Mapping body touch using body diagrams and dolls

Nicole E. Lytle

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Mapping Body Touch Using Body Diagrams and Dolls

by

Nicole E. Lytle

Submitted to the Graduate Faculty as partial fulfillment of the requirements for the

Master of Arts Degree in Psychology

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May 2012
An Abstract of
Mapping Body Touch Using Body Diagrams and Dolls
by
Nicole E. Lytle
Submitted to the Graduate Faculty as partial fulfillment of the requirements for the Master of Arts Degree in Psychology
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The present study investigated the cognitive ability of 3- to 5-year-old children (n=109) to use dolls and body (human figure) diagrams as symbols to map body touch. We examined whether children performed worse using symbols to map body touch as compared to location. We were also interested to see whether performance in mapping body touch differed by symbol dimension (2-d vs. 3-d). Findings revealed that children’s symbol performance improved with age. However 5-year-olds were the only group to perform near ceiling in all tasks. Additionally, we found that younger children’s accuracy in mapping body touch decreased when asked to use the body diagram. Forensic applications of the findings are discussed
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Chapter 1

Mapping Body Touch Using Body Diagrams and Dolls

Each year in the United States, hundreds of thousands of children undergo forensic evaluation on suspicions of abuse. Since physical evidence often is lacking, obtaining accurate and complete information during child abuse investigations is of great import. Researchers have consistently demonstrated that children are able to report on events when questioned in a non-suggestive context (Baker-Ward, Ornstein, Larus, & Clubb, 1993; Peterson & Bell, 1996; Steward & Steward, 1996). Young children’s responses to free-recall and open-ended questions are highly accurate, but brief, often lacking the details needed to evaluate the experience in question (Dent & Stephenson, 1979; Goodman & Reed, 1986). Children’s reports may be hindered by a number of factors including poor memory, limited vocabulary and/or embarrassment when discussing touch events (Bruck, 2009; Goodman & Aman, 1990). In an attempt to overcome these obstacles and elicit additional information, a number of forensic interview protocols have incorporated the use of anatomically detailed (AD) dolls and/or body diagrams (e.g., American Academy of Child and Adolescent Psychiatry Practice Parameters, 1997; American Professional Society on the Abuse of Children Professional Guidelines, 2002).

The presumption behind the use of AD dolls and body diagrams is that they
improve the quality and quantity of children’s event reports. These types of props are thought to cue children’s event memory, decrease the need for complex language and/or help navigate any negative emotions a child may feel when disclosing abuse. While the proposed benefits would be valuable, researchers have yet to agree on whether AD dolls and body diagrams actually provide assistance to children during forensic evaluation.

In order for AD dolls and body diagrams to be helpful, children must first understand them as symbols to map body touch. Additionally, the props must somehow aid children’s reporting of a specific event (e.g., cue memory for a true touch event). The present study investigated whether children are able to understand the symbolic nature of AD dolls and body diagrams to map body touch.

1.1 Dolls as Props during Forensic Evaluation

In the 1980’s, many forensic interviewers began using AD dolls with children during investigations of alleged sexual abuse. Interviewers thought children would be better at demonstrating abuse by their play or by pointing to places where touching had occurred. Children were asked to “show what happened” while demonstrating with a doll (Boat & Everson, 1988; Conte, Sorenson, Fogarty, & Rosa, 1991; Kendall-Tackett & Watson, 1992). The rationale for using dolls with young children was that dolls might help children report additional details when they had difficulty verbalizing an experience on their own (Boat & Everson, 1986; Kendall-Tackett & Watson, 1992; Yates & Terr, 1988). Child abuse professionals who employed the props assumed that children were able to act out personally experienced events using the dolls (DeLoache & Smith, 1999).
Early on, some child professionals thought they could correctly categorize abused children by how the children played with AD dolls. They believed that abused children would show sexualized play with AD dolls whereas non-abused children would play normally with the dolls. If this were true, professionals could more easily identify victims of child sexual abuse. However, studies showed that abused and non-abused children do not consistently differ in the way they play with AD dolls (Cohn, 1991; Everson & Boat, 1990; McIver, Wakefield, & Underwager, 1989). Even non-abused children play with new parts on AD dolls, including the genitals. Hence, there is no data to suggest professionals can accurately classify abused and non-abused children according to their play.

Although professional organizations now discourage the practice of attempting to diagnose abuse according to children’s play, many professionals continue using AD dolls by asking children to point to where they have experienced touch. Some investigators believe that by asking children to point to touch locations, children will be able to overcome communicative obstacles including limited vocabulary and fear or embarrassment when disclosing sexual abuse. AD dolls may also act as memory cues, increasing the number of forensically relevant details in the child’s event report. The goal of using AD dolls with children, then, is to increase the number of forensically relevant details reported without adversely affecting accuracy.

Several research studies have been conducted in order to examine the amount and accuracy of information provided by children when asked to use AD dolls. Findings from lab studies demonstrate that, while young children may report more information when questioned using AD dolls, they do so at the expense of accuracy (Bruck, Ceci, &
Francoeur, 2000; Bruck, Ceci, Francouer, & Renick, 1995). For example, Goodman, Quas, Batterman-Faunce and Riddlesberger (1997) found that children 3- to 10-years-old provided more details about genital touch during a stressful medical procedure when asked to show and tell what happened using an AD doll. However, the youngest children made more mistakes when using dolls than they did during free recall of the event. When questioned with AD dolls, 3- and 4-year-olds provided as much incorrect information as they did correct information. Additionally, field studies provide evidence that when introduced following an exhaustive interview, AD dolls do not increase the amount or quality of forensically relevant information provided by children (Lamb, Hershkowitz, Sternberg, Boat, & Everson, 1996; Thierry, Lamb, Orbach, & Pipe, 2005).

