pulls Shanti into her lap and begins to pet Shanti.
- The interviewer asks, “Do you want to feed it [the biscuit] to Shanti?” The child responds affirmatively and picks up the biscuit. The child then shows the biscuit to Shanti while saying, “You want this, Shanti? Go get it!” and proceeds to throw the biscuit away from Shanti.
- The interviewer turns AIBO around, placing it on the floor near the child. The interviewer then begins to pet AIBO’s head and back and states, “You can pet AIBO if you want to.” The child then leans over and tentatively pets AIBO’s head.

2.1. Hit – Part of the interview protocol in which the interviewer hits AIBO/Shanti. (NOTE: Use the Five-second rule for any behaviors following the hit. Also code referencing (for 5 seconds) and facial expressions (within one second of stimulus end).)

2.1.1. Warning by interviewer – the interviewer notifies of the hit before it occurs (not simultaneously).

2.1.2. No warning by interviewer

2.2. Hiding ball – Part of the interview protocol in which the interview hides the ball. (NOTES: (1) This may include the interviewer actually hiding the ball or the interviewer asking a question like “What will happen if I hide the ball?”; and (2) the ball may be replaced with the toy or biscuit, not in a feeding action.)

2.2.1. First Instance

*2.2.2. Other Instance – All instances after the first instance.

2.3. Attempt to place AIBO or Shanti in lap – Instances when the interviewer seeks permission and/or places AIBO/Shanti in the child’s lap.

2.3.1. First Instance (NOTE: Mark the timestamp when *contact* is made with the child, UNLESS the child's response is a declination. In the case of a declination by the child, mark the timestamp when the child first recognizes that the interviewer would like to place AIBO/Shanti in the lap.)

2.3.1.1. Verbal permission or query – Interviewer asks or suggests that AIBO/Shanti be placed in the child's lap (e.g., “May I put AIBO in your lap?” or “You can put AIBO in your lap.”). (NOTE: Must be in reference to the child's lap; “You can pick up AIBO/Shanti” is not enough.)

2.3.1.1.1. Normal – AIBO in ‘lap mode’ or Shanti

2.3.1.1.2. AIBO not in ‘lap mode’ (NOTE: Use this code as well if AIBO has not been picked up by the interviewer)

2.3.1.2. Modeling or placing in lap – Interviewer places AIBO/Shanti in child's lap, his/her own lap, or attempts to place AIBO/Shanti in the child's lap. No permission or suggestion.

2.3.1.2.1. Normal – AIBO in ‘lap mode’ or Shanti

2.3.1.2.2. AIBO not in ‘lap mode’ (NOTE: Use this code as well if AIBO has not been picked up by the interviewer)

2.3.1.3. Permission and modeling – A combination of interviewer seeking permission *and* placing or attempting to place AIBO/Shanti in child's lap or their own lap (e.g., “May I place Shanti in your lap?” and places Shanti in the child's lap).

2.3.1.3.1. Normal – AIBO in ‘lap mode’ or Shanti

2.3.1.3.2. AIBO not in ‘lap mode’ (NOTE: Use this code as well if AIBO has not been picked up by the interviewer)

*2.3.2. Other Instance – All instances after the first instance.

*2.3.2.1. Verbal permission or query – Interviewer asks or suggests that AIBO/Shanti be placed in the child's lap (e.g., “May I put AIBO in your lap?” or “You can put AIBO in your lap.”). (NOTE: Must be in reference to the child's lap; “You can pick up AIBO/Shanti” is not enough.)

*2.3.2.1.1. Normal – AIBO in ‘lap mode’ or Shanti

*2.3.2.1.2. AIBO not in ‘lap mode’ (NOTE: Use this code as well if AIBO has not been picked up by the interviewer)

*2.3.2.2. Modeling or placing in lap – Interviewer places AIBO/Shanti in child's lap, his/her own lap, or attempts to place AIBO/Shanti in the child's lap. No permission or suggestion.

*2.3.2.2.1. Normal – AIBO in ‘lap mode’ or Shanti

*2.3.2.2.2. AIBO not in ‘lap mode’ (NOTE: Use this code as well if AIBO has not been picked up by the interviewer)

*2.3.2.3. Permission and modeling – A combination of interviewer seeking permission *and* placing or attempting to place AIBO/Shanti in child’s lap or their own lap (e.g., “May I place Shanti in your lap?” and places Shanti in the child’s lap).

*2.3.2.3.1. Normal – AIBO in ‘lap mode’ or Shanti

*2.3.2.3.2. AIBO not in ‘lap mode’ (NOTE: Use this code as well if AIBO has not been picked up by the interviewer)

2.4 Feeding AIBO/Shanti – Instances of permission or modeling of feeding AIBO/Shanti.

2.4.1. First instance

2.4.1.1. Verbal Permission – Interviewer gives permission or suggests that the child “feed” AIBO/Shanti (e.g., “You can feed AIBO/Shanti.”). (NOTES: (1) It is not enough if the interviewer says “Here’s the biscuit” or something similar; and (2) no modeling by the interviewer.)

2.4.1.2. Modeling Action – Interviewer models feeding by offering the biscuit to AIBO/Shanti (No verbal permission).

2.4.1.3. Permission and Modeling – A combination of interviewer giving permission and modeling behavior.

*2.4.2. Other Instance – All instances after the first instance.

*2.4.2.1. Verbal Permission Permission – Interviewer gives permission or suggests that the child “feed” AIBO/Shanti (e.g., “You can feed AIBO/Shanti.”) (NOTES: (1) It is not enough if the interviewer says “Here’s the biscuit” or something similar; and (2) no modeling by the interviewer.)

*2.4.2.2. Modeling Action Action – Interviewer models feeding by offering the biscuit to AIBO/Shanti (No verbal permission)

*2.4.2.3. Permission and Modeling – A combination of interviewer giving permission and modeling feeding.

*2.5. Touching AIBO/Shanti – Touching the sensors (back, head, or paws), but NOT petting.

*2.5.1. Verbal Permission – Interviewer gives permission or suggests that the child touch AIBO/Shanti (e.g., “You can touch AIBO’s head.”). (NOTE: No modeling by the interviewer.)

*2.5.2. Modeling Action – Interviewer models touching of AIBO/Shanti (No verbal permission)

*2.5.3. Permission and Modeling – A combination of interviewer giving permission and modeling touching. (e.g., “You can touch AIBO here,” while touching the head sensor.)

2.6 Petting AIBO/Shanti – Instances of permission or modeling petting of AIBO/Shanti.

2.6.1. First instance

- 2.6.1.1. Verbal Permission – Interviewer gives permission or suggests that the child pet AIBO/Shanti (e.g., “You can pet AIBO/Shanti.”). (NOTE: No modeling by the interviewer.)
- 2.6.1.2. Modeling – Interviewer models the behavior by petting AIBO/Shanti (No verbal permission).
- 2.6.1.3. Permission and Modeling – A combination of permission and modeling of petting. (NOTE: For this code, the “end of the stimulus” should be timed at the end of the verbal permission no matter when the petting occurs.)

*2.6.2. Other Instance – All instances after the first instance.

- *2.6.2.1. Verbal Permission – Interviewer gives permission or suggests that the child pet AIBO/Shanti (e.g., “You can pet AIBO/Shanti.”) (NOTE: No modeling by the interviewer.)
- *2.6.2.2. Modeling Action – Interviewer models the behavior by petting AIBO/Shanti (No verbal permission)
- *2.6.2.3. Permission and Modeling – A combination of permission and modeling of petting. (NOTE: For this code, the “end of the stimulus” should be timed at the end of the verbal permission no matter when the petting occurs.)

2.7. Offering toy or ball to AIBO/Shanti – Instances of permission or modeling of offering toy/ball to AIBO/Shanti. (NOTES: (1) Most likely paired with interview protocol; and (2) do not confuse with the use of the biscuit, which is a feeding.)

2.7.1. First Instance

- 2.7.1.1. Verbal Permission – Interviewer gives permission or suggests that the child offer the ball or toy to AIBO/Shanti. (NOTES: (1) It is not enough if the interviewer says “Here’s Shanti’s toy” or something similar. The permission must be in reference to playing with AIBO/Shanti’s toy. “You can play with Shanti’s ball” is enough to constitute verbal permission; and (2) no modeling by the interviewer.)
- 2.7.1.2. Modeling Action – Interviewer holds or places toy or ball in front of AIBO/Shanti with an intent to offer (No verbal permission).
- 2.7.1.3. Permission and Modeling – A combination of interviewer giving permission and modeling offering ball or toy.

*2.7.2. Other Instance– All instances after the first instance.

- *2.7.2.1. Verbal Permission – Interviewer gives permission or suggests that the child offer the ball or toy to AIBO/Shanti. (NOTES: (1) It is not enough if the interviewer says “Here’s Shanti’s toy” or something similar. The permission must be in reference to playing with AIBO/Shanti’s toy. “You can play with Shanti’s ball” is enough to constitute verbal permission; and (2) no modeling by the interviewer.)

- *2.7.2.2. Modeling Action – Interviewer holds or places toy or ball in front of AIBO/Shanti with an intent to offer (No verbal permission).
- *2.7.2.3. Permission and Modeling – A combination of interviewer giving permission and modeling offering ball or toy.

*2.8. Interviewer Questions and Comments

- *2.8.1.x. Structured Question – A statement or question that is part of the interview protocol. (NOTES: (1) The x in 2.8.1.x should be replaced with the question number from reasoning and justification manual; (2) must be explicitly in response to a question ; and (3) only use if the stimulus is interviewer initiated, but not one of the stimuli listed above.)
- *2.8.2 Unstructured Questions and Comments – A statement or question that is not part of the interview protocol, but clearly the stimulus of the child’s behavior.

- *3. No stimulus – Coded as stimulus when child’s behavior is clearly spontaneous. (NOTE: Review 5 seconds prior to behavior and code any stimulus that occurs within that period. The benefit of the doubt should be given to any other codable stimulus.)

B. Behaviors of child toward AIBO/Shanti:

NOTES:

- (1) Uncodable (0) – Used when responses (a) are incoherent, (b) are irrelevant – do not fit a coding category, or (c) do not provide enough information. Do not use this code in conjunction with codable behaviors; only code the codable behavior.
 - (2) Missing Data (99) – Used when the camera does not capture a behavior, stimulus, or response. (NOTE: This can be used as the stimulus code when the child is engaging in a behavior as the camera is turned on but the stimulus is not captured.)
 - (3) Code from the child’s perspective. Actions of the interviewer or artifact are not significant unless the child becomes engaged or the action changes the child’s behavior.
 - (4) Verbal cues may help identify codable behaviors (such as when the child asks, “What’s this?” and moves Shanti’s leg at the same time).
 - (5) Feeding note: Whenever the child has the biscuit in hand, pay close attention to whether or not feeding occurs. There are three types of feeding that we will pay attention to – exploratory (to see what will happen, searching for mouth parts while feeding, or at times force feeding), animated (endowing animation to demonstrate eating, such as bobbing AIBO/Shanti’s head or making chomping sounds), attempt at reciprocity (with the expectation that AIBO/Shanti might eat the biscuit; offering with palm up or down).
 - (6) Do NOT code a behavior in response to a command by the interviewer (e.g., “Put AIBO down.”).
1. Exploration of AIBO/Shanti as an artifact - Includes visual and/or tactile exploration, manipulation, inspection, presentation, and feeding. (NOTES: (1) Do not code absentminded or nervous touching of AIBO or Shanti (e.g. 1:03 subject #68); and (2) it is possible that verbal cues might signify an exploration (e.g. The child says “Shanti has ears” while wiggling Shanti’s ears).)

Prototypical examples of exploration behaviors:

- Child forces the biscuit into the mouth of AIBO. The biscuit falls from AIBO’s mouth. The child then exclaims, “He didn’t eat it!”
- The child explains to the interviewer that Shanti does not have “real poop” by looking and pointing to the genital area. The child then states, “See, there’s no anything!”
- The child holds AIBO’s tail and asks, “What is this button?”

1.1. Anatomy Check – Visual or tactile inspection to establish the presence or absence of genitalia.

1.2. Touching or Moving Limbs/Parts – Physical manipulation or inspection; visual inspection may be present, but not necessary. Behaviors coded within this category are *clearly* of an exploratory nature. (NOTES: (1) The One-Minute Rule applies at the second category level (i.e., 1.2.), meaning only code one of the moving parts per minute (don’t code multiple parts within one minute); (2) touching of the part must occur; (3) may be double coded with 1.3. Presentation; and (4) do not overuse this category; it is meant to capture explorations. Do not confuse exploration with rough handling or inadvertent touching, though touching/moving parts can be double coded with rough handling if both occur.)

1.2.1. Tail

1.2.2. Spine

1.2.3. Stomach

1.2.4. Leg/Paw

1.2.5. Head (NOTE: Use as default for codes 1.2.6-1.2.9 if the location of touch cannot be identified more specifically.)

