



## Using Puppets to Elicit Talk During Interviews on Engineering with Young Children

**Brianna L Dorie, Purdue University, West Lafayette**

Brianna Dorie is a doctoral candidate in Engineering Education at Purdue University. Her research focuses upon how young children engage in and learn about engineering in informal environments, especially through the use of media.

**Zdanna Tranby**

**Scott K Van Cleave, Science Museum of MN**

**Dr. Monica E Cardella, Purdue University, West Lafayette**

Dr. Monica Cardella is an assistant professor of Engineering Education at Purdue University. She is also the director of Informal Learning Environments Research for the Institute for P-12 Engineering Learning and Research (INSPIRE). She conducts research on undergraduate engineering students' design and mathematical thinking in formal and informal contexts in addition to research on how children develop engineering thinking in informal learning environments.

**Dr. Gina Navoa Svarovsky, Science Museum of Minnesota**

## Using Puppetry to Elicit Talk During Interviews on Engineering with Young Children

As research is progressing to show that very young children are capable of what was previously thought to be more complex “adult” thinking, more tools are needed to evaluate what they can and do know about concepts and ideas. Engineering education has started to evaluate young children’s knowledge about engineering. One of the most common assessments, Draw an Engineer Test (DAET), has been used effectively in elementary school classrooms<sup>19</sup>, but may not be accessible to very young children due to their limited dexterity and developmental level. This paper outlines background methodological information regarding the use of puppets to elicit talk from very young students (ages 3-6) during an open-ended interview about an engineering activity. It is hoped that this information will introduce this interview technique to the engineering education community.

Open-ended questions are tricky at best with most research subjects. However, with a younger audience there are some additional barriers that inhibit the interview process such as shyness, short attention span, lack of vocabulary, and level of parental guidance<sup>1</sup>. When in an interview, a child may try to ‘second guess’ what the researcher wants them to say, especially if they believe that the interviewer may already know the answer<sup>2</sup>. Additionally young children tend to give monosyllabic answers to open ended questions<sup>3</sup>, and might require more prompting than adults. One aide that has been recently investigated is the use of puppets to elicit children’s talk for qualitative research<sup>4</sup>.

Puppets have long been engagement tools within clinical contexts as a therapeutic tool and for play therapy<sup>4</sup>. Puppets provide a concrete focal point that enhances children’s comprehension, interest, and engagement during a discourse activity<sup>5,6</sup>. So instead of discussing their own insecurities, fears, or opinions, the puppet is used as a surrogate as children project their own persona onto the puppet. Puppets have also been used to encourage children in mathematical lessons<sup>7</sup>, promote engagement in science<sup>9</sup>, and teach phonics<sup>9</sup>. Puppets have been shown to:

- Decrease children’s fears of the interview process
- Lower anxiety levels
- Help assess children’s knowledge
- Help children to adjust to environment
- Provide effective communication and teaching tools

Most research focuses on puppets within clinical contexts, but recently the use has extended towards other applications such as qualitative interviews<sup>4</sup>. There are three common interview techniques in practice: the Alien Puppet Interview (API)<sup>10</sup>, the Puppet Interview (PI)<sup>11,12</sup>, and the Berkeley Puppet Interview (BPI)<sup>13,14</sup>. Each technique has a different strategy depending on how the child interacts with the puppet. In the Alien Puppet Interview (API), the child explains directly to the puppet (alien, animal etc.) since it is considered to have no prior knowledge of the subject of interest<sup>10</sup>. This assists in getting a child to talk about basic things that they normally would not mention in the

presence of a more experienced “other”. For example, Krott and Nicoladis (2005) used a puppet named Mork to get children to explain English words for a psycholinguistic study on how children understand language<sup>10</sup>. The Puppet Interview (PI) method the children are the puppet masters, expressing their own perception through the puppet, allowing the puppet to take on portions of their persona<sup>10,11</sup>. The Berkeley Puppet Interview (BPI) is the most commonly used technique and is defined as an interactive process that helps to elicit children’s self perceptions<sup>14</sup>. The BPI uses two identical puppets that make opposing statements about themselves before posing the same question to the child<sup>13</sup>. Recently, Mantzicopoulos et al. (2008) developed PISCES (Puppet Interview Scales of Competence in & Enjoyment of Science) to measure motivational beliefs about science in kindergarteners<sup>15</sup>. They used two puppets that stated dichotomous statements about science, such as “I like science,” to allow the interviewee to identify which statement they were in agreement with.

### **Methodological Considerations**

The GRADIANT project explores gender differences in the development of engineering interest and expertise by examining the number, richness, and range of engineering-focused behaviors observed during parent-child conversation within three informal engineering learning environments: a pre-school program where parents and children can play with engineering-focused toys, a family-oriented engineering event for elementary students and their parents, and an engineering exhibit within a science museum. The overarching goal of the GRADIANT study is to advance the understanding of how parent-child conversations and activity within informal engineering environments can contribute to the development of girls’ interest and understanding in engineering.