In order to use AD dolls, children must understand the doll as both an object and a symbol for them. DeLoache (1990) suggested this might be especially difficult for younger children, as they are experienced in using dolls as playthings rather than tools to communicate personal experiences. DeLoache and Marzolf (1995) found that 2½- and 3-year-old children struggled to use AD dolls as self-representations when asked about a game involving touch. Thus, children provided more correct information when directly asked by the researcher than when asked to demonstrate using the doll.

Bruck et al. (1995, 2000) identified additional problems associated with children’s use of AD dolls to report touch experiences. Children 3- and 4-years of age were questioned immediately following a routine medical examination in which half of the children received a genital exam. All children were interviewed using AD dolls and asked to demonstrate certain events using the dolls and their own bodies. AD dolls were found to elicit behaviors from children that could be interpreted as sexual. For example,
when asked to show how the doctor had touched them, some children inserted fingers into both the genital and anal cavities of the doll. While the doctor did perform a genital exam on half of the children, he never inserted his fingers into the genital or anal cavity. Findings demonstrate that, when paired with suggestive interviewing techniques, the use of dolls is associated with higher rates of incorrect information as well as increased false reports of body touch.

Furthermore, Bruck et al. (1995, 2000) found that young children were not very good at reporting genital touch. Regardless of how children were questioned, performance in reporting genital touching was poor. Children were inaccurate when asked to show on their own bodies, the dolls, and when responding to the interviewer’s direct questions about body touch. Three-year-olds were just as likely to deny a touch had occurred, as they were to falsely report a touch.

Despite their intuitive appeal, then, there is little empirical support for the use of AD dolls during forensic interviews with children. Why do AD dolls generally fail to bolster children’s reports? In the lab studies described above, researchers staged events and then examined whether dolls assisted children’s memory reports. While the findings generally reveal the dolls do not aid children’s reports, we are left not knowing why. One possibility is that the dolls simply do not benefit children’s memory reports of experienced events. Another more basic possibility is that the children do not appreciate the dolls as symbols. DeLoache and colleagues (DeLoache, 1987, 1991; Marzolf & DeLoache, 1994) have found children appreciate the symbolic quality of two-dimensional (2-d) symbols before that of three-dimensional (3-d) symbols (further reviewed in the section below) when asked to perform a search task. As such, some
forensic interviewers have moved away from using AD dolls and have adopted the use of body diagrams during forensic evaluation.

### 1.2 Body diagrams as Props during Forensic Evaluation

Currently, many professionals use body diagrams when questioning alleged victims of child sexual abuse. Children are shown the front and back view of a same-gender unclothed child and asked to label body parts. Interviewers often gage children’s ability to use body diagrams to map body touch by whether they are able to identify and label body parts on the diagram. Body parts include public regions (e.g., arm, leg) as well as genital and anal regions. Interviewers then ask the child to point to the location on the diagram where they were touched. Interviewers may also point to a region on the diagram and ask if this is where the child was touched. Sometimes interviewers interrupt the verbal reports of young children and instruct them to show on the diagram, perhaps in belief that this is verifying they correctly understand what the child is reporting. Sometimes, interviewers introduce an adult body diagram that is the same sex as the suspected perpetrator. Interviewers use adult body diagrams in an attempt to identify where the child touched the adult and/or which body parts of the adult touched the child.

The rationale for using body diagrams is similar to initial reasoning for using AD dolls. Professionals who use body diagrams assume the diagrams will help children overcome limited vocabulary, motivational issues and memory deficits in order to help children more accurately report details of abuse. However, given the relatively recent shift to body diagrams, there are few studies that have examined the effectiveness of body diagrams on children’s reports.
Although research investigating their usefulness is limited, there is some evidence to suggest that body diagrams increase the number of forensically relevant details reported by children. Following an exhaustive forensic interview, Aldridge et al. (2004) showed suspected victims of child sexual abuse (ages 4- to 13-years-old) a gender neutral body diagram and asked additional questions regarding body touch. Aldridge and colleagues reported that body diagrams increased the number of forensically relevant details reported by all children beyond the initial interview. Body diagrams were particularly useful with 4- to 7-year old children who recalled 27% of forensically relevant details during the drawing portion of the interview. Since reports could not be validated, the effects of body diagrams on accuracy could not be determined. Researchers went on to conclude that body diagrams should only be introduced after “exhausting” children’s memories for an event through standard interview protocol, as information elicited by body diagrams may be less accurate. They caution that using body diagrams before an allegation has emerged may be a suggestive practice, produce false allegations from non-abused children.

Brown, Pipe, Lewis, Lamb and Orbach (2007) investigated the effects of body diagrams on children’s report accuracy. Children (5- to 7-years-old) participated in a staged event where children had their pictures taken. During the event, a photographer touched the children seven times (e.g., she wiggled their ear, put her arm around their shoulder and patted them on the back). Following a delay, children were interviewed using an exhaustive interview protocol (i.e. National Institutes of Child and Human Development interview protocol). At the end of the interview, children were questioned specifically about touch in one of three ways: using a body diagram only, body diagram
plus instructions or verbal prompts only (i.e., no body diagram). Children in the body diagram conditions made more false reports of touch than did children in the verbal prompts only condition. Body diagram conditions did not increase the number of correct touches reported. All children performed poorly when recalling touch. Approximately 35% of all touches were reported.

Similarly, Bruck (2009) found body diagrams did not benefit the accuracy of 3- to 7-year-old children’s reports of a staged touch event but rather increased errors. Body diagrams produced more errors than did verbal interviews and increased 3-, 4- and 5-year-old’s false reports of touch. Findings also showed that body diagrams increased 5- and 6-year-old children’s denial of actual touches. Children of all ages performed poorly in reporting body touch regardless of interview protocol and their ability to label body parts.