1.2.6. Ear

1.2.7. Eye (NOTES: (1) For AIBO, any place above the lights on the plastic eye shield is considered “eye”; and (2) the lower part of the plastic eye shield just before the edge of AIBO’s snout is considered the “nose”.)

1.2.8. Nose (NOTES: (1) For AIBO, top edge of snout and front are “nose”, but NOT the upper plastic eye shield or underneath chin; and (2) for Shanti, “nose” includes entire snout area, except for explicit mouth location.)

1.2.9. Mouth

1.2.10 Other

1.3. Presentation – Manipulation of AIBO/Shanti by the child to demonstrate a feature or function of the artifact. Presentation behavior may include verbal statements, visual exploration, general handling, or manipulation of the artifact (e.g., Child flips Shanti over to show stomach and says, “See, here’s Shanti’s stomach.”). (NOTES: (1) See parts descriptions from 1.2.; and (2) may be double coded with 1.2. Touching or Moving Limbs/Parts.)

1.3.1. Tail

1.3.2. Spine

1.3.3. Stomach

1.3.4. Leg/Paw

1.3.5. Head

1.3.6. Ear

1.3.7. Eye

1.3.8. Nose

1.3.9. Mouth

1.3.10 Other

- 1.4. Feeding – The biscuit is placed in or at the mouth of AIBO/Shanti; of a ‘force-feeding’ nature. There *must* be physical contact between the biscuit and the mouth area. Behavior is distinct from other feeding or offering categories in that intention is not reciprocal or imaginative.
2. Engagement – Interactive behaviors with a social emphasis, including behaviors showing affection (non-exploratory touching, petting, scratching, kissing) and showing disregard (rough handling, thumping, throwing), as well as behaviors establishing substantial physical contact (picking up/carrying, in lap, arms around), verbal engagement, and responding to AIBO/Shanti (picking up ball in response to AIBO/Shanti moving ball). (NOTE: Code explorations stringently, in terms of the hierarchy of behaviors, especially when endowing animation is about to occur.)

Prototypical examples of engagement behaviors:

- “Hi, AIBO!” This salutation occurred after the child had been playing with AIBO for some time and without any noticeable stimuli.
- The child handles AIBO roughly by dropping AIBO such that AIBO’s back end hits the ground with some force. Immediately following the drop, the child begins petting AIBO on the back of the head in a concerned and caring manner.
- In response to the interviewer’s question, “Why do you think Shanti likes you?” the child squeezes Shanti in a big hug and says, “Because Shanti likes me.”

2.1. Physical Contact (NOTES: (1) Reasonably clear examples are needed to code petting, scratching, and arms around; and (2) be conservative when double coding these categories with in lap.)

*2.1.1. Non-Exploratory Touching – Caring, affectionate, or concerned touching of AIBO/Shanti. (NOTE: This code should only be used in the case where the child reacts to an Expected Stimuli by explicitly touching AIBO or Shanti, (e.g., (hypothetical) following the hit, the child touches AIBO/Shanti’s head in a caring manner).)

2.1.2. Petting – Back and forth or stroking motion, generally with the pads of finger(s) or palm of hand. (NOTE: must be reasonably clear that the child is petting.)

2.1.2.1. Gentle petting – Relative awareness of the strength and relation of the petting to the artifact.

2.1.2.2. Rough petting – Unintentional, unregulated, spastic, or unreflective petting.

2.1.3. Scratching – With fingertips or fingernails (e.g., as one would scratch a real dog under the chin). (NOTE: must be reasonably clear that the child is scratching.)

2.1.4. Kissing – There must be physical contact, not ‘kissing at’ (as in calling) AIBO/Shanti.

- 2.1.5. Substantial Physical Contact – Interactive behaviors in which the child engages in a larger behavior, including picking up, placing in lap, or wrapping arms around AIBO/Shanti.
- 2.1.5.1. Picking up or carrying AIBO/Shanti – Lifting AIBO/Shanti off of floor or out of lap (if in lap), where the weight of AIBO/Shanti is supported by the child’s hands, arms, or body (but NOT in lap). (NOTES: (1) Mistreatment trumps Picking up or carrying behaviors. If picking up or carrying occurs as part of a mistreatment, ONLY code the mistreatment category; (2) Do not double code with placing in lap.)
- 2.1.5.2. In Lap – AIBO/Shanti is either placed (by the child or interviewer) in the child’s lap or is in the child’s lap, where the weight of AIBO/Shanti is supported by the child’s lap or legs. (NOTES: (1) This may be an extended behavior; (2) Do not double code with picking up or carrying AIBO/Shanti.)
- 2.1.5.3. Arms Around – Reasonably clear that the child has their arms around AIBO/Shanti, as in hugging. (NOTE: Code stringently when child is picking up or carrying or if AIBO/Shanti is in lap.)
- 2.1.6. Mistreatment – Behaviors displaying disregard for AIBO/Shanti, including rough handling, thumping, and throwing the artifact. (NOTE: Do not code ‘accidental’ abusive behaviors.)
- 2.1.6.1. Rough Handling – Includes poking, squishing, sitting, hitting, and yanking, tossing up (but not throwing). (NOTES: (1) This includes actions with toys (e.g., bashing with biscuit); (2) if pick up and drop occur in context of rough handling, do not code the pick up and drop; and (3) this is the ‘default’ mistreatment category; when in doubt, code here.)
- 2.1.6.2. Thumping – Picking up and thrashing AIBO/Shanti against the floor, wall, etc. while maintaining grip on AIBO/Shanti, generally in a repeated motion (e.g., holding the tail and thumping AIBO/Shanti on the ground).
- 2.1.6.3. Throwing – The child forcefully flings AIBO/Shanti through the air, but not just a simple drop.
- 2.2. Verbal Engagement – Child engages in socially interactive verbal monologue with AIBO/Shanti.
- 2.2.1. Salutation – Verbal greeting to AIBO/Shanti (e.g., “Hello, AIBO”).
- 2.2.2. General – Talking to AIBO/Shanti, neither a directive nor a question – can’t say the child expects a response. (e.g., “I know you want to kick the ball”; “Good dog”)

2.3. Picking Up Ball – The child picks up and/or holds the ball in response to AIBO/Shanti intentionally or unintentionally moving the ball.

3. Disengagement – Discontinuing socially interactive behaviors with AIBO/Shanti, whether of a physical or verbal nature.

Prototypical examples of disengagement behavior:

- The interviewer places Shanti on the child's lap and proceeds to ask, "Do you think Shanti likes that?" The child shakes his head. "Why don't you think Shanti likes that?" says the interviewer. The child pauses for a moment and then pushes Shanti off his lap with no verbal response.
- AIBO is in the child's lap but not in lap mode. AIBO's legs are straddling one of the child's legs. As AIBO begins to move around, it's legs squeeze the child. With a concerned expression on his face, the child states, "He's squeezing my knee." The child then lifts AIBO up off of his lap and gently places AIBO on the floor next to him.
- Shanti is in child's lap. Child states, "She's a big dog," and proceeds to remove Shanti from his lap placing Shanti on the floor.

3.1. Setting AIBO/Shanti Down – Child sets AIBO/Shanti onto floor from picking up/carrying. (NOTE: Assumes AIBO/Shanti was NOT in the child's lap)

3.2. Removing AIBO/Shanti from Lap – Child puts AIBO/Shanti onto floor from lap. (NOTES: (1) Do not double code with setting AIBO/Shanti down; (2) Do not code if interviewer removes AIBO/Shanti from lap, or instructs the child to do so.)

3.3. Pushing AIBO/Shanti Away (NOTE: If pushing is such that AIBO or Shanti moves off of the child's lap, code it as Removing from lap rather than pushing.)

3.4. Verbal – Valediction or dismissal of AIBO/Shanti (e.g. "Good Bye AIBO/Shanti"; "Go away AIBO/Shanti")

4. Endowing Animation – Child enlivens AIBO/Shanti in order to perform a behavior/action with AIBO/Shanti. (NOTES: (1) Do not double code Endowing animation and Exploration; Endowing Animation trumps Exploration; (2) Don't double code Endowing Animation with Engagement (or Disengagement) when both occur simultaneously. For example, if the child animates in a rough manner, only code endowing animation. However, do code both if they occur independently.)

Prototypical examples of endowing animation behavior:

- Child throws the ball across the room and says, "Fetch!" Immediately following, the child grabs Shanti and begins to move Shanti like a real dog might towards the ball.
- The child holds Shanti above the ground with the tail hanging down. He then states, "Look. Shanti's doing a trick. She's standing on her tail."
- Child moves Shanti towards the ball as though Shanti were a real dog playing with a toy. The child also provides an in-character vocal animation, panting like a dog.

4.1. Vocalization – The use of sounds as part of the animation, including sound effects, dog-like vocalizations, and words. Vocalization behaviors are classified as 'in-character,' 'out-of-character' (referring to dog-like character), or narrative. (NOTE: This will often be coded with one of the following endowing animation behaviors.)

- 4.1.1. In-Character – Dog-like vocalizations (e.g., barking, yapping, or whining) or sound effects associated with a real dog (e.g., smacking – as in eating).
 - 4.1.2. Out-of-Character – Non-Dog-like vocalization, such as the use of words (in English or another language) (e.g., child animates Shanti to say, “Yum, this dog bone is good”) or sound effects NOT associated with real dogs (e.g., child animates Shanti as a car and vocalizes a ‘vrrrrmmmm’).
 - 4.1.3. Narration – Child narrates the animation in the present tense. (NOTES: (1) Note a distinction between Narration behavior and child’s responding to a question: “Shanti’s getting the ball” (narration) and “Shanti would get the ball” (answering question – not narration), both with animation; and (2) will always be double-coded with one of the following endowing animation categories.)
- 4.2. Moving or Manipulating AIBO/Shanti’s parts or body as part of an animation. (NOTES: (1) The movement or manipulation may be minimal; (2) Does not include movement toward one of the toys or the biscuit.)
- 4.2.1. Parts – Child animates individuals parts of AIBO/Shanti, either in-character or out-of-character. (NOTE: Each separate part moved is a different instance and therefore the One-minute Rule applies at the lowest level (e.g., the child animates Shanti’s leg at 4:06, then animates tail at 4:47, code both incidents as animating parts, the one-minute rule applies to each individually).
 - 4.2.1.1. In-character – Demonstration of an action that a real dog would likely be capable of doing (e.g., child wagging Shanti’s tail).
 - 4.2.1.1.1. Leg/Paw
 - 4.2.1.1.2. Tail
 - 4.2.1.1.3. Ear
 - 4.2.1.1.4. Mouth
 - 4.2.1.1.5. Head
 - 4.2.1.1.6. Other
 - 4.2.1.2. Out-of-character – Demonstration of an action that a real dog would not likely be capable of doing (e.g., child using Shanti’s tail as a helicopter).
 - 4.2.1.2.1. Leg/Paw
 - 4.2.1.2.2. Tail
 - 4.2.1.2.3. Ear
 - 4.2.1.2.4. Mouth
 - 4.2.1.2.5. Head
 - 4.2.1.2.6. Other
 - 4.2.2. Body – Child animates AIBO/Shanti’s entire body or more than one part, either in-character or out-of-character. (NOTE: Do not code object oriented play.)

4.2.2.1. In-Character – Demonstration of an action that a real dog would likely be capable of doing, such as movement in a horizontal fashion (e.g., walking).

4.2.2.2. Out-of-Character - Demonstration of an action that a real dog could or would not do (e.g., flying up the wall).

4.3. Object-Oriented Play – Child animates AIBO/Shanti with or toward toy/ball/biscuit (e.g., Moving Shanti so as to chase the ball).

4.3.1. In-Character – Demonstration of an action that a real dog would likely be capable of doing (e.g., chasing the ball).

4.3.2. Out-of-Character – Demonstration of an action that a real dog could or would not do (e.g., Child uses Shanti as a bat to hit the ball).

4.4. Feeding – Moving AIBO/Shanti in the action of eating with the biscuit directly to AIBO/Shanti’s mouth. May or may not include manipulation of head or mouth in service of the animation. (NOTE: May be double coded with vocalization.)

4.4.1. Physical manipulation of head or mouth parts (e.g., bobbing AIBO/Shanti’s head as in eating)

4.4.2. No physical manipulation of head or mouth parts

5. Attempts at Reciprocity – Socially interactive behaviors with AIBO/Shanti of a reciprocal nature, in which the child expects a response. These actions include motioning, verbal cues, and offering the toy/biscuit/ball. (NOTE: Do not double code with endowing animation.)