As part of this study, it was necessary to find a method that would able us to elicit responses from very young children (ages 4-6) in an unfamiliar environment and allow them to generate rapport with the interviewer. The API was most suited to our needs, as we wanted to get at explanations of the child’s actions during the activity. Over the course of refining our interview techniques, we learned many useful lessons.

#### *Choosing Puppets*

There are several considerations that are needed when choosing appropriate puppets in order to reduce bias and encourage discussion with the child. Bromfield (1995) suggests that puppets should be smaller than the child to limit intimidation and also to allow the child to handle easily<sup>18</sup>. Physically rigid puppets are also not advised, as the permanent expression can hamper emotional display (e.g. sneer or a smile), biasing the interaction of the interviewee. A flexible puppet is preferred in order to increase interaction through gestures and provide variation for development of the puppet’s personality<sup>4</sup>. Additionally soft puppets tend to be more pleasing to the eye, increasing the likelihood that a child would want to touch and play with them.

The puppet’s gender, race and physical appearance can influence the child’s conduct during the interview<sup>4</sup>. By choosing a gender neutral puppet, such as an alien or a monster,

allows a child to connect easier than a puppet of the opposite gender<sup>4</sup>. The color of the puppet is also an important decision, as colors such as pink and blue denote gender preference. In addition, sex-oriented exaggerated facial features such as long eyelashes, lush lips, boxy jaws or hairy eyebrows in conjunction with a non-hairy face promote gender stereotypes. Also during the interview personal pronouns such as she and he were avoided.

For this research project, an androgynous orange hairy monster nicknamed “Mookie” was chosen (see Figure 1). The arms and legs are positionable in order to point to objects during the interview. Three other puppets were screened with general audience before deciding on the final puppet.



Figure 1 . Mookie puppet and Mookie in action during an interview.

### *Preparation for Interviews*

In preparation for the interview the researchers were trained on proper puppet techniques with a theater department. Several techniques were learned such as maintaining the puppet’s spine when it moves to make it more realistic, and using the puppet consistently. It is also important to develop a character for the puppet, complete with a unique voice, age and background. In this case, Mookie was a curious four-year-old narcoleptic monster that lives at the museum.

One of the most important aspects of puppeteering is developing rapport with the audience, which is especially important for conducting this type of interview. To develop rapport, the researcher asked small questions that built on each other. For example the interviewer would say (as Mookie), “I’m 4, how about you?” and when the child answers a more open-ended question was posed to draw them out. An example would be “What type of things do you like to play with?” with a reply that Mookie loves the same thing. The focus of this interaction is to provide a point of connection.

### *Interview Staging*

While children tend to feel more comfortable in familiar places, and thus more likely to describe both positive and negative experiences in more detail, several techniques can be applied as to make the interview location more intimate. The first would be to pick a location that has minimum distractions to minimize stimuli to the child. Having both the researcher and child seated on the ground instead of at a table decreases power inequalities that already exist between adults and children – the interviewer becomes less intimidating on the floor<sup>4</sup>. It is also important that the parents are within the visual range of the child. While having parents nearby can influence the child's responses to reflect more positive expressions than negative<sup>4</sup>, the comfort of having a parent nearby is important for young children in unfamiliar situations and contexts. Also, it may not be appropriate practice to interview a young child without their parent present<sup>17</sup>.

### *Use of Puppets*

By using puppets in the interview, we are trying to counteract a young child's possible inclination to guess what an adult hopes they will say, and to overcome a young child's proclivity towards monosyllabic answers when questioned by unknown adults<sup>17</sup>. Having the interviewer use an "alien" puppet that doesn't know about the matter in question helps to facilitate talk. In this case the interview protocol was developed as to provide a sense of believability. By pretending that Mookie was asleep during the activity, it provides a less experienced "other" that the child can explain to, instead of to the adult who was present, since children are reluctant to tell you things they think you already know<sup>4</sup>. An example of the interview protocol goes as follows:

*[Interviewer To child] Let's be really gentle and wake up Mookie. Thanks! Hey Mookie, wake up. Mookie doesn't seem to be waking up. What's a kind way to help Mookie wake up? Let's try it.*

*[Interviewer To child, as Mookie] Oh, is it morning already? Did I miss anything? Oh? Oh no! I went to sleep and missed everything. And I wanted to find out all about that game that you played.*

During the interview, a second puppet was also on site for the child to use if needed, as some children become more talkative when they have their own puppet<sup>4</sup>. However, we found that the second puppet detracted from the interview process as it was often a distraction.

### **Discussion**

As part of a larger project, children ages 4-6 were interviewed about an engineering task that they had just completed with an adult during a museum program. The interviews allowed children to direct the methodology; through their actions such as attentiveness and eye contact, on whether they were interviewed with or without a puppet. The decisions were based on how the child responded to the puppet during the opening

moments of the interview. If the child became so energetic that it was difficult to get them to answer questions, or if the child was non-receptive, the interview progressed without the puppet aide, which happened in only one out of the twenty interviews. However, in almost half of the interviews, the puppet was set aside to allow the child to focus on answering.