Like the doll studies discussed above, the lab studies on body diagrams also have used the procedure of staging an event then testing children’s memory report for the event. There are two basic possibilities to account for the failure of dolls and diagrams to promote children’s reports. One of those possibilities is that the body diagrams and dolls simply do not help children recall more information, or that they somehow act to elicit false details from children. Perhaps children are better at verbally recalling information versus using a human-like prop as a cue for their recall. The question here is whether dolls and diagrams promote memory reports. However, a more basic question is whether young children appreciate dolls and body diagrams as symbols for themselves. In order for dolls and diagrams to stand a chance in promoting reports, children must understand the purpose is to represent them and the suspect under question. From a forensic
standpoint, this is a very important issue. If children simply do not understand body diagrams or dolls as symbols, then either the symbols should not be used, or they need to be used in some other ways that help train children on their use. Prior to use of props, then, research is needed to establish children’s basic cognitive competency of symbolic understanding of the forensic interview tools.

Judy Deloache and colleagues have conducted over 20 years of cognitive developmental research on young children’s understanding of symbols. This research can help guide forensic developmental psychologists in their search for best practice guidelines on interview props.

1.3 The Development of Children’s Understanding of Symbols

Children’s appreciation of symbols begins very early in childhood with key developments extending throughout the preschool years (for a review, see DeLoache & Smith, 1999). The recognition that one object stands for another has been termed representational insight and marks toddlers’ appreciation of the symbolic nature of pictures and their ability to use pictures to solve problems (DeLoache, 1995, 2000). Two-dimensional pictures or photographs are the first symbols with which children begin to demonstrate representational insight. Representational insight develops gradually whereby children become increasingly able to appreciate abstract symbols such as maps. While representational insight is necessary for children’s success with more complex symbols (e.g., 3-d models), it is not in itself sufficient (Suddendorf, 2003). DeLoache (1987, 1991, 2000) has hypothesized that in order for children to successfully use 3-d objects as symbols, they must have developed a sense of dual representation. Dual
representation is the understanding of a symbol as a real object, and at the same time, representative of something other than itself (DeLoache & Marzolf, 1995). Through a series of scale model studies, DeLoache and her colleagues have provided strong support for the development of dual representation between 2½ - and 3-years of age (DeLoache, 1987, 1991; DeLoache, Kolstad, & Anderson, 1991).

The prototypical scale model study used by DeLoache and colleagues involves a three-dimensional scale model of a room in which the scale model is highly similar in appearance to the room (e.g., corresponding furniture are the same color and texture) with the only difference being size. In the standard task, 2½- and 3-year-old children watch as a miniature Snoopy doll is hidden in the model. The experimenter then explains that a big Snoopy is hidden in the very same place in the full-sized room. Children are then taken to the full-sized room and asked to find the big Snoopy. Only when children understand the symbolic relationship between the scale-model and the room, are they able to map the location of big Snoopy. At the end of each trial, researchers test children’s memory for the original hiding location by asking them to find the small Snoopy in the scale model. While children are almost always successful remembering the locations of the small Snoopy in the scale model (75% to 95% accurate), only the 3-year-olds are able to consistently use the scale model to guide their search in the corresponding full-sized room. Children under 3-years-old can remember the location of the small Snoopy but they are unable to appreciate the symbolic quality of the scale model to guide their search in the larger space.

DeLoache and colleagues have consistently found children appreciate 2-d objects earlier than they appreciate 3-d objects as symbols in search tasks (DeLoache, 1987,
1991; Marzolf & DeLoache, 1994). They postulate this is because 2-d symbols do not require dual representation. Rather, 2-d objects such as photographs have a single use: as a symbol. In terms of using a symbol to guide their search in a corresponding location, children perform equally well when mapping location from symbol to referent and referent to symbol (DeLoache, 1990). By 2½- years of age children are able to use 2-d symbols (i.e., photographs and drawings) to locate hidden objects, however, they fail under standard conditions to use 3-d symbols (i.e., scale models) in the same way. It is not until 3-years of age that children readily use 3-d symbols to map the location of a hidden object.

Additionally, DeLoache and colleagues have identified certain factors that make symbol tasks more difficult for children. For example, increasing the salience of the scale model as an object (i.e., allowing children to play with the model for 5 to 10 minutes) decreased 3-year-old children’s success in using the symbol. Under these conditions, only 44% of children were able to locate big Snoopy as compared to 80% in the standard task. Similarly, when salience of the scale model as an object was decreased (i.e., the model was placed behind a window), 2½-year-old children’s performance improved. In this condition, 50% of 2½-year-olds were able to locate big Snoopy as compared to 20% in the standard model task. Researchers also found that iconicity, the degree of similarity between a symbol and its referent, and children’s experience played a role in their performance. Symbols that were considered more similar in appearance to their referent led to increased success in mapping location. Likewise, children who had experience using symbols performed better on subsequent trials. Therefore, when evaluating symbol performance it is important to remember that other factors influence
success and failure, not only the development of dual representation and representational insight.

In summary, extant research suggests children must have representational insight in order to appreciate symbols. Children appreciate 2-d symbols (at around age 2½-years) to map location before 3-d symbols (at around age 3-years), a finding that appears to be driven by the need for dual representation. With 3-d objects children must appreciate their dual nature as both a symbol and an object. Additional task characteristics, particularly those that manipulate the need to appreciate dual representation, likely affect children’s performance.