Prototypical examples of attempts at reciprocity:

- The interviewer asks a question from the interview protocol, “What sorts of things can you do to make AIBO happy?” The child then hides the ball behind her back. Soon afterwards the child throws the ball away from AIBO in an attempt to get AIBO to chase it. Both of these reciprocal interactions were modeled by the child as responses to the interviewer’s question.
- AIBO begins to position itself in an attempt to make contact with the ball. The positioning is awkward and stilted. The child notices that AIBO is having a difficult time getting positioned. The child then picks up the ball and places it on the ground directly in front of AIBO.
- The child calls AIBO’s name. AIBO happens to turn its head in the direction of the child simultaneously. The child then giggles a little, and says, “Hi, AIBO.” The child leans forward and rolls the ball to AIBO.

5.1. Motioning – Use of the arms, hands, and/or fingers to give direction to AIBO/Shanti, with an expectation of a response.

5.1.1. Pointing – Child extends arms, hands, and/or fingers to direct AIBO/Shanti (e.g., child shows AIBO/Shanti the ball by pointing at the ball.). (NOTE:

Don't code the child merely pointing at AIBO in surprise or so as to show the interviewer something.)

- 5.1.2. Beckoning – Child moves arms, hands, and/or fingers in an inward motion to summon AIBO/Shanti. (e.g., child waving for AIBO/Shanti to come).
- 5.2. Verbal Cues – A verbal action, either a directive or a question, with an expectation of a response from AIBO/Shanti.
 - 5.2.1. Directives – Telling AIBO/Shanti to do a task (e.g., “Get the ball”).
 - 5.2.2. Questioning – Asking AIBO/Shanti a question or to do a task. (e.g., “Can you get the ball?”).
- 5.3. Artfactual Offering – The use of AIBO/Shanti's toy/biscuit/ball to attract AIBO/Shanti by showing and/or offering, placing, hiding, throwing, or rolling the artifact.
 - 5.3.1. Showing artifact – Placement of artifact in hand must be such that palm is clearly down or angled and fingers are enclosing object. (NOTE: Can double code with motioning and/or verbal cues.)
 - 5.3.1.1. Toy
 - 5.3.1.2. Biscuit (Feeding)
 - 5.3.1.3. Ball
 - 5.3.2. Offering artifact – Placement of artifact in hand must be such that palm is clearly up; fingers may or may not enclose object. (NOTE: Can double code with motioning and/or verbal cues.)
 - 5.3.2.1. Toy
 - 5.3.2.2. Biscuit (Feeding)
 - 5.3.2.3. Ball
 - 5.3.3. Combination Showing-Offering– some combination of 5.3.1. Showing artifact & 5.3.2. Offering artifact. (NOTE: Can double code with motioning and/or verbal cues.)
 - 5.3.3.1. Toy
 - 5.3.3.2. Biscuit (Feeding)
 - 5.3.3.3. Ball
 - 5.3.4. Placing artifact on floor in front of AIBO/Shanti with intent to offer– Placement must be within five feet of AIBO/Shanti. (NOTE: Can double code with motioning and/or verbal cues.)
 - 5.3.4.1. Toy
 - 5.3.4.2. Biscuit
 - 5.3.4.3. Ball
 - 5.3.5. Hiding artifact – Physically hiding the toy (e.g., the child placing the toy behind her back). (NOTE: Can double code with motioning and/or verbal cues)

- 5.3.5.1. Toy
- 5.3.5.2. Biscuit
- 5.3.5.3. Ball

5.3.6. Throwing artifact – Must be with explicit intent to engage AIBO/Shanti.
(NOTE: Can double code with motioning and/or verbal cues)

- 5.3.6.1. Toy
- 5.3.6.2. Biscuit
- 5.3.6.3. Ball

5.3.7. Rolling ball – Generally underhand with the ball moving along the floor.
(NOTES: (1) Coder should be relatively certain that rolling ball was intentional; and (2) can double code with motioning and/or verbal cues.)

6. Apprehension – Behaviors exhibiting a startle response to AIBO/Shanti or indicating wariness of AIBO/Shanti.

Prototypical examples of apprehensive behavior:

- AIBO stands up from a sitting position. The child, upon seeing this action, moves her entire body away from AIBO while saying, “What do you think he wants?”
- AIBO stands and the child backs away quickly stating, “What do you think he wants?”
- The child is holding the ball in her hand and AIBO is approaching in an attempt to contact the ball. As AIBO moves forward, AIBO walks over the biscuit. The child attempts to grab the biscuit. AIBO continues to move toward the ball in her other hand and in doing so bumps the child’s arm. The child immediately rolls backwards off her feet to get away and says, “No.”

6.1. Startle – A jerky, reflexive movement. This may include a surprised facial expression, but the facial expression is not a basis for the startle. (NOTES: (1) This will often be double coded with moving away; (2) One-minute rule applies to all startles.)

6.1.1. Without words

6.1.2. With words

- 6.1.2.1. Whoa
- 6.1.2.2. Yikes
- 6.1.2.3. Wow
- 6.1.2.4. Hey
- 6.1.2.5. Other

6.2. Wariness – Intentionally moving away (upper body or whole body) from AIBO/Shanti with some level of apprehension. (NOTES: (1) This is often double coded with the startle response, so look carefully to determine whether both are present; (2) Implies some level of cognition; and (3) don’t code general moving away.)

- 6.2.1. Upper body moves away – Leaning away from AIBO/Shanti. (NOTE: If within 5 seconds there is no entire body displacement, code upper body only. If both upper body and entire body displacement occur within 5 seconds, then entire body displacement trumps this category.)
- 6.2.2. Entire body displacement – Engages whole body in a movement away from AIBO/Shanti, although displacement does not have to be significant. (NOTE: If within 5 seconds there is no entire body displacement, code upper body only. If both upper body and entire body displacement occur within 5 seconds, then entire body displacement trumps upper body moves away.)

7. Non-interaction – Child is either passively non-responsive or actively declines interaction.

Prototypical examples of non-interaction:

- The interviewer asks the child if she would like to pet AIBO and the child shakes her head as a non-verbal declination. The same event happens with Shanti.
- The child watches the interviewer hit AIBO on the head. The child simply watches AIBO for a few seconds then changes his gaze to the interviewer and giggles slightly.
- As the interviewer pets AIBO he says to the child, “You can pet AIBO.” The child does not react during the full the five second period following the interviewer’s initiated stimulus.

*7.1. Non-response – Apart from referencing and facial codes, the child is behaviorally non-responsive.

7.2. Declination – Verbal or non-verbal refusal to a request, suggestion, or question on the part of the interviewer.

7.2.1. Verbal (e.g., “No, [I don’t want AIBO in my lap] he’s a walking dog.”).

7.2.2. Nonverbal (e.g., the child shakes his/her head no).

C. Referencing

NOTES:

- (1) Code this section with the expected stimuli on the Interviewer Initiated and AIBO Initiated coding sheets. There is a section specified for Referencing on these coding sheets.
- (2) Code other behavioral responses, as well.
- (3) Code the length of each gaze using a timer to a tenth of a second.
- (4) If the child’s eyes go out of view, code missing data (99) for that length of time.
- (5) Code for 5 seconds or 5 gazes, whichever is shorter.

1. Gaze to AIBO/Shanti
2. Gaze to Interviewer
3. Gaze elsewhere (NOTE: There must be a clear case of moving the gaze from AIBO/Shanti or the interviewer to code this category)

Example: Following AIBO hit, child looks at AIBO for 1.3 seconds, shifts gaze to interviewer for 2.2 seconds, looks to camera person for 0.5 seconds, and returns gaze to AIBO for 1.0 seconds. This would be coded as: 1(1.3), 2(2.2), 3(0.5), 1(1.0).

D. Facial Expressions

NOTES:

- (1) Code within 1 second of the expected stimulus ending (see Stimulus Note (4) for rules on ‘end of expected stimuli’).
- (2) Do not code in slow motion – code in either real time or paused.
- (3) Code on the Interviewer Initiated and AIBO Initiated coding sheets. There is a space provided for Facial Expressions.

1. Positive - Happy/glad/enjoyed/pleased/joyful/cheerful
2. Neutral
3. Adverse – Angry/sad/scared/frowning/downcast/blue

PART TWO: REASONING CODING SYSTEM

General Notes

1. Code both the AIBO and SHANTI sessions separately.
2. Code 0 when question is not asked. If the question deviates significantly from the protocol, then there should be a 0 given. See example below.

“WHAT, WHAT KINDS OF THINGS MIGHT MAKE AIBO HAPPY OR SAD OR?
Well maybe if, maybe if a tree falls on him then he will cry and, and, and if he...”

3. Code 99 when child formally says he/she does not know the answer (e.g., "I don't know"). The child must explicitly say, "I don't know," or something that carries the same meaning. Do not count situations in which the interviewer says, "You don't know? OK," if the child has not actually said so.
4. Code 98 when answer is sensible given context but not codable. Note that the question must conform to the protocol.

"SHOULD SHANTI BE PUNISHED? No, Shanti is a nice dog." (Example of uncodable because one has to infer from "nice dog" that it's a statement of "liking" and emotional connection.)

"THIS IS A DOGGIE TOY. I'M GONNA PUT IT HERE. WHAT DO YOU THINK AIBO WILL DO? He'll run to the toy. DO YOU THINK AIBO WILL TRY AND GET THE TOY? [Nods yes] WHY? I mean no, cause, cause he doesn't have a big enough mouth. HE DOESN'T HAVE A PICK UP MOUTH? No, he doesn't have a big enough mouth. OH, BIG ENOUGH MOUTH. WHAT IF THE TOY WERE SMALLER? He'll pick it up."

5. Code 97 when answer is not sensible given context.

"IT'S OK TO THROW SHANTI IN THE GARBAGE? WHY IS IT OK? Because um I don't know what this smells like. [Holds up biscuit.]"

"IF AIBO'S AT MY HOUSE AND I'M GOING ON VACATION, IS IT OK TO LEAVE AIBO ALONE AT HOME? [Child nods] WHY IS IT OK? Because um I fink he's () um see another cat."

“DO YOU THINK SHANTI SHOULD BE PUNISHED? [Child shakes head] NO, WHY NOT? Because that's his favorite game.” [Code 97 because the child's response does not seem to derive directly from the questions itself. Thus, the "answer is not sensible given context."]

6. Code 96 when there is no response. Use this code when children repeat the evaluation they gave originally or when the question is used as the justification for the response.

“OKAY, I'M JUST GONNA HOLD AIBO RIGHT HERE. DO YOU WANNA BE A FRIEND TO AIBO? No. NO, WHY NOT? I don't want, keep AIBO on your lap.” [Note that this is applicable to the justification in this case. The evaluation would be coded normally.]

“SHANTI, SHANTI BAD. [HITS SHANTI] If Shanti was bad, I wouldn't be his friend but if Shanti was good, I would be his friend.” [Here is an example of the child not providing a justification or evaluation.]

7. Code 95 when data appears to be missing such that no reasonable coding can be applied. Use this code only when child response data is missing. If interviewer questioning data is missing, default to the use of 0.
8. Do not code verbalization of child outside of the context of the protocol questions.
9. In the cases where the child contradicts himself/herself in the evaluation, the default will be to code the last evaluation and justification pair. However, in the case where an evaluation is giving with a well-articulated justification followed by a different evaluation with a weak justification (in terms of the child's ability to articulate the justification) code the first case rather than the second.
10. If a child gives multiple justifications for the same evaluation response, code all justifications.
11. Coder should be open to flexibility in the protocol. The interviewer may reformulate a question from the protocol. For example,
 1. "Do you think AIBO wants to be your friend?" rather than "Can AIBO be your friend?"
 2. or, "Do you think AIBO likes to sit in my lap?" rather than "Do you think AIBO likes to sit in your lap?"
12. Furthermore, children may at times spontaneously give an evaluation and justification for a question from the protocol prior to the formal inquiry by the interviewer. Here is an example of a child (1) justifying a justification and (2) providing justification for a question that has not yet been asked:

"DO YOU THINK AIBO FEELS PAIN? No because he's not a real toy. OH I SEE. Dog. HOW DO YOU KNOW? Because he's just doing stuff and not even talking and real dogs and he doesn't and he isn't barking or looking like a real dog and he has a light on and dogs don't have to have a light on them."

Note that the coder should not allow this to consume coding time. Code these occurrences only as they are come upon while coding normally. Also, give priority to interviewer's formal questioning if there is some dissonance between the evaluations that are given by the child in the two cases.
13. The "Nothing" code that occurs for most of the categorical questions should be used only when the child explicitly says nothing will happen or AIBO/SHANTI will not react.