Many times, the child reacted more warmly to the puppet than the interviewer, and this encouraged us to continue the interview with the puppet asking the questions. In these cases, the puppet was always naive to the engineering activity, like the “alien” puppet described in the API technique. Some children were asked if they would like to use a puppet and only a few accepted. In general, the younger children (4-5 years) were more receptive to the puppet, whereas 6-years old were a little more skeptical and would often only talk with the interviewer. This is in alignment with the study done by Epstein et al. (2008) who found that puppet methodology is more useful for very young children<sup>4</sup>.

All together we found that using a puppet was more important for gaining an initial rapport between the interviewer and the child. The puppets acted as an aide, that in young children allowed them to feel comfortable in a different environment than they were used to. This round of interviews was part of a baseline phase of GRADIENT and we will be using the same set of interview techniques for the second phase. Preliminary findings to date for GRADIENT are explored in another paper.<sup>20</sup>

### *Implications*

The puppet interview technique has the potential to become a useful tool for working with very young children, especially now that engineering education is advancing research with younger participants. The puppet methodology allows a child to feel comfortable in an interview, allowing for more detailed answers, with a bit of added effort. However, more empirical evidence is needed to ascertain the usefulness of this methodology.

### **Acknowledgement**

We would like to thank the Theater Department at the Science Museum of Minnesota for their help and guidance.

This material is based upon work supported by the National Science Foundation under Grant No. (HRD-1136253). Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

## References

1. Clark, C. 1999. The autodriven interview: A photographic viewfinder into children's experience. *Visual Sociology* 14:39-50.
2. Smith, A. B., Taylor, N. J., & Gollop, M. M., 2000. *Children's voices: Research, policy and practice*. Pearson Education, New Zealand.
3. Tizard, B & Hughes, M. 1984. *Young children learning, talking and thinking at home and at school*. Fontana Press, London.
4. Epstein, I., Stevens, B., McKeever, P., Baruchel, S., & H. Jones 2008. Using puppetry to elicit children's talk for research. *Nursing Inquiry* 15(1): 49-56.
5. Eder, R.A. 1990. Uncovering young children's psychological selves: Individual and developmental differences. *Child Development* 61:849-63.
6. Mize, J., & Ladd, G. W., 1988. Predicting preschoolers' peer behavior and status from their interpersonal strategies: A comparison of verbal and enactive responses to hypothetical social dilemmas. *Developmental Psychology*, 24(6): 782-88.
7. Cauley, K.M, 1988. Construction of logical knowledge: study of borrowing in subtraction. *Journal of Educational Psychology* 80(2): 202-05.
8. Naylor, S., Keogh, B., Downing, B., Maloney, J., & Simon, S. 2007. The PUPPETS Project: using puppets to promote engagement and talk in science. *Contributions from Science Education Research*, 289-296.
9. Johnston, R. S., & Watson, J. E., 2005. *A seven-year study of the effects of synthetic phonics teaching on reading and spelling attainment*. Scottish Executive Education Department, Information, Analysis and Communication Division.
10. Krott, A. & E. Nicoladis, 2005. Large constituent families help children parse compounds. *Journal of Child Language* 32:139-58.
11. Cassidy, J., 1988. Child-mother attachment and the self in six-years olds. *Child Development* 59:121-34.
12. Verschueren, K., Buyck, P., & A. Marcoen, 2001. Self-representations and socioemotional competence in young children: A 3-year longitudinal study. *Developmental Psychology* 37:126-34.
13. Measelle, J., Ablow, J., Cowan, P., & C. Cowan, 1998. Assessing young children's views of their academic, social, and emotional lives: An evaluation of the self-perception scales of the Berkeley puppet interview. *Child Development* 69:1556-76.
14. Ablow, J., Measell, J., Kraeemer, H., Harrington, R., Luby, J., Smider, N., Dierker, L., Clark, B., Dubicka, B., Heffelfinger, A., et al. 1999. The MacArthur three-city outcome study: Evaluating multi-informant measure of young children's symptomatology. *Journal of the American Academy of Child and Adolescent Psychiatry* 38: 1580-90.
15. Mantzicopoulos, P., Patrick, H., & Samarapungavan, A., 2008. Young children's motivational beliefs about learning science. *Early Childhood Research Quarterly*, 23(3): 378-394.
16. Birbeck, D. & M. Drummond, 2005. Interviewing and listening to the voices of very young children on body image and perceptions of self. *Early Child Development and Care* 176(6): 579-596.
17. Clark, A., 2005. Listening to and involving young children: a review of research and practice. *Early Child Development and Care* 175(6): 489-505.
18. Bromfield, R., 1995. The use of puppet in play therapy. *Child and Adolescent Social Work Journal* 12: 435-37.
19. Cunningham, C.M., Lachapelle, C., and A. Lindgren-Streicher (2005). Assessing Elementary School Students' Conceptions of Engineering and Technology. In Proceedings: *American Society of Engineering Education*. Portland, OR.
20. Cardella, M., Dorie, B., Tranby, Z., Van Cleave, S., and G. Svarovsky (2013). Gender Research on Adult-child Discussions within Informal Engineering Environments (GRADIENT): Early Findings. In Proceedings: *American Society of Engineering Education*. Atlanta, GA.