DeLoache and Marzolf (1995) note it is not surprising that young children appear not to benefit from the use of AD dolls during forensic interviews. They suggest that children 3-years-old and younger are inexperienced symbol users and likely fail to understand how to use dolls as representations of themselves to communicate personally experienced events. DeLoache and Marzolf (1995) found that during a staged touch event, 2½- and 3-year-old children did not readily accept AD dolls as symbols representative of themselves (42% and 71% correct respectively). These children provided more information when directly asked about touch than they did by demonstrating on the doll. However, 4-year-olds performed better in using dolls to map body touch (92% correct placements).

In order for children to benefit from the use of either AD dolls or body diagrams during forensic interviews they must have a basic understanding of the interview props as symbols. Children must accept and use the prop as a symbol representative of them. Furthermore they must be able to accurately map between their own bodies and the prop
(Deloache & Marzolf, 1995). Research is needed to establish when children can solve the specific problem of mapping body touch using AD dolls and body diagrams. All of the forensic developmental studies reviewed above that have tested the utility of AD dolls or body diagrams have employed the methodology of staging an event and later testing children’s memory with or without the props.

To date, only three studies were found to have examined children’s basic ability to use dolls and body diagrams to map body touch. Ladd, London and Bruck (2011) employed a simple touch task with children in order to explore their understanding of symbols to map body touch. By design, the task bypassed memory demands in order to isolate the basic cognitive ability of mapping body touch onto a symbol. For each touch task, researchers placed a sticker on a particular location on the child (e.g., their elbow) and asked the child to show on a symbol (i.e., doll, body diagram, self-photograph or adult researcher) where that sticker currently was on them.

Preliminary findings show that while children’s accuracy increases with age, children were not consistently successful in their use of symbols to map body touch until 5-years-old. Surprisingly, and in contrast to the corpora of studies by DeLoache and colleagues, data also show that children perform worse when asked to use the body diagram as compared to any other symbol type.

Thus, separate studies by DeLoache and Marzolf (1995) and Ladd et al. (2011) show later development (4-years- and 5-years of age respectively) in children’s ability to map body touch as compared to mapping location when asked to use a 3-d symbol (i.e., a doll). Ladd et al. have found that children do not perform at ceiling on mapping body touch tasks when asked to use 3-d (doll) or 2-d (body diagram) symbols until 5-years of
Additionally, whereas previous symbols research consistently demonstrates children understand and use 2-d symbols before 3-d symbols to map location (DeLoache, 1987, 1991; Marzolf & DeLoache, 1994), the three studies by Ladd et al. report children perform worse using a 2-d symbol (body diagram) when mapping body touch.

These findings are quite surprising and suggest that perhaps there is some aspect related to mapping body touch that is more complex for children than mapping location. However, we cannot conclude differences exist since none of the studies described included both a mapping location task and mapping body touch task to compare children’s performance.

In sum, following research that demonstrated concerns in using AD dolls during forensic interviews, numerous protocols shifted to using body diagrams when questioning children about alleged touching events. Many professionals expected that since children first understand 2-d symbols to map the location of a hidden object, they would understand body diagrams before AD dolls to map body touch. However, research by Ladd et al. (2011) suggests there is something unique to body touch that complicates the task of mapping between a symbol, particularly body diagrams, and them. Continued research is needed to explore these findings and to establish a better understanding of children’s ability to map body touch.

1.4 The Present Study

The present study further investigated children’s basic ability to map body touch using symbols. The main goals were to examine 1) whether children performed worse using symbols to map body touch as compared to mapping location and 2) if performance
in mapping body touch differed by symbol dimension. We chose to investigate symbol understanding in children 3- to 5-years of age based on previous work that demonstrated developmental changes during this time (DeLoache & Marzolf, 1995; Ladd et al., 2011) that likely influence children’s ability to successfully use symbols during forensic investigation.

Unlike past research, the current study included tasks for both mapping location and mapping body touch in order to determine whether differences exist in children’s performance by mapping type. We used the same mapping body touch task used by Ladd et al. (2011) and designed a mapping location task similar to DeLoache and colleagues scale model tasks (DeLoache, 1987, 1991; DeLoache et al., 1991). In order to better understand the influence of symbol dimension on task performance, children were asked to use a 2-d and 3-d symbol for both tasks. We also considered symbol performance by age in months versus age in years, the standard in past studies.

1.5 Hypotheses

As was found in previous symbols research, we expected that children’s accuracy in using symbols to map both location and body touch would improve with age (DeLoache & Marzolf, 1995; DeLoache & Smith, 1999; Ladd et al., 2011). We predicted that children 5-years of age (60-months) and older would be the only children to readily use 2-d and 3-d symbols to map both location and body touch.

We hypothesized that young children would perform better at mapping location than mapping body touch. Citing the large body of research showing children 3-years of age and older are able to use both 2-d and 3-d symbols to map location (DeLoache, 1987,
1991; Marzolf & DeLoache, 1994), we believed that all children should perform reasonably well on our mapping location task. Our task essentially replicated DeLoache’s scale model task and so, children should perform equally well. Additionally, when mapping location we expected children to perform better using 2-d symbols (i.e., drawings) over 3-d symbols (i.e., models), citing DeLoache and colleagues previous research on symbol dimension and mapping location.

Considering findings from the few studies that have looked at children’s understanding of dolls and diagrams to map body touch (DeLoache and Marzolf, 1995; Ladd et al., 2011), we anticipated a delay in children’s use of symbols to map body touch (as compared to mapping location). Also, we predicted children would be more accurate in mapping body touch using the 3-d symbol (i.e., doll) over the 2-d symbol (i.e., body diagram). Although symbols research investigating location mapping found children use 2-d symbols first (DeLoache, 1987, 1991; Marzolf & DeLoache, 1994), research in our laboratory provided evidence that children perform worse when asked to use body diagrams to map body touch over any other symbol type (Ladd et al., 2011). We expected 5-year-old children (60-months) and older to perform at ceiling on mapping body touch tasks regardless of symbol dimension. To summarize, we anticipated main effects of age, task type and symbol dimension, with an interaction between task type and symbol dimension.