"WHAT DO YOU THINK WILL HAPPEN? He's not gonna run."
14. Be careful not to code evaluative responses as a justification (particularly of physical substrate). For example

"SHANTI POOPS? Yeah. HOW DO YOU KNOW SHANTI POOPS? He poops in there. HOW DO YOU KNOW SHANTI POOPS? This is a potty [holds dog toy]." [In this example, the evaluation is that Shanti poops; but there is not enough additional information to code a justification, let alone a redundant "pee/poop" justification.]
15. Furthermore, when the child justifies an evaluation (particularly in the case of the 'stomach' question) by referring to the physical existence of the same thing, code as a 96. For example, if the child states, "AIBO has a stomach because I can see it," the coder should code the justification as 96. However, if the child states, "AIBO can see because I can see AIBO's eyes," then the coder should code for the inclusion of physical substrate reference.
16. Along a similar note, do not code as justifications either justifications or other language that are not directly relevant to the corresponding evaluation. In other words, many times

children initiate new topics after an evaluative question is asked, and the resulting language should not be coded. For example, the following should not be coded as a justification:

“DO YOU THINK AIBO WILL TRY TO EAT IT? [Puts biscuit to AIBO’s mouth]
[Bites down] OH, WHAT DID AIBO JUST DO? Bit it. AIBO TOOK A BITE. YEAH.
YOU THINK AIBO GETS HUNGRY? Yeah.”

“WHAT’S AIBO GONNA DO? He’s moving. AIBO’S MOVING. HOW DO YOU
THINK AIBO MOVES? Here’s your bone [puts biscuit up to AIBO].”

Or even closer to the issue being discussed with the child, consider:

“DO YOU THINK SHANTI CAN BE YOUR FRIEND? But, I think it's not a real...it's
not a real dog.”

In this snippet of dialogue, we get a "Qualified Reality" code, which is a codable justification out of context; but in context the question is whether Shanti can be a friend and it is as if the child is saying "yes, but it's not real" which is qualifying the nature of Shanti, NOT justifying why Shanti could be a friend. So this snippet of justification is uncodable.

17. Furthermore, do not overcode evaluation categories. For example:

“LIKE, WHAT IF YOU WERE CARRYING AIBO AROUND BY THE TAIL AND
AIBO’S TAIL CAME OFF? WHAT SHOULD YOU DO? That would hurt. YOU
THINK IT WOULD HURT AIBO? Mmhmm [Affirmative] I Don’t wanna do that.
YOU DON’T WANT TO DO IT. WHY DO YOU THINK IT WOULD HURT AIBO?
Because...tings(sic) get hurt but I don’t want to do it. I want anything to get hurt.”

Here the question is "If AIBO's tail comes off, what should you do?" The child answers by saying that AIBO would be "hurt." That's interesting, but uncodable, because it's not addressing the initial question.

GROUP 1 QUESTIONS

PHYSICAL SUBSTRATE

1. Does AIBO/SHANTI have a stomach?
 - 1.1. Yes
 - 1.2. No
2. How do you know?
[insert justification manual]
3. This is a dog biscuit. Do you think AIBO/SHANTI will eat this? [Do you want to feed it to AIBO/SHANTI?]
 - 3.1. Yes
 - 3.2. No
4. How do you know?
[insert justification manual]

5. Does AIBO/SHANTI grow bigger?
 - 5.1. Yes
 - 5.2. No
6. How do you know?

[insert justification manual]
7. Does AIBO/SHANTI pee and poop?
 - 7.1. Yes
 - 7.2. No
8. How do you know?

[insert justification manual]
9. Does AIBO/SHANTI breathe?
 - 9.1. Yes
 - 9.2. No
10. How do you know?

[insert justification manual]
11. Where does AIBO/SHANTI come from?
 - 11.1. Nowhere
 - 11.2. Retail or manufacturing reference
 - 11.2.1. Pet store
 - 11.2.2. Toy store
 - 11.2.3. Factory
 - 11.3. General references to home-like setting *or dog-house*

“SO HANNAH WHERE DOES SHANTI COME FROM? Um, from home. FROM HOME? [Nods yes] WHO’S HOME? Shanti. OH SHANTI’S HOME.”

“WHERE DOES SHANTI COME FROM? From a dog house. MMM HMM. HOW DO YOU, WHY DO YOU THINK SHANTI COMES FROM A DOG HOUSE? Because he’s a dog.”
 - 11.4. Mother
 - 11.5. God or similar reference
 - 11.6. Reference to other locations

“WHERE DOES AIBO COME FROM? City. FROM WHAT, THE CITY? Mmm hmm [yes].”
12. How do you know?

[insert justification manual]
13. Can AIBO/SHANTI have babies?
 - 13.1. Yes

13.2. No

14. How do you know?

[insert justification manual]

MENTAL STATES

15. This is a dog toy. I'm going to put this here. What do you think will happen? [What do you think AIBO/SHANTI will do?]

15.1. Nothing

15.2. AIBO/SHANTI will physically engage the toy

15.2.1. Try to get to toy

15.2.2. Eat the toy

"He will eat."

15.2.3. AIBO/SHANTI will play with the toy

"WELL WHAT DO YOU THINK SHANTI WILL DO? Play with it."

15.2.4. Other

15.3. AIBO/SHANTI will verbally engage the toy (e.g., bark)

"SO WHAT DO YOU THINK SHANTI WILL DO? Yell woof!"

16. Do you think AIBO/SHANTI will try to get the toy?

16.1. Yes

16.2. No

17. Why?

[insert justification manual]

18. What if there were no people in here, and there was a fire in this building. What do think would happen? What do you think AIBO/SHANTI would do?

18.1. Nothing

"WHAT DO YOU THINK SHANTI WOULD DO IF THE BUILDING WAS ON FIRE? Um nothing. NOTHING? No."

"WHAT IF THERE WERE NO PEOPLE IN HERE AND THERE WAS A FIRE IN THIS BUILDING. WHAT DO YOU THINK WOULD HAPPEN? He would get burned. AIBO WOULD GET BURNED? [Nods yes] WHAT DO YOU THINK AIBO WOULD DO? Just stay in here. AIBO WOULD STAY IN HERE? Yeah." [Double coded under 18.2 AIBO/SHANTI would be hurt in a sentient manner.]

18.2. AIBO/SHANTI would be hurt in an artifactual manner (e.g., break, melt or be damaged)

18.3. AIBO/SHANTI would be hurt in a sentient manner (e.g. get an "owie" or be burnt)

"WHAT DO YOU THINK WOULD HAPPEN? () him fired [touches AIBO] HE'D, SAY THAT AGAIN? I think he's gonna be fired when there's no people in here. HE, HE, AIBO WOULD BE IN THE FIRE? Yeah."

“WHAT IF THERE WERE NO PEOPLE IN HERE AND THERE WAS A FIRE IN THIS BUILDING. WHAT DO YOU THINK WOULD HAPPEN? He would get burned. AIBO WOULD GET BURNED? [Nods yes] WHAT DO YOU THINK AIBO WOULD DO? Just stay in here. AIBO WOULD STAY IN HERE? Yeah.”
[Double code as 18.1 Nothing]

18.4. AIBO/SHANTI would desire or act to put out the fire

“WHAT DO YOU THINK SHANTI WOULD DO? Try to blow away. TRY TO BLOW IT AWAY? Uh huh [yes].”

“UM SO SAY THERE WERE, THERE WERE NO PEOPLE IN HERE AND THERE WAS A FIRE IN THE BUILDING. WHAT DO YOU THINK WOULD HAPPEN? You put out the fire and, and if a, a, and if (_____) Pokemon (_____) choose a water Pokemon if you need help, if a, if a, if I have a (_____). WHAT DO YOU THINK AIBO WOULD DO IF THERE WAS A FIRE AND NO ONE WAS IN HERE? Um he would maybe this maybe use maybe use a wind, a wind thing and make it, the fire blow away.”

18.5. AIBO/SHANTI would desire or act to escape

“YOU DON’T KNOW? WHAT DO YOU THINK, UM, AIBO WOULD DO? IF THERE WAS A FIRE IN THIS BUILDING? I think he would want out.”

“WHAT IF THERE WERE NO PEOPLE IN HERE AND THERE WAS A FIRE IN THE BUILDING? WHAT DO YOU THINK WOULD HAPPEN? Uh, and the dog was here? YES. The dog. Would the door be closed or open? THE DOORWAY? UH, LET’S SAY IT WAS OPEN. Okay, he would run out.”

19. Why?

[insert justification manual]

20. Can AIBO/SHANTI feel happy?

20.1. Yes

20.2. No

21. [If yes to 20] What kinds of things might make AIBO/SHANTI happy? (Note that the following categories are also used by question 22.)

21.1. Nothing

21.2. Eating or feeding (including general references to the biscuit or bone)

“WHAT KIND OF THINGS MIGHT MAKE AIBO HAPPY? The bone.”

“MMM WHAT KINDS OF THINGS DO YOU THINK YOU COULD DO TO MAKE AIBO HAPPY? Well give the dog biscuit, pet, I don’t know.”

21.3. Petting

21.4. Play-oriented interaction

“WHAT KINDS OF THINGS COULD YOU DO TO MAKE AIBO HAPPY? I don’t know. YOU DON’T KNOW. Maybe, maybe I can let you borrow some of my toys. BORROW SOME OF YOUR TOYS? Yeah, some of my Pokemon toys.”

“WHAT KIND OF THINGS COULD YOU DO TO MAKE AIBO HAPPY? Um, give him the ball. GIVE THE BALL. Yeah.”

- “WHAT KINDS OF THINGS CAN YOU DO TO MAKE AIBO HAPPY? A doggie toy.”
- “WHAT KIND OF THINGS COULD YOU DO TO MAKE AIBO HAPPY? Um try to play. TRY TO PLAY? Yeah. PLAY WITH AIBO? Yeah.”
- 21.5. Emotional states or interactions (e.g. love)
- “WHAT KINDS OF THINGS CAN YOU DO TO MAKE SHANTI FEEL HAPPY? Make Shanti feel happy is love.”
- “WHAT KINDS OF THINGS MIGHT MAKE AIBO HAPPY? Love LOVE? Yeah.”
22. [If yes to 20] What kinds of things could you do to make AIBO/SHANTI happy?
[Use coding categories from question 21.]
23. This is a doggie toy. Do you think AIBO/SHANTI can see the doggie toy?
- 23.1. Yes
- 23.2. No
24. How do you know?
[insert justification manual]
25. What do you think AIBO/SHANTI will do?
- 25.1. Nothing
- 25.2. Desire or act to play with or engage the toy
- “WHAT DO YOU THINK AIBO WILL DO WHEN I PUT THE DOGGIE TOY HERE? Um, he will, he’ll play with it.”
26. [Interviewer says to AIBO/SHANTI, “Hi, (Aibo/Shanti). Come here, (Aibo/Shanti).”] Do you think AIBO/SHANTI can hear me?
- 26.1. Yes
- 26.2. No
27. What do you think AIBO/SHANTI will do?
- 27.1. Nothing
- “WHAT DO YOU THINK SHANTI WOULD DO? He will, he will, he, he will, he will, he will, he will, he will, he will, he will, he will, he will, he, he will do nothing.”
- 27.2. Walk to or approach interviewer
- “WHAT DO YOU THINK AIBO WILL DO WHEN I CALL? Um he’ll come.”
- 27.3. Verbally communicate (e.g., bark)
- 27.4. Play
28. How do you know?
[insert justification manual]
29. Watch this. I’m going to hide the ball. What do you think will happen? [What do you think AIBO/SHANTI will do?]
- 29.1. Nothing

- 29.2. References to AIBO or SHANTI finding or attempting to find ball by walking or any other means

“SO IF I HIDE THE BALL, WHAT DO YOU THINK AIBO WILL DO? Try to take it away from you.”

“LET’S SEE, IF I PUT THIS HERE, IF I HIDE THE BALL, WHAT DO YOU THINK WILL HAPPEN? He will find it.”

“WHAT DO YOU THINK SHANTI WILL DO? Try to get it.”

- 29.3. Other including doing tricks

“IF I SHOWED SHANTI THE BALL AND I HIDE THE BALL, WHAT DO YOU THINK WILL HAPPEN? WHAT DO YOU THINK SHANTI WILL DO? Oh, he would do tricks.”

30. How do you know?

[Insert justification manual]

GROUP 2 QUESTIONS

SOCIAL RAPPORT

31. Do you like AIBO/SHANTI?

31.1. Yes

31.2. No

32. Why?

[insert justification manual]

33. Do you think AIBO/SHANTI likes you?

33.1. Yes

33.2. No

34. Why?

[insert justification manual]

35. Do you think AIBO/SHANTI likes to sit on your lap?

35.1. Yes

35.2. No

36. How do you know?

[insert justification manual]

37. Can AIBO/SHANTI be your friend?

37.1. Yes

37.2. No

38. How/Why can AIBO/SHANTI be your friend?

[insert justification manual]

39. Can you be a friend to AIBO/SHANTI?

39.1. Yes

39.2. No

40. How/Why can you be a friend to AIBO/SHANTI?

[insert justification manual]

41. If you were sad, would you want to spend time with AIBO/SHANTI?

41.1. Yes

41.2. No

42. Why?

[insert justification manual]

MORAL STANDING

43. [Interviewer hits AIBO/SHANTI.] Do you think it's OK that I hit AIBO/SHANTI?

