Commercial Case Studies

WEEK 10 OF 16-867 HUMAN-ROBOT INTERACTION

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Project Status Presentation

Will be emailing grades back this week (out of 10)
Will also be emailing class feedback
AIBO
Friendlier to a U.S. Market

Less of a need for a robot pet in the U.S., so instead:

- Less toy-like (more tool-like)
  - Practical abilities like calendar reminders, guarding, or cleaning
  - More high-tech appearance (human like, or “fancy”)

- More toy-like
  - More entertaining behaviors
  - Reduction in price
Complex == Lifelike?

Yes

- More complex motions led to better relationship
- If the behavior is predictable, it will be boring

No

- Many “simple” examples that are lifelike: fish
- AIBO has too obvious and predictable internal models, real pets have more randomness and obscurity
PLEO
Design Choices

Form
- Shape
- Scale
- Skin
How do you Play with a Robotic Toy Animal?  
A long-term study of Pleo

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ABSTRACT

Pleo is one of the more advanced interactive toys currently available for the home market, taking the form of a robotic dinosaur. We present an exploratory study of how it was interacted with and reflected upon in the homes of six families during 2 to 10 months. Our analysis emphasizes a discrepancy between the participants’ initial desires to borrow a Pleo and what they reported later on about their actual experiences. Further, the data suggests an apparent tension between participants expecting the robot to work as a ‘toy’ while making consistent comparisons with real pet animals. We end by discussing a series of implications for design of this category of toys, in order to better maintain interest and engagement over time.

Categories and Subject Descriptors
I.2.9 Robotics (Commercial robots and applications)
K.4.2 Social Issues

General Terms
Design, Human Factors

Keywords
Pleo, robotic toys, robot, home, children, long-term

around it. While robots have been used in industry for decades, and in the home for purposes such as vacuuming [e.g. 7], it is only recently that robots have become available for personal use among children.

One example of a commercial robotic toy that has recently gained interest among researchers [10, 21] is Pleo (by Ugobe), which takes the physical form of a baby dinosaur (see Figure 1). Pleo is interesting as a robot because like many toys, it does not prescribe a set of specific activities or games for the user, but instead encourages open-ended exploration and play. It is also different from most other toys as it is a fairly sophisticated device with a large range of sensors, motors, and advanced software components. This category of toys potentially pose new challenges for designers, partly as they are built for very open-ended interaction and also as their relatively high production costs advocate for a lasting long-term mode of interaction.

In this paper, we present the results from a long-term exploratory study of Pleo, where it was placed in the homes of six families for a period of 2 to 10 months. One of the goals of the study was to obtain a better understanding of the design challenges involved in developing advanced interactive toys for everyday settings.

BACKGROUND

..
How do you Play with a Robotic

- Participants did in several ways treat Pleo as if it were a real animal – petting, naming, displaying emotions towards it.
- But still do not keep up long-term interest.
Technical Challenges

- 4 hours charge time per 1 hour of run time
- Cannot play with Pleo without battery
- Struggled to walk
- Limited “learning”
- Required software updates via website for new behaviors and sounds
Toy vs. Animal

“With a toy, simply pretending can usually be enough to be considered playing. With a real animal, playing seems to mean a more concrete form of interaction, where actions and instant feedback is expected from the pet.”
Promoting Long-Term Interaction

- What design changes would you make to the Pleo to encourage long-term interactions?
- Think about some of the successful features of the Roomba and AIBO
- Remain within the realm of what is feasible with current technology
AIBO and Pleo: Expectations


Judging a Bot By Its Cover:
An Experiment on Expectation Setting for Personal Robots

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Abstract—Managing user expectations of personal robots becomes particularly challenging when the end-user just wants to know what the robot can do, and neither understands nor cares about its technical specifications. In describing what a robot can do to such an end-user, we explored the questions of (a) whether or not such users would respond to expectation setting about personal robots and, if so, (b) how such expectation setting would influence human-robot interactions and people’s perceptions of the robots. Using a 2 (expectation setting: high vs. low) x 2 (robot type: Pleo vs. AIBO) between-participants experiment (N=24), we examined these questions. We found that people’s initial beliefs about the robot’s capabilities were significantly influenced by 16 actuators throughout its body to control its movements, and 19 lights on its head, tail, and elsewhere to express emotions like happiness or anger and reactions to its environment” [3]. While listing technical specifications and the number of actuators is informative to robotics hobbyists, it is less informative to end-users, who just want to know what the robot is for and what it can do.

How is this best accomplished? If a robot is introduced as less capable than it in fact is, users may be pleasantly surprised when it exceeds their expectations. This would be consistent with previous studies suggesting that users’ expectations are not always based on the technical specifications of the product.
Potential Advantages to Expectation Manipulation

OVER-PROMISE,
UNDER-DELIVER

- Confirmation Bias
- Underselling the robot can lead to never discovering true abilities
- Good advertising to sell the product

UNDER-PROMISE,
OVER-DELIVER

- May be pleasantly surprised
- Won’t be disappointed
- Evidence from the business world it increases customer satisfaction and repeat customers
### TABLE I.

**USER EXPECTATIONS OF ROBOTS EXPERIMENT DESIGN**

<table>
<thead>
<tr>
<th>Robot Type</th>
<th>Expectation Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AIBO</strong></td>
<td>High: 3 women and 3 men</td>
</tr>
<tr>
<td><strong>Pleo</strong></td>
<td>High: 3 women and 3 men</td>
</tr>
</tbody>
</table>
Conclusions

- Setting expectations does impact people’s beliefs about the robot
- Setting expectations low produced more positive perceptions of the robot than when they were set high
- No impact on the interaction length
Amazon “Alexa”
Interface Choice

- Voice, and (almost) only voice control
- Customizable trigger word (Alexa, Amazon, or Echo)
- Speaker with convincing voice response
- LED band to indicate volume and status
“Skills” and “Ecosystem” Model

- After overwhelming success of smartphone crowd-sourced programming model
- Limits based on:
  - Privacy -> limits recording to 7 seconds
  - Limiting disruption to users -> No push notifications
- Open API to allow connectivity to other IoT devices and services
Unforeseen Concerns
Unforeseen Concerns
Unforeseen Concerns
Response

- 4 digit security code for ordering
- Child-friendly responses to questions like “Who is Santa Claus?”
- Suggested: “family mode” where politeness is required to receive requested action
Success?

- 8.5 million Amazon Echo customers [Jan ’17, CIRP]
- 7,000+ skills

Amazon Customer Awareness of Amazon Echo
Why so successful?

- Very little latency
- Good quality speech recognition and generation
- Simplicity and reliability