1.6 Method

1.6.1 Participants
One hundred and nine (53% male) 3- to 5-year-olds (37-months to 71-months) were recruited from Toledo, Ohio area schools and daycares. Our sample was made up of 32 three-year-olds (38% male), 47 four-year-olds (62% male) and 30 five-year-olds (57% male). All children completed each of the four symbols tasks during the testing session.

1.6.2 Materials

Materials for the mapping location task included three similar representations of a barn: a child-sized play barn (55”L x 36”W x 49”H) constructed from cardboard acted as the referent, while a miniature plastic toy barn (13”L x 8”W x 10”H) and line drawings depicting a barn (8 ½ x 11, front and back) acted as symbols. A real apple, a small apple replica and an apple sticker were used to hide in or around the child-sized play barn (real apple), toy barn (small apple) and drawings (apple sticker). The size of the apple corresponded to the barn size. This task was chosen to replicate the scale model studies conducted by DeLoache and colleagues (for a review see DeLoache & Smith, 1999). See appendix B for the location task referent and symbols.

In the mapping body touch task, 22” My Buddy brand dolls were used (from – Ladd et al., 2011). All dolls were fully clothed. Four different dolls were needed in order to match dolls and children by sex and race (i.e., white or black, male or female). Body diagrams of a child, front and back, were taken from a forensic interview manual (also used by Ladd et al., 2011). Clothes were drawn on all child body diagrams. Dolls and diagrams acted as symbols for the mapping body touch task. See Appendix C for body touch task example referent and symbols. For this task, small and large sized
stickers of different shapes (e.g., circles and stars) were used. For this task, the child participating acted as the referent.

1.6.3 Design Overview

The proposed experiment used a 2×2 within subjects design. The independent variables were mapping type (location vs. body touch) and symbol type (2-d vs. 3-d). Both variables are within-subjects factors. Age in months was used as a predictor variable. To differentiate between the four types of tasks, we refer to each task by its mapping type (location vs. body touch) and dimension (2-d vs. 3-d).

The dependent variable of interest was task performance. Task performance was determined by how accurately children used each symbol for mapping. There were four placements for each symbols task. Participants could score between 0 and 4 correct placements on each of the four task types (i.e., mapping location, 2-d; mapping location 3-d, mapping body touch, 2-d; mapping body touch, 3-d). A second dependent variable, anatomical identification, was included to measure children’s accuracy in identifying (i.e., pointing to) body parts. We felt it was important to include this measure, as some forensic interviewers test children’s ability to use interview props by whether they can label body parts on the doll or body diagram. Children were asked to make four anatomical identifications with both 2-d and 3-d body touch symbols. Participants could score between 0 and 4 correct identifications on each of the tasks.

1.6.4 Procedure

Prior to testing, parents read and signed University of Toledo approved consent forms. All testing took place at the child’s school or daycare in a well-traveled location that was visible to other people. Each child was tested individually in a single session
that lasted approximately 20 minutes. The researcher began each testing session by
explaining the tasks as a game and asked each child if he or she wanted to play. The
testing session began once the child agreed to participate\(^1\).

Children then participated in the mapping location and mapping body touch tasks.
Aside from mapping type (location vs. body touch) the two tasks were designed to be as
similar as possible. They were near identical in instruction and cognitive demands.
Presentation of mapping tasks was counterbalanced.

**Mapping Location.** Mapping location tasks began with the researcher introducing
the child-sized play barn. The child and the researcher sat side by side so that they were
viewing the play barn from the same vantage point. The researcher showed the child a
symbol (i.e., 2-d barn drawing or 3-d toy barn) and demonstrated the similarities between
the symbol and the large barn. For example, she notes, “See this barn has a door just like
the big barn. Can you point to the door on the small barn/drawing?” The researcher
repeated this with three other locations (i.e., window, floor, roof). Next, the researcher
explained that she would place the real apple in the big barn, and she wanted the child to
hide the small apple in the very same place in the small barn. She then placed the real
apple, for example, inside the barn. She reminded the child, “Now remember, your job is
to put the small apple in the small barn in the very same place.” Similarly, with the
drawings, the researcher placed the real apple in the play barn and asked the child to
place their apple sticker in the exact same place on the drawing. With each placement,

\(^1\) Half of the child participants received instructions to say, “I don’t know” if they did not know
the answer to questions asked by the experimenter. Less than ten children responded to a
question with “I don’t know,” therefore, we did not include this variable for further analysis.
The findings associated with “I don’t know” instructions will be reported in a separate paper.
the researcher noted, “The big apple is right here on the big barn. Your job is to put the small apple (replica or sticker) in just the same place on the small barn/drawing as the big apple is on the big barn.” The experimenter was sure not to state the location (i.e., did not say “on the silo”) but rather focused the child’s attention to the location. There were a total of four different placements for each symbol type: barn drawing (2-d) and small barn (3-d). Presentation of the barn symbols and locations were fully counterbalanced.

**Mapping Body Touch.** The researcher began by showing the child a symbol (i.e., doll or body diagram) and stating that it was like them in a lot of ways. For example, the researcher said, “See she has a nose. Can you point to the doll’s nose?” This was repeated with three other body parts (i.e., foot, hand and shoulder). Next, the researcher explained that she was going to place a big sticker on the child and that the child should place their small sticker on the symbol in just the same place. For example, the researcher placed a sticker on the child’s stomach and said, “The big star (sticker) is right here on you (pointed to sticker on stomach). Your job is to put the little star on the doll in just the same place as the big star is on you right now.” The experimenter was sure not to state the name of the body part (i.e., did not say “on your stomach”) but rather focused the child’s attention to the body part with the sticker placement.