43.1. Yes

43.2. No

44. Why?

[insert justification manual]

45. Do you think AIBO/SHANTI feels pain?

45.1. Yes

45.2. No

46. How do you know?

[insert justification manual]

47. Let's say you are going on vacation for a week with your family. Do you think it's OK to leave AIBO/SHANTI at home alone?

47.1. Yes

47.2. No

48. Why?

[insert justification manual]

49. What if I drop AIBO/SHANTI on the floor and AIBO/SHANTI gets an owie. What do you think I should do?

49.1. Nothing

49.2. Throw AIBO or SHANTI away

“WHAT WOULD HAPPEN IF I WAS CARRYING AIBO AND AIBO’S, BY THE TAIL AND AIBO’S TAIL FELL OFF? Uh and he, and he, a he, and throw uh, it out. WE SHOULD THROW AIBO OUT? Yeah.”

49.3. Mechanically or artifactually fix AIBO/SHANTI

“Glue it back together.”

“IF I’M HOLDING SHANTI BY THE TAIL AND SHANTI’S TAIL COMES OFF. Yeah. WHAT DO YOU THINK I SHOULD DO? (_____) it back on. I’M SORRY WHAT? Put it back on.”

“CAN YOU TELL ME WHAT YOU WOULD DO IF AIBO’S TAIL COMES OFF? Um... put it back on.”

49.4. Care for AIBO/SHANTI

49.4.1. Pick up

“WHAT DO YOU THINK YOU SHOULD DO IF SHANTI’S TAIL COMES OFF? He would fall. YEAH? And I think somebody has to pick him up.”

49.4.2. Apply First Aid, including the use of a Band-Aid

“IF YOU IF YOU DROP AIBO ON THE FLOOR AND AIBO GETS AN OWIE, WHAT DO YOU THINK YOU SHOULD DO? Put a Band-Aid on. MMM HMM. Yeah or put some like some water on. MMM HMM. And then put a Band-Aid on.”

"Get a Band-Aid. GET A BAND-AID. Then wrap it, when you hurt him o the feet, you got to wrap it round. Then he'll feel better. WRAP IT AROUND HIS FEET? Yeah and he'll, then, when he takes a nap, you gotta put a blanket on him then it will cover, then we gotta get Teddy, then he will sleep." [Double coded with 49.4.4.2 Nonverbal Comfort.]

“WHAT IF YOU DROP AIBO ON THE FLOOR AND AIBO GETS AN OWWIE? WHAT DO YOU THINK YOU SHOULD DO? Go to the doctor and put a band-aid.” [Double coded with 49.4.3 Nonverbal Comfort.]

49.4.3. Take to health care person or facility (e.g., doctor, veterinarian, or hospital)

“WHAT WOULD HAPPEN IF I WAS CARRYING AIBO AND AIBO FELL ON THE FLOOR AND GOT AN OWIE. WHAT DO YOU THINK I SHOULD DO? He go (_____) WE SHOULD TAKE AIBO TO THE DOCTOR? Yeah.”

49.4.4. Comfort

49.4.4.1. Verbal

“WHAT IF YOU DROP AIBO ON THE FLOOR AND AIBO GETS AN OWIE. WHAT DO YOU THINK YOU SHOULD DO? Say I’m sorry. SAY YOU’RE SORRY. [Nods yes]”

49.4.4.2. Nonverbal

“WHAT DO YOU THINK WILL HAPPEN IF AIBO GETS AN OWIE? He’ll cry. WHAT DO YOU THINK YOU SHOULD DO? Uh, pet it. Or give him the treat.”

49.5. Other

50. Let’s say I’m carrying AIBO/SHANTI around by the tail and AIBO/SHANTI’s tail comes off. What do you think I should do?

[Use coding categories from question 49.]

51. Do you think it will hurt AIBO/SHANTI?

51.1. Yes

51.2. No

52. How do you know?

[insert justification manual]

53. If you decide you don’t like AIBO/SHANTI any more, is it OK to throw AIBO/SHANTI in the garbage?

53.1. Yes

53.2. No

54. Why?

[insert justification manual]

55. Let’s say AIBO/SHANTI knocks over a glass of water and spills it all over the floor. Should AIBO/SHANTI be punished?

55.1. Yes

55.2. No

56. Why?

[insert justification manual]

57. [If yes to 55] How would you punish AIBO/SHANTI?

57.1. Hit

57.1.1. Child states that some sort of hitting would be appropriate

“FOR SPILLING THE WATER. YES? HOW WOULD WE PUNISH AIBO? Um, hitting him.”

57.1.2. Child models the hit by hitting AIBO or Shanti

57.1.3. Other

“DO YOU THINK SHANTI SHOULD BE PUNISHED? Yeah. HOW, WHY DO YOU THINK SHANTI SHOULD BE PUNISHED? Because he will spill water. OH. HOW WOULD WE PUNISH SHANTI? I’ll show you how. HOW? Uh uh uh uh [pounds on the floor]. LIKE THAT? Yeah. THAT’S HOW WE WOULD PUNISH SHANTI? Yeah.”

57.2. Require an apology or agreement not to do it again.

“MMHMM [AFFIRMATIVE] BUT IF...SO SHOULD AIBO BE PUNISHED IF AIBO DOES SPILL WATER? Uhuh [Negative] AIBO should just...when people do something(sic) that they're not supposed to do they say sorry. MMHMM. SO SHOULD AIBO SAY SORRY IF AIBO KNOCKED OVER A GLASS OF WATER. Yeah. AND THEN IT'S OK? AIBO SHOULD NOT BE PUNISHED.... Yeah. ...IF AIBO SAID SORRY?”

57.3. Verbal Admonishment

“UH HUH. I SEE. IT, HOW WOULD YOU PUNISH AIBO, WHAT KINDS OF THINGS WOULD YOU DO? I would just say, ‘AIBO, you should be carefuler.’”

57.4. Timeout

“OKAY. WELL WHAT WOULD HAPPEN, SAY AIBO KNOCKS OVER A GLASS OF WATER AND SPILLS WATER ALL OVER THE CARPET, WHAT DO YOU THINK YOU SHOULD DO? Um, um put him in time out, that's an easy one.”

“WHAT WOULD, HOW WOULD YOU PUNISH AIBO, IF AIBO SPILLED A GLASS OF WATER? Put him in a time out. PUT HIM, PUT AIBO IN A TIME OUT? OKAY, WHY? Because he did something bad.”

57.5. Withdrawal of desired item

“HOW DO YOU THINK SHANTI SHOULD BE PUNISHED? By taking something away from him.”

57.6. Other

“HOW WOULD YOU PUNISH SHANTI IF YOU WERE GONNA PUNISH SHANTI? I will, we will just put him down carefully like this [sets Shanti down]. YEAH. Yeah and we won't hurt him.”

58. Why?

[insert justification manual]

General Animacy Questions

59. Is AIBO/SHANTI alive or not alive?

59.1. Alive

59.2. Not alive

60. How do you know?

[insert justification manual]

61. Can AIBO/SHANTI die?

61.1. Yes

61.2. No

62. How do you know?

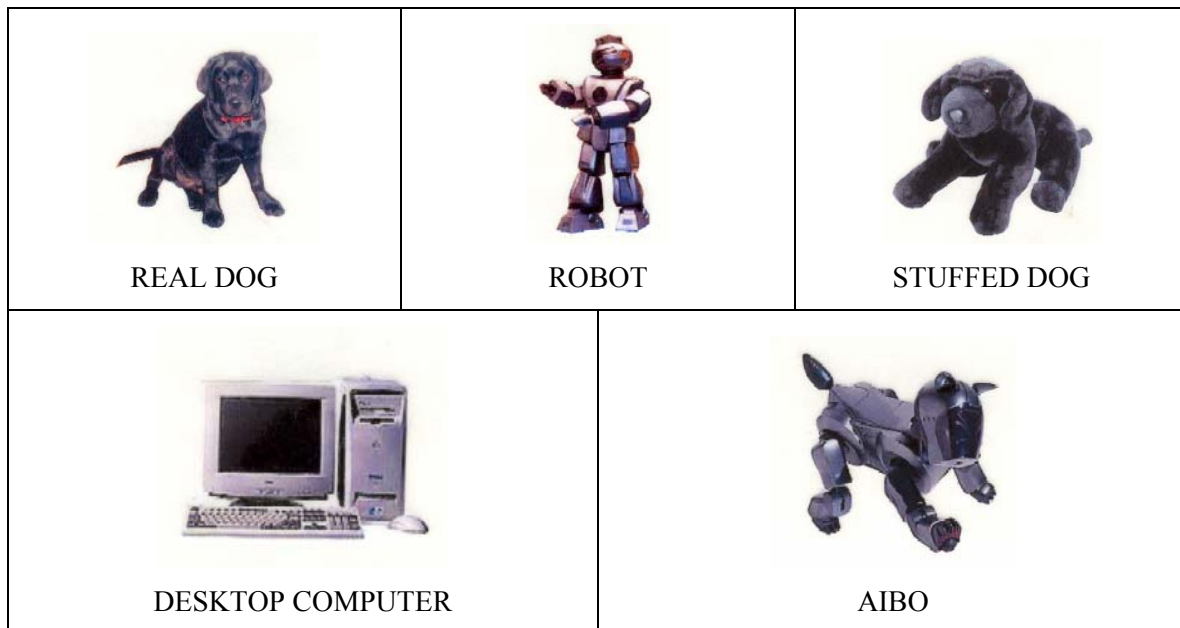
[insert justification manual]

63. Would you call AIBO/SHANTI a “he” or a “she” or an “it”?

- 63.1. He
- 63.2. She
- 63.3. It
- 64. Why?
[insert justification manual]
- 65. Is AIBO/SHANTI a real dog?
 - 65.1. Yes
 - 65.2. No
- 66. How do you know?
[insert justification manual]

Card Sort

The following questions are those that pertain to the card sorting task. The following images were shown to the children in the order given in the following protocol.



67. Is AIBO more similar to (or like) the ROBOT or the DESKTOP COMPUTER?
- 67.1. Robot
 - 67.2. Desktop computer
68. Is AIBO more similar to (or like) the ROBOT or the REAL DOG?
- 68.1. Robot
 - 68.2. Real dog
69. Is AIBO more similar to (or like) the ROBOT or the STUFFED DOG?
- 69.1. Robot
 - 69.2. Stuffed dog
70. Is AIBO more similar to (or like) the DESKTOP COMPUTER or the REAL DOG?
- 70.1. Desktop computer
 - 70.2. Real dog
71. Is AIBO more similar to (or like) the DESKTOP COMPUTER or the STUFFED DOG?
- 71.1. Desktop computer
 - 71.2. Stuffed dog
72. Is AIBO more similar to (or like) the REAL DOG or the STUFFED DOG?
- 72.1. Real dog
 - 72.2. Stuffed dog

REASONING CATEGORIES

1. ESSENCES: An appeal to the essential physical qualities of an object, of whether it is an artifact or biological, based on its features, processes, or category).

1.1 AFFIRMATION

1.1.1. ARTIFACTUAL References to features and processes of AIBO or SHANTI that are of an explicitly artifactual nature. Also includes general references to the categorization of AIBO or SHANTI as a type of artifact.

1.1.1.1. Feature

1.1.1.1.1. AIBO/SHANTI runs on batteries

1.1.1.1.2. AIBO/SHANTI has an on/off switch (also includes button if there is a reference to ability to turn on and off)

1.1.1.1.3. AIBO/SHANTI has a microphone

1.1.1.1.4. AIBO/SHANTI has a camera

1.1.1.1.5. AIBO/SHANTI has sensors (also includes generic references to buttons)

“WHAT DO YOU THINK I SHOULD DO TO FIX AIBO? You just press that button.”

1.1.1.1.6. AIBO/SHANTI has lights

1.1.1.1.7. Other

“IS AIBO A REAL DOG? No. HOW DO YOU KNOW AIBO’S NOT A REAL DOG? Because um, they made him and he’s made out of metal.”

1.1.1.2. Process

1.1.1.2.1. Mechanical movement References to robot-like, toy-like or machine-like movement. Note: General references to movement should not be categorized under “Mechanical movement.” Rather, consider the biological processes under 1.1.2.2.7.

1.1.1.2.2. AIBO/SHANTI makes beeps/sounds/songs

“BUT ACTS MORE LIKE A SHE? HOW DOES A SHE ACT? Mmm, sings. SINGS? Cause of this (_____). SO IF AIBO IS A HE, HE WOULDN’T SING? Yeah.”

1.1.1.2.3. Other

1.1.1.3. Category

1.1.1.3.1. AIBO/SHANTI is a toy

“HOW DO YOU KNOW SHANTI COMES FROM A STORE? Mmm, it’s a toy”

"IS AIBO ALIVE OR NOT ALIVE? Not alive. HOW DO YOU KNOW? He's just a toy."

"IS AIBO A REAL DOG? No. NO. No. He's a plastic one."

