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By

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6:58 AM – Ding!

I looked down at my phone and saw, “Good morning, please don’t forget Littlefoot.”

It was a text from Piper, a friend and colleague from Blink. The day before, I told her to send me a text in the morning as a reminder to bring Littlefoot to the office. Since ordering a PleoRB I named Littlefoot in April, it has been hanging out and visiting the office for a few months. Piper’s 8.5-year-old son, Liam, had heard about Littlefoot and was dying to meet the mechanical dinosaur.

A reminder to bring Littlefoot to the office.

When I walked into the office, there was Liam sitting by my desk attentive and ready to meet Littlefoot.
“I heard that you really wanted to meet someone,” I said looking at Liam.
He enthusiastically nodded his head.
“He is a lot bigger than I thought he would be,” Liam said, staring at a powered down Littlefoot.

I used this initial meeting between Liam and Littlefoot as an opportunity to collect data and observe interactions. Liam already had some knowledge about Littlefoot from his mom. She had already set a premise of what Littlefoot was and what he could do. In the limited time that Liam spent with Littlefoot there were multiple, interesting interactions that occurred. One of the first

things Liam noticed about Littlefoot was his size. He expected the robot to be smaller like an action figure. Once he sat down with Littlefoot he noticed the sensors he had in the front of his face and the microphones on the side of the head. Interactions between Liam and Littlefoot become more interesting once the robot was powered on.
Based on Liam's interactions and comments I built a framework of how Littlefoot was perceived.

Figure 1: A model of how Liam perceived and understood Littlefoot based on interactions, comments, and observations.

From this short interaction between a young human boy and a robot the following findings emerged:

- The robot was immediately accepted as a fun, smart, playful being that had complex emotions similar to a living being. These projected emotions played a key role in how Liam interacted with and how he perceived the robot.
- Multifaceted interactions occurred with the robot that extended beyond petting and holding. Because Liam viewed Littlefoot as an intelligent being there were experiences being shared and skills being taught with the robot.
- Familial relationships were projected onto Littlefoot similar to that of a pet and/or living being.

Observed Interactions Between Liam and Littlefoot

Communication with Littlefoot

Liam treated Littlefoot like a human or pet by talking to him, showing him affection, projecting emotions onto Littlefoot, and sharing experiences. Liam spoke to the robot in a pet-like manner and as if it understood what he was saying. Not surprisingly, the conversations were one-sided. Topics included pointing out objects in the room, asking the robot questions, and narrating individual actions he and Littlefoot were performing. At one point Liam even told Littlefoot, "If you want me to do something let me know."

Nurturing Actions and Affection Towards Littlefoot

Liam was nurturing and affectionate towards the robot. If he felt Littlefoot was distressed or sad he would feed it dinosaur robot food. Littlefoot was fed so often that continuous burping and belching sounds were emitted throughout the day. To help Littlefoot and make a connection Liam carried him around and hugged him. He often petted the robot because he felt the robot liked it. In addition, I witnessed Liam tickling Littlefoot's leg and foot. He reasoned that Littlefoot might be ticklish because he liked and responded to petting.

Liam, age 8, holds Littlefoot, the robotic dinosaur.

Liam carefully holding and carrying Littlefoot around the office.

Projected Emotional and Familial Relationships

While playing with Littlefoot, I noticed that Liam projected relationships and emotions onto Littlefoot. He referred to me as Littlefoot's mama. One instance while at my desk, Liam was holding Littlefoot pointing him in my direction saying, "Look! There is your mama!" This intrigued me so when I asked Liam why called me the robot's mom he said it was because I was his owner. Liam also believed that Littlefoot had preferences for things and actions by liking certain things. For instance, Liam stated that Littlefoot enjoyed pettings and feedings since the robot would react with delight. As a result, this encouraged Liam to continue to pet and feed Littlefoot.

Sharing Experiences With Littlefoot

The most fascinating interactions between Liam and Littlefoot are what I call shared experiences. Shared experiences are actions that are intended to have a mutual interaction and exchange between two bodies (in this case Liam and Littlefoot). I noticed that the more time that was spent with the robot, Liam's interactions, the complexity of the interactions, and shared experiences increased. The first shared experience was with a prop provided by the manufacturer – a robot rope for tug of war. With some instruction, Liam played tug of war and let Littlefoot win to make the dinosaur "happy."

As time passed Liam noticeably increased his interactions by continuously talking, petting, and having more complex shared experiences with Littlefoot. Liam showed the robot the drawings he made on the office's Etch-a-Sketch. He drew a couple of pictures and would set the Etch-a-Sketch in front of Littlefoot to show and share his drawings. He even went as far as to show Littlefoot how to use the Etch-a-Sketch by first narrating his actions then by physically picking up the robot's feet to turn the knobs.

Liam, age 8, plays with Littlefoot the Dinosaur and an Etch-A-Sketch

Liam showing Littlefoot his Etch-a-Sketch drawings.

Liam's Perceptions About Littlefoot

After playing with Littlefoot I was curious to know how Liam perceived Littlefoot. When asked, Liam thought Littlefoot was smart, cute, funny, and could feel things both physically and emotionally. He gave the following reasons:

- Littlefoot was smart because it signaled when it was hungry and responded to being petted and touched.
- Littlefoot was cute because of the reactions, movements, and sounds it made.
- Littlefoot was funny because of the sounds it made and wagging its tail like a dog.

These responses were driving Liam to connect and interact with Littlefoot. Littlefoot's sensors, artificial intelligence, and programmed movements created compelling and responsive reactions that encouraged interactions and a relationship. Happy sounds were elicited from Littlefoot when he was being petted and given a lot of attention. And as a result of being overfed by Liam, Littlefoot continuously burped throughout his interactions, causing giggles in the office. In addition, Littlefoot sang and danced twice while in the company of Liam. This was interpreted as the robot being content and happy with all the attention and interaction that was being received.

All these findings and observations provide evidence that Liam viewed Littlefoot, a robot, as a living, sentient being that is autonomous and that has feelings, intelligent responses, and creates relationships with humans. It was fascinating observing Liam interact with Littlefoot. I

plan to do more sessions in the future to further uncover and understand human behaviors and interactions toward Littlefoot.

Stay tuned for more posts about Littlefoot!

> *Darshana Tuladhar, when not observing and analyzing human behavior and interactions, enjoys birds, playing the violin, drinking root beer, and salsa dancing, preferably simultaneously.*