There were a total of four different placements for each of the two symbol dimensions: the doll (3-d) and the body diagram (2-d). The procedure was the same across both symbol types with the child first identifying 4 body parts followed by the mapping body touch placements. All sticker placements were in innocuous “public” locations (e.g., hand). Correct placements were coded liberally with responses being correct if the child placed the sticker on or pointed to the correct location regardless of
side (e.g., right versus left hand). The order of symbol presentation and body touch locations were fully counterbalanced.

### 1.7 Results

Children’s performance, regardless of age, when asked to point to the body parts (i.e., nose, foot, hand and shoulder) and locations (i.e., door, window, roof, floor) for each symbol was near ceiling; therefore, we did not analyze these data further. The percentages of correct body part identifications by age were: 98.6% for 3-year-olds, 99.6% for 4-year-olds and 100% for 5-year-olds. Children’s performance did not differ by sex.

One hundred and nine children performed four mapping tasks as part of a 2×2 within subject design (location versus body touch, and 2-d versus 3-d). There were four trials for each task, thus each participant could score between 0 and 4 correct trials on each of the task types. The percentages of correct trials were: 77% for body touch 2-d, 85% for body touch 3-d, 94% location 2-d and 90% location 3-d. For children 5-years (60-months) and older, these percentages were: 93%, 94%, 98%, and 96% respectively. Thus, it is clear some children have mastered the tasks and are performing near ceiling; the statistical method was chosen accordingly. Traditional linear regression/ANOVA methods were inappropriate because they would predict values for the percentage correct above 100%. Instead, logistic regressions were used to predict the number correct using the GLM function in R (see Venables & Ripley, 1999, pp. 218-222). Logistic regressions were most appropriate due to the truncated scale (0 to 4 correct) and ceiling effects with the oldest children. Logistic regressions were first done separately for each of the four
conditions using age in months as a predictor. Each of these is statistically significant, smallest $\chi^2(1) = 46.52, p < .001$, with the probability of a correct response increasing with age. Figure 1 shows the relationship between the predicted probability of a correct response and the child's age in months. The grey region is ± one standard error. The mean value for the sample is shown with the dashed line. As is clear, children improve on all four tasks with age.

Figure 1. The relationship between the probability of a correct response on the four types as a function of age, based on a logistic regression, for each of the four different tasks. The grey region is ± one standard error. The dashed line is the mean proportion for the sample.
To compare among the four tasks a repeated measures logistic regression was conducted. This procedure was conducted as a mixed generalized linear model using the R package lme4 (Bates, Maechler, & Bolker, 2011). Both of the binary repeated measures (body touch versus location and 2-d versus 3-d) and age were included as predictors. Interactions between age and the experimental variables were examined and none were statistically significant (all interactions $p > .4$). Consistent with our hypothesis there was a main effect for age with the probability of correct responses increasing with age, $\chi^2(1) = 40.27, p < .001$, see Figure 1.

There were main effects for mapping type (body touch vs. location with location having more correct responses, $\chi^2(1) = 36.39, p < .001$) and symbol dimension (2-d vs. 3-d with 3-d having more correct responses, $\chi^2(1) = 4.04, p = .04$). The main effects for mapping type and symbol dimension need to be interpreted in light of a significant interaction between body touch/location and 2-d/3-d, $\chi^2(1) = 16.61, p < .001$. Young children’s performance on the 2-d body touch task is driving the main effects of mapping type and symbol dimension. Therefore, we cannot conclude that children’s ability to map body touch is different than their ability to map location.

All six pairs of conditions were compared, taking into account age. The conditions, from most accurate to least, were: location 2-d, location 3-d, body touch 3-d and body touch 2-d. Using a conventional $\alpha=.05$ and not correcting for multiple comparisons, all conditions are significantly different from each other. If correcting for the number of comparisons by a conservative Bonferroni adjustment $\alpha=.05/6=.008$, then the two location tasks do not differ significantly from each other nor do the two 3-d tasks (i.e., location 3-d and body touch 3-d). The only condition that stood out on all
comparisons was the 2-d body touch task, p < .01. Children’s performance on this task was worse than all others. This finding supports our hypothesis that when mapping body touch, children perform better using the 3-d symbol (i.e., doll) than using the 2-d symbol (i.e., body diagram).

1.8 Discussion

The need for complete and detailed reports from suspected victims of CSA has led many interview protocols to adopt the practice of using interview aids when questioning children about touch events. Due to concerns about the suggestive nature of AD dolls (Bruck et al., 1995, 2000) and research showing children are able to use 2-d symbols before 3-d symbols to map location (DeLoache, 1987, 1991; Marzolf & DeLoache, 1994), many professionals have shifted to primarily using body diagrams during forensic investigation. While research by DeLoache and colleagues has amassed showing that children as young as 3-years-old appreciate and use symbols to map location, studies examining children’s ability to map body touch (DeLoache & Marzolff, 1995; Ladd et al., 2011) suggest that mapping body touch is more difficult than mapping location. Additionally, Ladd et al. found that children were least successful in mapping body touch when asked to use a body diagram.