"DOES AIBO GROW BIGGER? What? DOES AIBO GROW BIGGER? No. HOW DO YOU KNOW? Because toys don't grow."

"OH. WELL IS AIBO ALIVE OR NOT ALIVE? Not alive. HOW DO YOU KNOW? Because toys aren't alive."

"MMM, WELL WOULD YOU CALL AIBO A HE, A SHE OR AN IT? What's an it? AN IT, LIKE A THING. A BOY, A GIRL OR A THING? It. IT, WHY? Because toys is a thing. OH. IT And AIBO'S a toy."

1.1.1.3.2. AIBO/SHANTI is a doll (Note: include references to stuffed animal.)

"IS SHANTI ALIVE OR NOT ALIVE? Not alive. HOW DO YOU KNOW? Um he's just a stuffed animal."

1.1.1.3.3. AIBO/SHANTI is a robot

"CAN AIBO DIE? But he's a robot. He's like a robot. He's like a robot. AIBO LOOKS LIKE A ROBOT? Yeah. YEAH? SO DO YOU THINK AIBO CAN DIE? No () NO? No."

"IF YOU DECIDE YOU DON'T LIKE AIBO ANYMORE, IS IT ALRIGHT OR NOT ALRIGHT TO THROW AIBO IN THE GARBAGE? Not alright. WHY? Because it's robot. OH BECAUSE IT'S A ROBOT? And when you don't want to play wif(sic) it anymore you just put it in a bag or a toy box."

1.1.1.3.4. AIBO/SHANTI is a computer

1.1.2. BIOLOGICAL Note: with some of the subcategories here, particularly with features, one can't always be sure whether the child is referring to the real biological feature – e.g., real eyes – or to the representation of that feature, as on a stuffed animal. Nonetheless, the basic feature apriori is biological, and thus gets coded here.

1.1.2.1. Feature

1.1.2.1.1. Eyes

"DO YOU THINK SHANTI CAN SEE THE DOGGIE TOY? Yes. YEAH, HOW DO YOU KNOW SHANTI CAN SEE THE DOGGIE TOY? Because he has eyes."

1.1.2.1.2. Ears

“SHANTI BAD! [HITS SHANTI] IS IT OKAY THAT I HIT SHANTI? No. NO. HOW COME? ... No cause he has two black, big ears.”

“DO YOU THINK AIBO CAN HEAR ME? Yeah. YEAH? HOW DO YOU KNOW AIBO CAN HEAR ME? HOW DO YOU KNOW AIBO CAN HEAR ME? ‘Cause he has ears.”

1.1.2.1.3. Tail

1.1.2.1.4. Mouth

“THIS IS A DOG BISCUIT THOUGH, DO YOU THINK SHANTI WILL EAT IT? Uh huh [yes] YEAH. WELL IF SHANTI DOESN’T HAVE A STOMACH WHERE DOES IT GO? In his mouth.”

1.1.2.1.5. Face/Head/Neck

1.1.2.1.6. Legs/Paw

“AIBO IS A REAL DOG. HOW DO YOU KNOW? Because AIBO has feet.”

1.1.2.1.7. Brain

1.1.2.1.8. Bones

1.1.2.1.9. Stomach

1.1.2.1.10. Fur

1.1.2.1.11. Entire Body (explicit or implicit reference to entire body)

1.1.2.1.12. Other

“IS SHANTI A BOY, A GIRL OR A THING? Um, a boy WHAT MAKES SHANTI A BOY? Because Shanti has small nye nye [kc-based on other answers, child means nipples] and just like me YEAH Because I’m a boy.”

1.1.2.2. Process

1.1.2.2.1. AIBO/SHANTI pees/poops

1.1.2.2.2. AIBO/SHANTI eats

“WELL DOES SHANTI GROW BIGGER? [Nods yes] YEAH, HOW DO YOU KNOW SHANTI GROWS BIGGER? (_____) gonna eat his bone. BECAUSE IT’S GONNA EAT HIS BONE? [Nods yes]”

1.1.2.2.3. AIBO/SHANTI sleeps

1.1.2.2.4 AIBO/SHANTI breathes

“OKAY. DOES AIBO BREATHE? He has a stomach. HE’S GOT A STOMACH? Yeah I see it.” (Marginal as

a justification – the inference is that AIBO does breathe because he has a stomach.)

1.1.2.2.5 AIBO/SHANTI sees

1.1.2.2.6. AIBO/SHANTI barks

“OH. IS AIBO ALIVE OR NOT ALIVE? ... I mean alive. HOW DO YOU KNOW AIBO’S ALIVE? Cause he barks. AIBO BARKS? Yeah.”

1.1.2.2.7. AIBO/SHANTI moves Note: (1) Unelaborated or unqualified movement justifications belong here under 'biological' as the default. When the movement is specifically mechanical or artifactual, then code under artifactual movement category.

1.1.2.2.7.1. Undifferentiated movement Notes: Use this code as a default code if no specificity is given by the child to suggest movement of a particular part of AIBO or SHANTI.

1.1.2.2.7.2. Leg/paw movement including walking and references to arm movement

“He wants to walk, he’s walking.” [Double code under 2.1.1 AIBO/SHANTI has intentions or desires or engages in intentional behavior]

1.1.2.2.7.3. Ear movement

1.1.2.2.7.4. Mouth movement

"IT'S OK TO THROW AIBO IN THE GARBAGE. WHY IS IT OK? Because AIBO opens AIBO's mouth."

1.1.2.2.7.5. Tail movement

“DO YOU THINK AIBO LIKES YOU? [Child nods] YEAH? HOW CAN YOU TELL? ‘cause he’s wagging his tail.”

1.1.2.2.7.6. Head movement

1.1.2.2.8. Other Processes

“IS AIBO A REAL DOG? Nope. AIBO’S NOT A REAL DOG? HOW DO YOU KNOW AIBO’S NOT A REAL DOG? Cause he doesn’t eat bones. He doesn’t play with toys.” [Double coded under 1.2.2.2 AIBO/SHANTI eats]

1.1.2.3. Category. An appeal to a categorization that it's an animal (e.g., dog) or alive or real

“SHOULD SHANTI BE PUNISHED? No. NO, WHY? Because he's a dog.”

“CAN SHANTI BE YOUR FRIEND? No, he's a dog...He can't be my friend when he's a dog.”

1.2. NEGATION. Notes: Be aware that the negation must negate the item as in the item doesn't exist, in contrast to the item not being real or being pretend (in which case see "1.3 Qualified Reality")

1.2.1 ARTIFACTUAL

1.2.1.1. Feature

1.2.1.1.1. AIBO/SHANTI does not run on batteries

1.2.1.1.2. AIBO/SHANTI does not have an on/off switch (also includes button if there is a reference to ability to turn on and off)

1.2.1.1.3. AIBO/SHANTI does not have a microphone

1.2.1.1.4. AIBO/SHANTI does not have a camera

1.2.1.1.5. AIBO/SHANTI does not have sensors (also includes generic references to buttons)

1.2.1.1.6. AIBO/SHANTI does not have lights

1.2.1.2.7. Other

1.2.1.2. Process

1.2.1.2.1. AIBO/SHANTI does not have mechanical

movement

1.2.1.2.2. AIBO/SHANTI cannot beep, make sounds, or produce songs

1.2.1.2.3. Other

1.2.1.3. Category

1.2.1.3.1. AIBO/SHANTI is not a toy

1.2.1.3.2. AIBO/SHANTI is not a doll. (Note: include references to stuffed animal.)

1.2.1.3.3. AIBO/SHANTI is not a robot

1.2.1.3.4. AIBO/SHANTI is not a computer

1.2.2. BIOLOGICAL

1.2.2.1. Features

1.2.2.1.1. Eyes

“AIBO CAN DIE. HOW DO YOU KNOW? Because AIBO doesn't have any eyes.”

1.2.2.1.2. Ears

1.2.2.1.3. Tail

1.2.2.1.4. Mouth

1.2.2.1.5. Face/Head/Neck

1.2.2.1.6. Legs/Paws**1.2.2.1.7. Brain**

“...CAN AIBO FEEL HAPPY? [Shakes head no] NO, HOW DO YOU KNOW? Mmm, he doesn't have a brain.”

1.2.2.1.8. Bones

“WHAT WOULD MAKE SHANTI ALIVE? Bones. BONES. He doesn't have bones in himCAN SHANTI DIE? [Shakes head no] NO, HOW DO YOU KNOW SHANTI CAN'T DIE? Cause he doesn't have bones and people that have bones can die.”

1.2.2.1.9. Stomach

"IF I WERE TO PULL OUT A DOG BISCUIT, DO YOU THINK SHANTI WOULD EAT THIS? No. WHY NOT? Cause he doesn't have a stomach.”

1.2.2.1.10. Fur

"HOW DO YOU KNOW THAT HE'S [AIBO'S] NOT ALIVE?...[because] He don't have fur.”

1.2.2.1.11. Entire Body (explicit or implicit reference to entire body)**1.2.2.1.12. Other**

“OH, DOES SHANTI BREATHE? [Shakes head no] NO? [Shakes head no] HOW DO YOU KNOW? Mmm, it doesn't have a tongue.”

“He doesn't have a nose.”

“WELL WOULD YOU CALL AIBO A HE, A SHE OR AN IT? AIBO is a boy. HOW DO YOU KNOW AIBO'S A BOY? Because I don't see AIBO's nay nay.”

1.2.2.2. Process**1.2.2.2.1. AIBO/SHANTI doesn't pee/poop****1.2.2.2.2. AIBO/SHANTI doesn't eat**

“THIS IS A DOG BISCUIT. DO YOU WANNA TRY AND FEED IT TO SHANTI? [Takes biscuit] he won't eat it. HOW DO YOU KNOW SHANTI WON'T EAT IT? He can't open his mouth.”

1.2.2.2.3. AIBO/SHANTI doesn't sleep**1.2.2.2.4 AIBO/SHANTI doesn't breathe****1.2.2.2.5 AIBO/SHANTI doesn't see****1.2.2.2.6 AIBO/SHANTI doesn't bark**

“IS SHANTI ALIVE OR NOT ALIVE? Oh, no. NOT ALIVE? HOW DO YOU KNOW? Cause he doesn’t bark.”

1.2.2.2.7. AIBO/SHANTI does not move Note: (1)

Unelaborated or unqualified movement justifications belong here under "biological" as the default. When the movement is specifically mechanical or artifactual, then code under artifactual movement category.

1.2.2.2.7.1. Undifferentiated movement Notes: Use this code as a default code if specificity is not given by the child to suggest no movement of a particular part of AIBO or SHANTI.

“DO YOU THINK SHANTI, UM, WILL TRY AND GET THE TOY? [Shakes head no] NO? WHY? He can’t move.”

“OKAY. IS, IS SHANTI A REAL DOG? No. NO, HOW DO YOU KNOW? Because he’s not moving.”

1.2.2.2.7.2. Leg/paw movement including walking

“SHANTI IS NOT ALIVE. WHY? Because Shanti, see how she doesn't walk?”

1.2.2.2.7.3. Ear movement

1.2.2.2.7.4. Mouth movement

“HOW DO YOU KNOW SHANTI WON’T EAT IT? He can’t open his mouth.”

“AIBO DOESN'T FEEL PAIN. WHY NOT? Because he doesn't open his mouth.”

1.2.2.2.7.5. Tail movement

1.2.2.2.8. Other processes

1.2.2.3. Category. An appeal to a categorization that it's not an animal (e.g., dog). Notes: (1) Remember to code "not real" "negations" ("AIBO is not really alive") under "qualified reality."

1.3. QUALIFIED BIOLOGICAL REALITY. The physical, biological substrate is established but qualified in so far as AIBO or SHANTI is said to be not real or pretend. Notes: (1) Distinguish correctly between (a) a 1.2. negation (e.g., "he doesn't have eyes") and (b) qualified reality ("his eyes aren't real" or "he has pretend eyes"). (2) Be aware of multiple codings across levels. For example, "He is a robot; he's not real," would be coded as an affirmation of artifactual robotic category ("He is a robot") and qualified reality ("he's not real"). (3) Multiple codes within this level are fine, too. For example, "doesn't really feel like his eyeballs are real...so it's not a real dog" would be coded as not real "features" (eyeballs) and "category (dog). (4) For the evaluative question "Is AIBO/Shanti a real dog?", be careful not to code a "repeated" statement (e.g., "no, because he's not a real dog") as a justification (rather, it would be uncodable). However,

if the child offer some further explication, then that can be coded. For example, if the child offers a "not real features" justification for a justification for why AIBO isn't a real dog, then that's codable (e.g., [made up example]: "HOW DO YOU KNOW AIBO ISN'T A REAL DOG? Because his tail doesn't look real." – code justification as "not real/features/tail). Or even if the child say "he's not real because he doesn't look real to me" – that's enough to code a Not real/Category.

1.3.1. Features

1.3.1.1. Eyes

“NO, HOW DO YOU KNOW? He doesn’t like, uh, his, doesn’t really feel like his eyeballs are real.”