Previous forensic developmental research examining the utility of dolls and body diagrams has failed to establish the basic ability of young children to map body touch when using these symbols. These studies have focused on the effects of using dolls and body diagrams on children’s memory reports instead of answering the basic question of whether children can use dolls and diagrams to map body touch. If children lack the
cognitive ability to use dolls and body diagrams as symbols than it would be impossible for them to benefit from their use during forensic interview. Therefore, the major goal of the present study was to extend the work by DeLoche & Marzolf (1995) and Ladd et al. (2011) by comparing developmental trends in performance on symbol tasks that involved both mapping location and mapping body touch tasks when memory demands were removed. By doing so, we were able to isolate children’s basic understanding of these props as symbols to map body touch.

In order to explore children’s abilities, we employed two separate tasks in which children were asked to use a 2-d and 3-d symbol to map location and body touch. Consistent with previous research, we found that children’s symbol performance improved with age. This was true across all symbol tasks. However, 5-year-olds (60-months) were the only children to perform at ceiling across all tasks. Previous research on symbolic development has demonstrated that as children age they become more experienced symbol users and thus their performance improves. Other variables of interest in the current study included mapping type (location vs. body touch) and symbol dimension (2-d vs. 3-d). Children were more accurate when asked to map location (vs. body touch) and performed better when asked to use 3-d symbols (vs. 2-d). However, these findings are qualified by a significant interaction. Children’s performance did not depend solely on mapping type or symbol dimension. Rather children’s accuracy decreased when asked to map body touch using a body diagram. It appears that characteristics unique to the body diagram made mapping body touch more difficult. Considering DeLoache’s findings that other factors (e.g., degree of similarity and experience) influence children’s success in using symbols to map location, it is
reasonable to think about how these other factors may relate to symbol dimension and influence children’s success in mapping body touch.

DeLoache found that iconicity, or degree of physical similarity between a symbol and its referent, influence children’s performance in mapping location. Perhaps, the degree of similarity between the child drawing and the child was not enough for children to understand the symbol could be used to represent them. For example, the barn drawing and toy barn look more similar to the play barn than the doll and body diagrams look to the actual child. The barn referent and symbols all contained very similar physical features. Barns are objects that by nature have relatively similar characteristics. They may differ in size, color and orientation but generally speaking, most adults and children recognize the stereotypical image of a barn. Furthermore, person characteristics tend to vary. Individuals have a unique make up including their physical appearance. The dolls and body diagrams used in our study and during forensic evaluation do not capture the unique features of each child. We did our best to match children to symbols by sex and race; however, we did not create a symbol that reflected the same degree of similarity as the barn symbols to the barn referent.

When considering iconicity and body touch symbols, dolls may have an advantage over body diagrams in several ways. Dolls like humans are three dimensional. This feature may allow children to more easily identify physical similarities (e.g., the doll has arms and legs that look like my arms and legs) and relate to the doll as compared to a 2-d body diagram. While the increased iconicity of 3-d symbols does not seem to benefit children in mapping location, it may be that for body touch, these features help the child to see the self as more like a doll than a diagram. Dolls also include the feature of color
(e.g., skin color matches more closely than a black and white line drawing) and a size that is more similar to the child’s physical size. If children more readily identify with dolls than they do body diagrams, it is likely they will perform better when using dolls to map body touch. In order to test the role of iconicity when mapping body touch, researchers need to isolate and manipulate the different aspects related to iconicity that may improve symbol/referent recognition.

A second factor that DeLoache discusses as important to symbol performance is experience. Children’s successes increase as they become more experienced symbol users. As such, it is possible that children have more experience using symbols to map location than they do in mapping body touch. For example, children may often practice searching for hidden objects in a picture but rarely talk about touch using dolls or body diagrams. Similarly, children may pretend more often during play that dolls/action figures are real beings that experience the world in ways similar to them. It is less likely that children play with body diagrams and pictures in this way. These play experiences likely influence how practiced children are in using symbols as well as how easily they are able to identify with the symbol as being able to represent them.

Finally, an issue specific to mapping body touch is the requirement of children to use symbols as representations of the self. When mapping location children only need to accept that smaller space is being used to represent a very similar but larger space (or vice versa). Mapping body touch creates a more complex symbol/referent relationship in that the referent is now the child. Further complicating this self/symbol relationship is the fact that the symbols are inanimate objects. Unlike children, these objects do not interact with the world around them. DeLoache and Marzolf (1995) found that 2½- and
3-year-old children struggled to use AD dolls as self-representations when asked about a game involving touch. It may be that young children’s poor performance is in part due to their unwillingness to accept dolls and body diagrams as representative of the self.

The current study only highlighted the similarities between the child referent and child symbols since that is the main practice during forensic interview. However, researchers may consider incorporating a training session in which children receive more detailed instructions on how the symbols should be used. This practice may benefit children’s performance by encouraging and teaching them how to effectively use symbols as self-representations.

In summary, we found that all children were able to accurately label the body parts of interview props, a practice used by many forensic interviewers to test children’s ability to use dolls and body diagrams to map body touch. Many of the youngest children were able to accurately label body parts, however, failed when asked to use body diagrams to map body touch. This is especially concerning since numerous interview protocols have moved to using body diagrams when questioning children about alleged sexual abuse. Child abuse professionals should know that children under 5-years-old do not consistently demonstrate they are able to use body diagrams when mapping body touch. We are not advising interviewers to revert back to using AD dolls with young children as previous research has raised concerns (e.g., the use of AD dolls may adversely affect accuracy of children’s event reports) about their use with young children.

The current findings highlight a need for additional research on children’s basic understanding of forensic interview props as symbols. Research is needed to examine whether factors other than dimension account for young children’s errors when using
symbols to map body touch. Future research should also consider whether training children to use symbols improves their performance in mapping body touch.
References


Appendix A

Experimenter Script

ID: __________

Symbol Study – Thesis
Script 4

I. Mapping Location

Barn Drawing: Point Task

“Look what I have. I have this big barn (point to play barn) and I have this drawing (point to barn drawing). The drawing is a lot like the big barn.”