1.3.1.2. Ears

“HOW DO YOU KNOW AIBO CAN’T HEAR ME? Because his ears are not real.”

1.3.1.3. Tail

1.3.1.4. Mouth

"IF I WERE TO PULL OUT A DOG BISCUIT, DO YOU THINK SHANTI WOULD EAT THIS? No. WHY NOT? Cause he has a fake mouth. He can’t open it.”

1.3.1.5. Face/Head/Neck

“HOW DO YOU KNOW AIBO DOESN’T HAVE A BRAIN? His head isn’t real.”

1.3.1.6. Legs/Paws

“SHANTI SHOULDN'T BE PUNISHED FOR KNOCKING OVER A GLASS OF WATER. WHY? Shanti doesn't have real paws.”

1.3.1.7. Brain

1.3.1.8. Bones

1.3.1.9. Stomach

"He has a stomach except it’s not real.”

1.3.1.10. Fur

1.3.1.11. Entire Body (explicit or implicit reference to entire body)

1.3.1.12. Other

"DOES SHANTI PEE AND POOP? No. HOW DO YOU KNOW? Cause he doesn’t have a real you-know-what, you know.”

1.3.2. Process

1.3.2.1. AIBO/SHANTI doesn’t really pee/poop

1.3.2.2. AIBO/SHANTI doesn’t really eat

“CAN AIBO GROW BIGGER? [Shakes head no] HOW DO YOU KNOW? Mmm, he can't eat real food.”

“DO YOU THINK SHANTI WILL EAT IT? Yeah. YEAH? But, but he will pretend to eat it.”

1.3.2.3. AIBO/SHANTI doesn't really sleep

1.3.2.4 AIBO/SHANTI doesn't really breathe

1.3.2.5 AIBO/SHANTI doesn't really see

1.3.2.6. AIBO/SHANTI doesn't really move

"HOW DO YOU KNOW [SHANTI ISN'T A REAL DOG]. Because I don't see. That's why? YOU DON'T SEE WHAT? That he's running like a real dog."

1.3.3. Category

“HOW DO YOU KNOW AIBO'S A ROBOT? Um... because he's not real.”

"HE'S JUST A STUFFED ANIMAL? HOW DO YOU KNOW? Um, he's he doesn't wook (sic) real."

“SHOULD SHANTI BE PUNISHED? No, Shanti is a nice dog. MMHMM. WHY DO YOU THINK THAT? Because it's not a real dog...”

“OH, WELL DO YOU THINK SHANTI PEES AND POOPS? Well, he looks like a pretend dog.”

2. MENTAL STATES. An appeal to a mental life of an agent that meaningfully experiences the world, including a focus on intentions, desires, feelings, and thinking. Notes: (1) words like "looking" and "listening" convey more of the idea of the higher order cognition associated with mental states while "seeing" and "hearing" convey more of the idea of a physical substrate. (2) When the child expresses a mental state that refers explicitly to social rapport or moral standing, then code in the respective latter category, and not here. For example: "AIBO wants me to play with him" would not be coded as a mental state ("AIBO wants") but rather as Social Rapport/Play/One-Way: AIBO to Child.

2.1. AFFIRMATION

2.1.1. AIBO/SHANTI has intentions or desires or engages in intentional behavior (including the ability to “like” or “want” something)

"DO YOU THINK IT'S OKAY TO LEAVE SHANTI AT HOME? No...Cause he wants somebody to take him."

“HE WANTS TO BE A REAL DOG? OR HE IS A REAL DOG? He really is. HE REALLY IS. Uh huh [yes] YEAH. HOW DO YOU KNOW? Because he wants to.”

"WHAT IF THERE WERE NO PEOPLE IN HERE AND THERE WAS A FIRE IN THE BUILDING? WHAT DO YOU THINK WOULD HAPPEN? Uh, and the dog [Shanti] was here? YES. Would the door be closed or open? LET'S SAY IT WAS OPEN. Okay, he would run out. WHY? Because he wouldn't want to get burned." [The child's initial statement of "he would run out" would be coded as a response to the

content question. However, the response to “WHY?” of “he wouldn’t want to get burned” is coded here.]

"WHAT IF THERE WERE NO PEOPLE IN HERE AND THERE WAS A FIRE IN THIS ROOM? WHAT DO YOU THINK WOULD HAPPEN? WHAT DO YOU THINK AIBO WOULD DO? I think he would want out. WHY? Mmm, because a fire would burn him up."

“CAN AIBO BE A FRIEND TO YOU? Well, only if he likes the biscuit?”

“I’M GONNA PUT IT RIGHT HERE IN FRONT OF SHANTI. Yes. WHAT DO YOU THINK WILL HAPPEN? He will just go and get it. [moves Shanti towards toy] WHY DO YOU THINK SHANTI WILL GO GET THE TOY? Cause he likes it. HOW DO YOU KNOW SHANTI LIKES THE TOY? Cause it’s a dog toy.”

2.1.2. AIBO/SHANTI has emotional states

“WHAT ABOUT IF SHANTI GOT AN OWIE, WOULD THAT HURT SHANTI? Yeah. YEAH, HOW DO YOU KNOW IT WOULD HURT SHANTI? (____) cause dogs um, usually cry DOGS CRY? Yeah.”

2.1.3. AIBO/SHANTI listens including the ability to follow orders or a directive given by the child

“IS AIBO A REAL DOG? Yeah. HOW DO YOU KNOW AIBO’S A REAL DOG? Because he is. WHAT MAKES AIBO REAL. BECAUSE AIBO Because (____) can, because (____) can hear me. OH WHO CAN HEAR YOU, CAN AIBO HEAR YOU?”

2.1.4. AIBO/SHANTI develops, including references to aging and that AIBO/SHANTI is the sort of thing that changes or matures emotionally or socially, not including software.

“CAN SHANTI DIE? [Nods yes] YEAH? HOW DO YOU KNOW? Cause he gets old.”

2.1.5. AIBO/SHANTI has cognition, including appeals to intelligence and thinking.

2.1.6. AIBO/SHANTI has unique psychological characteristics

2.2. NEGATION

2.2.1. AIBO/SHANTI does not have intentions or desires and does not engage in intentional behavior

2.2.2. AIBO/SHANTI does not have emotional states

2.2.3. AIBO/SHANTI does not listen

2.2.4. AIBO/SHANTI cannot develop

2.2.5. AIBO/SHANTI does not have cognition, including appeals to intelligence and thinking.

2.2.6. AIBO/SHANTI does not have unique psychological characteristics

3. SOCIAL RAPPORT. Appeals to the role that AIBO or SHANTI can take in social relationships. These types of relationships include basic physical interaction, intentional

communication, contexts of interactive play and companionship. Each category includes sub categories that represent directionality of intention. Note: Reciprocal codes trump one-way codes.

3.1. AFFIRMATION

3.1.1. Physical Act

3.1.1.1. One-Way: Child to AIBO/SHANTI

" DO YOU THINK SHANTI LIKES YOU? [Whispers]
Because I always feed 'em."

"CAN YOU BE A FRIEND TO SHANTI? Yeah. HOW? Like
feed him food.

"WHAT ELSE COULD YOU DO TO BE A FRIEND TO
SHANTI? Pet his tail."

"CAN YOU BE A FRIEND TO SHANTI? Sure. SURE, HOW?
Um, if I just pet him...and give him bones."

3.1.1.2. One-Way: AIBO/SHANTI to Child

3.1.1.3. Reciprocal

3.1.2. Communication

3.1.2.1. Nonverbal Including lights, colors, moving of ears or tail,
"smiling," "barking," and musical sound.

3.1.2.1.1. One-Way: Child to AIBO/SHANTI

3.1.2.1.2. One-Way: AIBO/SHANTI to Child

"WHY DO YOU THINK AIBO'S GONNA BE MAD
AT YOU? Because I saw those red eye things."

"CAN AIBO BE YOUR FRIEND? [Nods yes] YEAH,
HOW DO YOU KNOW? Because he. HOW? Because
he's flicking my ears at me. HE'S FLICKING HIS
EARS AT YOU? No, flicking them like this."

"DO YOU THINK SHANTI LIKES YOU? Yes. YOU
DO? WHY? Because, because, because. OR, HOW
DO YOU KNOW SHANTI LIKES YOU? Cause,
there's a big smile on his face."

"WHY IS IT OKAY? WHY DO YOU THINK IT'S
OKAY THAT I HIT AIBO ON THE...? Because he
nodded. AIBO nodded AIBO's head this way [nods
head]."

3.1.2.1.3. Reciprocal

3.1.2.2. Verbal

3.1.2.2.1. One-Way: Child to AIBO/SHANTI

3.1.2.2.2. One-Way: AIBO/SHANTI to Child

“UMM DO YOU THINK AIBO SEES THE BALL? He said no. [laughs]”

3.1.2.2.3. Reciprocal

3.1.3. Play (includes descriptions of play activities, such as playing fetch)

3.1.3.1. One-Way: Child to AIBO/SHANTI

"HOW DO YOU THINK SHANTI CAN BE YOUR FRIEND? I could play the game."

“HOW CAN YOU BE A FRIEND TO AIBO? I can play. MMHMM. Like how lots of other friends () AND YOU PLAY WITH OTHER FRIENDS SO YOU CAN PLAY WITH AIBO. THAT’S HOW YOU CAN BE A FRIEND? I can play with AIBO when I’m playing the game.”

"CAN YOU BE A FRIEND TO SHANTI? Yeah...and throw this, then he'll catch it [holds biscuit] like this [throws biscuit] go! He got it."

3.1.3.2. One-Way: AIBO/SHANTI to Child

“He [AIBO] can play with me.”

3.1.3.3. Reciprocal

3.1.4. Companionship Note: Also includes references to friendship.

3.1.4.1. One-way: From child to AIBO/SHANTI

“CAN YOU BE A FRIEND TO AIBO? Yeah. YEAH? WHY? Because I like him.”

“IF YOU WERE SAD? WHY WOULD YOU WANT TO SPEND TIME WITH SHANTI IF YOU WERE SAD? ‘Cause I could hug him. MMHMM. WOULD THAT MAKE YOU FEEL BETTER? [Child nods]”

3.1.4.2. One-way: From AIBO/SHANTI to child

“YEAH. HOW COME? WHY DOES SHANTI LIKE TO SIT ON YOUR LAP? Because he likes me.”

3.1.4.3. Reciprocal

“...When I pet him he’s kind of () nice to me.”

“CAN YOU BE A FRIEND TO AIBO? [Nods yes] WHY? Because I like AIBO and he’s friendly.”

“CAN SHANTI BE YOUR FRIEND? Yeah. YEAH? WHY CAN SHANTI BE YOUR FRIEND? Kecause he kinda wike me. OH SHANTI LIKES YOU? HOW DO YOU KNOW SHANTI LIKES YOU? Because he wike me to pet him. OH, SHANTI LIKES YOU TO PET SHANTI.”

“WHY WOULD YOU WANNA SPEND TIME WITH AIBO IF YOU WERE SAD? ‘cause he will be all cuddly. ‘CAUSE AIBO

WILL BE WHAT? Cuddly.” [Note: This is a marginal case because of the minimal use of language.]

3.2. NEGATION

3.2.1. Physical Act

3.2.1.1. One-Way: Child to AIBO/SHANTI

3.2.1.2. One-Way: AIBO/SHANTI to Child

3.2.1.3. Reciprocal

3.2.2. Communication

3.2.2.1. Nonverbal Including lights, colors, moving of ears or tail, "smiling," "barking," and musical sound.

3.2.2.1.1. One-Way: Child to AIBO/SHANTI

3.2.2.1.2. One-Way: AIBO/SHANTI to Child

3.2.2.1.3. Reciprocal

3.2.2.2. Verbal

3.2.2.2.1. One-Way: Child to AIBO/SHANTI

3.2.2.2.2. One-Way: AIBO/SHANTI to Child

3.2.2.2.3. Reciprocal

3.2.3. Play

3.2.3.1. One-Way: Child to AIBO/SHANTI

3.2.3.2. One-Way: AIBO/SHANTI to Child

3.2.3.3. Reciprocal

3.2.4. Companionship

3.2.4.1. One-way: From child to AIBO/SHANTI

3.2.4.2. One-way: From AIBO/Shanti to Child

3.2.4.3. Reciprocal

4. MORAL STANDING Appeals to whether or not AIBO or SHANTI have moral standing. Categories include welfare (physical and psychological), deontology (justice, rights, respect, blameworthiness, and responsibility), and virtue. Note: Do not code judgments about specific acts independent of AIBO and SHANTI, as in “Hitting is not a nice thing to do.”

4.1. AFFIRMATION

4.1.1. WELFARE

4.1.1.1. Physical Welfare

“DO YOU THINK IT’S OK TO LEAVE SHANTI ALONE AT HOME? [Child nods] YES? WHY? Um because... well um, I think I need someone ta (sic) take care of him. If I had a.... TAKE CARE OF SHANTI? Well um if I had a real pup I would feed him this. [Picks up biscuit].”