“See – it has a door.”
“Point to the barn door.” C I ______________________

“And it has a window.”
“Point to the window.” C I ______________________

“Point to the roof.”
C I ______________________

“And now, point to the floor.”
C I ______________________

“So you see, the drawing is a lot like the big barn”

“Now we are going to play a game using the big barn, the barn drawing and these apples”

“I am going to hide the big apple in the big barn, and your job is to put the apple sticker in the very same spot on the drawing.”
Barn Drawing: Placement Task

“The big apple is right here (place apple by the right front window – outside). Your job is to put the apple sticker on the drawing in the very same place that the big apple is by the big barn right now”

1) Right front window – outside
   C  I ______________________

“The big apple is right here (place apple beside barn – non silo side, outside). Your job is to put the apple sticker on the drawing in the very same place that the big apple is by the big barn right now”

2) Non-silo side of barn, outside
   C  I ______________________

“The big apple is right here (place apple in the middle of the barn - inside). Your job is to put the apple sticker on the drawing in the very same place that the big apple is by the big barn right now”

3) Inside barn
   C  I ______________________

“The big apple is right here (place apple behind the barn – middle of the doorway, outside). Your job is to put the apple sticker on the drawing in the very same place that the big apple is by the big barn right now”

4) Behind the barn
   C  I ______________________

“Now I am going to put the drawing away and we are going to use this toy barn. This toy barn is like the big barn in a lot of ways.”

Toy Barn: Point Task

“See – it has a door.”
   “Point to the barn door.”
   C  I ______________________

“And it has a window.”
   “Point to the window.”
   C  I ______________________

“Point to the roof.”
   C  I ______________________

“And now, point to the floor.”
   C  I ______________________
“So you see, the toy barn is a lot like the big barn”

“Now we are going to play a game using the big barn, the toy barn and these apples”

“I am going to place this big apple in the big barn, and your job is to place this little apple in the very same spot in the toy barn.”

**Toy Barn: Placement Task**

“The big apple is right here (place apple on the roof). Your job is to put the little apple by the toy barn in the very same place that the big apple is by the big barn right now”

5) Roof C I ______________________

“The big apple is right here (place apple in front of the small door - outside). Your job is to put the little apple by the toy barn in the very same place that the big apple is by the big barn right now”

6) Small door - front C I ______________________

“The big apple is right here (place apple on top of silo). Your job is to put the little apple by the toy barn in the very same place that the big apple is by the big barn right now”

7) On top of silo C I ______________________

“The big apple is right here (place apple behind barn in the support beam). Your job is to put the little apple by the toy barn in the very same place that the big apple is by the big barn right now”

8) Behind barn, support beam C I ______________________

**II. Mapping Body Touch**

**Body Diagrams: Point Task**

“Look what I have. I have this drawing (show child the body diagram), S/he is like you in a lot of ways.”

“See s/he has a nose.”

“Point to the nose.” C I ______________________
“And s/he has a foot.”
   “Point to the foot.” C I ______________________
   “Point to the hand.” C I ______________________
   “And now, point to the shoulder.” C I ______________________

“So you see, the drawing is a lot like you”

“Now we are going to play a game using stickers”

“I am going to put a big sticker some place on you, and your job is to put the little sticker on the drawing in just the same place as the big sticker is on you.”

**Body Diagrams: Placement Task**

“The big sticker is right here on you (place sticker on child’s foot). Your job is to put the little sticker on the drawing in just the same place as the big sticker is on you right now.”

1) Foot C I ______________________

“The big sticker is right here on you (place sticker on child’s stomach). Your job is to put the little sticker on the drawing in just the same place as the big sticker is on you right now.”

2) Stomach C I ______________________

“The big sticker is right here on you (place sticker on child’s calf). Your job is to put the little sticker on the drawing in just the same place as the big sticker is on you right now.”

3) Calf C I ______________________

“The big sticker is right here on you (place sticker on child’s neck). Your job is to put the little sticker on the drawing in just the same place as the big sticker is on you right now.”

4) Neck C I ______________________
“Now I am going to put the drawing away and we are going to use this doll. S/he is like you in a lot of ways.”

Doll: Point Task

“See s/he has a nose.”
   “Point to the nose.” C I ______________________

“And s/he has a foot.”
   “Point to the foot.” C I ______________________

“Point to the hand.”
   C I ______________________

“And now, point to the shoulder.”
   C I ______________________

“So you see, the doll is a lot like you”

“I am going to put a big sticker some place on you, and your job is to put the little sticker on the doll in just the same place as the big sticker is on you.”

“The big sticker is right here on you (place sticker on child’s nose). Your job is to put the little sticker on the drawing in just the same place as the big sticker is on you right now.”

5) Nose C I ______________________

“The big sticker is right here on you (place sticker on child’s wrist). Your job is to put the little sticker on the drawing in just the same place as the big sticker is on you right now.”

6) Wrist C I ______________________

“The big sticker is right here on you (place sticker on child’s forehead). Your job is to put the little sticker on the drawing in just the same place as the big sticker is on you right now.”

7) Forehead C I ______________________
“The big sticker is right here on you (place sticker on child’s on leg, above knee). Your job is to put the little sticker on the drawing in just the same place as the big sticker is on you right now.”

8) On leg, above knee C I ________________
Appendix B

Mapping location referent & symbols.

Referent:

3-d Symbol
2-d Symbol
Appendix C

Mapping body touch referent & symbols

Example child referent

Example 3d symbols (i.e., dolls)
Example 2d symbols (i.e., body diagrams)