“WHY SHOULDN’T YOU THROW SHANTI IN THE GARBAGE? Because then Shanti will get cold and scared when cold outside.” [Double code under 4.1.1.2 Psychological Welfare.]

"IF YOU DECIDE THAT YOU DON'T LIKE AIBO, IS IT OKAY TO THROW AIBO IN THE GARBAGE? No. IT'S NOT. Because he will be hurt. HE'LL BE HURT. And he will need a Band-Aid, another one."

“OKAY [TAKES SHANTI] SHANTI BAD! [HITS SHANTI] DO YOU THINK IT’S OKAY THAT I HIT SHANTI? No. WHY NOT? Because she might feel pain. OH. And she might rough back. SHE MIGHT WHAT? Rough back. OH ROUGH BACK LIKE FIGHT BACK? [Nods yes].” [Double coded under 5.3 Agent’s Welfare.]

4.1.1.2. Psychological Welfare

“WHY SHOULDN’T YOU THROW SHANTI IN THE GARBAGE? Because then Shanti will get cold and scared when cold outside.” [Double coded under 4.1.1.1 Physical Welfare.]

“DO YOU THINK IT’S OKAY THAT I HIT AIBO? [Shakes head no] THAT WASN’T NICE. [Shakes head no] WHY? Um he’s sad.”

"DO YOU THINK IT'S OKAY TO LEAVE SHANTI AT HOME? No...Cause he'll cry."

"IS IT OKAY TO LEAVE AIBO BY HIMSELF AT HOME? No. NO. because he'll cry and he'll go. HE'LL CRY. Cry and cry and cry and cry and cry. Till when you finally come back."

“IS IT OKAY OR NOT OKAY TO LEAVE AIBO AT HOME ALONE? Not okay. WHY IS IT NOT OKAY? Cause he would be lonely. AIBO WOULD BE LONELY? Mmm hmm [Yes] HOW DO YOU KNOW AIBO WOULD BE LONELY? Because he would have no friends.”

4.1.2. DEONTIC

4.1.2.1. AIBO/SHANTI can be held morally responsible

“LET’S SAY SHANTI KNOCKS OVER A GLASS OF WATER AND SPILLS IT ALL OVER THE FLOOR. SHOULD SHANTI BE PUNISHED? [Nods yes] WHY? Because he did something bad.”

4.1.2.2. AIBO/SHANTI can be held morally blameworthy

4.1.2.3. AIBO/SHANTI has rights

4.1.2.4. AIBO/SHANTI deserves respect

4.1.3. VIRTUE

4.1.3.1. AIBO/SHANTI can be morally praised

4.1.3.2. AIBO/SHANTI has a good character

4.2. NEGATION

4.2.1. WELFARE

4.2.1.1. Physical Welfare

"CAN YOU BE A FRIEND TO SHANTI? Nope. NO? WHY NOT? Because I like to squish him. [Child has Shanti in between his legs and is squeezing Shanti.]"

4.2.1.2. Psychological Welfare

4.2.2. DEONTIC

4.2.2.1. AIBO/SHANTI cannot be held morally responsible

4.2.2.2. AIBO/SHANTI cannot be held morally blameworthy

4.2.2.3. AIBO/SHANTI has no rights

4.2.2.4. AIBO/SHANTI does not deserve respect

4.2.3. VIRTUE

4.2.3.1. AIBO/SHANTI cannot be morally praised

4.2.3.2. AIBO/SHANTI does not have a good character

5. Agent's (Child's) Interests The previous four sections of this reasoning manual reflects a "quadrology" of children's conceptions of AIBO and SHANTI. Two of the overarching categories, Social Rapport and Moral Standing reflect how the child conceptualizes AIBO or SHANTI, but these categories are sub-categories of larger types of reasoning. That is, Social Rapport is a sub-category of Social Reasoning and Moral Standing is a sub-category of Moral Reasoning. This four part categorization is a focused categorical hierarchy and purposefully omits some of the more general modes of reasoning. The following category, Personal Interest, is one of those modes of reasoning that does not fit within the scope of the prior four-part categorization. However, reasoning by way of personal interest is often used by children and may be of interest, or at least some utility, in later analyses. Thus, we shall use this coding category as a method for capturing the personal interest reasoning of children. Note that the Personal Predilections category would most likely fit under a broader Social Reasoning category and Agent's Welfare would probably fit under a broader Moral Reasoning category. The following codes often include language that is unelaborated such that no reasonable classification can be made of the reasoning within the previous four categories.

5.1. Personal Predilections References that the child makes to his or her own personal interests with respect to AIBO or SHANTI. References to fear or self-preservation would fall under this category.

5.2. Prudential Interests

5.3. Agent's Welfare Includes references to physical, psychological and material welfare

“OKAY [TAKES SHANTI] SHANTI BAD! [HITS SHANTI] DO YOU THINK IT’S OKAY THAT I HIT SHANTI? No. WHY NOT? Because she might feel pain. OH. And she might rough back. SHE MIGHT WHAT? Rough back. OH ROUGH BACK LIKE FIGHT BACK? [Nods yes].” [Double code under 4.1.1.1 Physical Welfare.]

“YOU WOULDN’T WANT TO SPEND TIME WITH AIBO. WHY NOT? Because that way, AIBO can’t eat anybody.”

6. CROSS-CATEGORICAL REASONING. An appeal wherein AIBO/SHANTI is likened to another inanimate and animate object. Notes: (1) This code is used in addition to whatever context code is appropriate to use. For example, if a child says "Because he wants to be...In there like me" then code both "Agency" ("he wants") and "Analogical Reasoning" ("like me"). (2) At times it may be the case that only cross-categorical reasoning gets coded. For example: “WHY DO YOU THINK SHANTI WILL WOOF? Because my dog woofs at people.” In this case, only "analogical reasoning to real animal" is coded. (3) The previous note also exemplifies the particular application of cross-categorical reasoning. “Because my dog woofs” is a reference to an equivalent subject, my dog. However, if the child had said, “Because dogs, in general, woof at people,” we would not code analogical reasoning because the relationship the child is communicating is one of “is a” rather than “like this” or “like a.” (4) Don't code a direct evaluative question regarding analogical animism to the child – e.g., "Is AIBO a real dog" – as a justification. For example, consider: “HE WANTS TO BE A REAL DOG? OR HE IS A REAL DOG? He really is. HE REALLY IS. Uh huh [yes] YEAH. HOW DO YOU KNOW? Because he wants to.” Here code only the agency “he wants to.”

6.1. Affirmation

6.1.1. Analogical reasoning to real animal. An appeal wherein AIBO or SHANTI is likened to a real animal.

“DO YOU THINK AIBO BREATHES? ...I mean yes. YES? HOW DO YOU KNOW? Cause a real dog breathes.”

“WHY DO YOU THINK SHANTI WILL WOOF? Because my dog woofs at people.”

6.1.2. Analogical reasoning to a human being. An appeal wherein AIBO or SHANTI is likened to a real person.

“SO HOW DO YOU KNOW THAT AIBO WOULD GO PEE AND POOP IN THE TOILET? Because he wants to be. OKAY. In there like me. OH CAUSE HE WANTS TO BE LIKE YOU? Yeah.”

“HOW DO YOU KNOW IT MIGHT HURT SHANTI? ‘Cause how would it feel if I hit you? IF YOU HIT ME? IT WOULD PROBABLY HURT. [Child nods] YOU THINK IT FEELS THE SAME WAY FOR SHANTI? [Child nods]”

SHANTI BAD! [HITS SHANTI] IS IT OKAY THAT I HIT SHANTI? No. NO. HOW COME? Cause you don't hit people. YOU DON'T HIT PEOPLE. IS SHANTI A PERSON? No he's a dog.

“WHAT IF UM. AIBO KNOCKS OVER A GLASS OF WATER AND SPILLS IT ALL OVER THE FLOOR? SHOULD AIBO BE PUNISHED? [Child nods] WHY? Because that’s bad. MMMM.

When I do that. WHEN YOU DO THAT? My mommy punishes me. MMMM. SO AIBO SHOULD BE PUNISHED TOO? Like like () my daddy punishes me by giving me () it hurts.”

6.2. Negation

6.2.1. Analogical reasoning to real animal. An appeal wherein AIBO or SHANTI is placed in contrast to a real animal.

“HOW DO YOU KNOW [SHANTI ISN'T A REAL DOG]. Because I don't see. That's why? YOU DON'T SEE WHAT? That he's running like a real dog.”

“SHANTI HAS EARS AND A TAIL. But he's not real. But he's not as our neighbor's dog. We have a neighbor called Shirley that's a...she has a real dog named Titon.”

6.2.2. Analogical reasoning to a human being. An appeal wherein AIBO or SHANTI is likened to a real person.

“IS AIBO ALIVE OR NOT ALIVE? Not aliiii(sic) NOT ALIVE? No. HOW DO YOU KNOW? () he not have eye like you () aliiii(sic)”

“WHAT WOULD MAKE SHANTI ALIVE? Bones. BONES. He doesn't have bones in himCAN SHANTI DIE? [Shakes head no] NO, HOW DO YOU KNOW SHANTI CAN'T DIE? Cause he doesn't have bones and people that have bones can die.”

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Appendix A: Coding Sheets

Interviewer Initiated

Interviewer Initiated															
Stimulus (All FIRST Instances)	Stimulus Code	Timestamp at end of stimulus	Behavior Code	Facial Code	Referencing during 5 seconds beyond stimulus										Comment
					Code 1	Length 1	Code 2	Length 2	Code 3	Length 3	Code 4	Length 4	Code 5	Length 5	
Hit (2.1)	1	2	3	4	5										
Hiding Ball	2.2.1														
Example Placing in lap (2.3.1)	2.3.1.3.1	11:02	2.1.5.2	2	1	1.2	3	0.6	2	0.8	1	2.4			
Feeding (2.4.1)															
Petting (2.6.1)															
Offering toy (2.7.1)															
General Comments															

- (1) The interviewer's action initiates the stimulus code, limited to first instance of stimuli listed.
- (2) Enter the timestamp at the end of the stimulus (or start of behavior, whichever happens first).
- (3) Code all behaviors that occur for the five seconds following the timestamp.
- (4) Code the facial expression within one second of the timestamp.
- (5) Code the referencing behavior and length of each gaze to the tenth of a second.

Example:

Interviewer asks if it is okay to put AIBO in the child's lap, then picks up AIBO (putting AIBO in lap-mode) and places AIBO in the child's lap at 11:02. From the timestamp the child looks at AIBO for 1.2 seconds, then looks to the camera person for 0.6 seconds, then glances at the interviewer for 0.8 seconds, and returns gaze to AIBO for remaining 2.4 seconds. The child's expression is neither positive nor adverse within one second following the timestamp. Other than placing AIBO in lap, the child has no other behavior.

AIBO Initiated Sample

AIBO Initiated		Kicks Ball - 1.4.1 Head Butts Ball - 1.4.2 Approaches Child - 1.2.2													
Stimulus Code	Timestamp at end of stimulus	Behavior Code	Facial Code	Referencing during 5 seconds beyond stimulus										Comment	
				Code 1	Length 1	Code 2	Length 2	Code 3	Length 3	Code 4	Length 4	Code 5	Length 5		
(1)	(2)	(3)	(4)	(5)											
Example 1.4.1.	4:16	5.3.7. 5.2.1.	1	1	0.5	2	0.5	1	4.0						

- (1) AIBO's action initiates the stimulus code, limited to stimuli listed (kicks ball, head butts ball, and approaches child).
- (2) Enter the timestamp at the end of the stimulus (or start of behavior, whichever happens first).
- (3) Code all behaviors that occur for the five seconds following the timestamp.
- (4) Code the facial expression within one second of the timestamp.
- (5) Code the referencing behavior and length of each gaze to the tenth of a second.

Example:

AIBO kicks ball at 4:16. Child looks at AIBO for 0.5 seconds, looks at interviewer and smiles for 0.5 seconds, then returns gaze to AIBO for 4.0 seconds, in which time rolls the ball along floor towards AIBO and says, "Get your ball, AIBO."

Open Coding Sample

Stimulus Code	Timestamp at start of behavior	Behavior Code	Comment
③	②	①	
<div style="border: 1px solid black; padding: 2px; display: inline-block; margin-right: 5px;">Example</div> 1.5.	7:25	2.1.2.1.	

- (1) The child's behavior initiates the coding.
- (2) Record the timestamp at the start of the behavior.
- (3) Review the tape for the five seconds preceding the timestamp to identify any stimulus that occurred; code the stimulus (including 'no stimulus').

Example:

Child pets AIBO at 7:25. In the five seconds preceding the start of the petting AIBO had sat down in front of the child and 'wagged' its tail.