

# Evolution of the Talking Dinosaur: The (Not So) Natural History of a New Interface for Children

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## ABSTRACT

The purpose of this presentation is to demonstrate key features of the interface and content design of ActiMates Barney. ActiMates Barney operates in three different usage contexts: As a freestanding toy and, by means of a wireless radio link, with PC-based software and linear videotapes. The interface features of each mode (freestanding, with the computer, and with the television) are described, as well as how the interplay between design goals and usability research results shaped the product's final form.

## Keywords

Children, usability testing, interaction design, learning

## INTRODUCTION

ActiMates Barney (hereafter Barney) is a 13" animated plush doll containing motors that provide simple arm and head movement, and a small loudspeaker for audible speech. Children interact with Barney via touch sensors in his hands and feet, and a light sensor located in his left eye. Barney functions as a play partner to the child and 'behaves' as a play partner would in a variety of situations. Alone, in freestanding toy mode, he engages the child in one-on-one games and songs. When using his wireless link to the PC, Barney 'plays along' as the child's coach and teammate. He responds to the child's performance at the PC with praise and encouragement, gives hints, and even models appropriate performance by taking a turn. When using his wireless link to the VCR, Barney 'watches along' with the child, asking questions, directing attention, and encouraging participation.

## Pretend Play as an Interface Strategy

Barney represents a unique interface that uses the social dynamics of pretend play to integrate technology and learning. As an animated plush doll and a familiar media character, Barney taps into powerful pretend play and toy experiences common to early childhood. Children animate dolls and other objects on their own, treating them as if they are alive and responding to them in ways that mimic familiar social interactions [1]. Using speech and movement, Barney invokes similar pretend responses as an interface strategy. What distinguishes this product from other physical multimedia environments that have been developed for children is its heavy reliance on social expectations and the psychology of pretend play [2].

## Barney as a Freestanding Toy

Barney's interface was created as a model of simplicity: His functions are divided by sensor, and sensor input launches the one and only function associated with that sensor (i.e., feet are for songs, hands are for games, and eyes are for Peek-a-boo). Squeezing the touch sensors in either of Barney's feet causes him to sing one of sixteen familiar preschool songs. Squeezing the touch sensors in either of Barney's hands causes him to randomly play one of twelve games (e.g., reciting nursery rhymes, or playing an imitation game using animals sounds). Barney's eyes are dedicated to the game of Peek-a-boo. When Barney's light sensor detects a loss of light, he responds with an "It's dark" comment, and when it detects an increase in light, he responds with an "It's light" comment: "Peek-a-boo, I see you!" or "Oh, there you are!"

All of Barney's games, songs, and activities can be interrupted at any time. This means that: (1) any action on any sensor causes Barney to change what he is doing and start the function associated with the triggered sensor; and (2) repeated inputs on a single sensor will cycle the content of that sensor's menu. For example, repeatedly squeezing the foot allows the child to cycle through the songs that are available in the foot menu. In the original design, interruptive functions had not been included because it had

been assumed children would play along with Barney. Instead, research indicated that children expected the opposite: Barney was supposed to play along with them.

Barney's interface instructions (e.g., "Squeeze my hand to play a game!") are intermingled with friendship phrases - a set of compliments and positive other-directed statements such as "This is fun!" "I like playing with you!" and so on. These phrases were included because research revealed that over time the directive nature of the instructions had the effect of making Barney seem robotic rather than sociable, which diminished children's interest in him. Adding friendship phrases to the interface made Barney seem more like a friend, and much less task-oriented. As forms of unconditional praise, they also enhanced the child's pleasure during interactions as well.

### Barney with the Computer

In the PC mode, Barney maintains his freestanding toy functions, but now the onscreen characters participate by playing Peek-a-boo, singing songs, and playing games with Barney and the child. Everything related to computer control is done only with the mouse. A concrete division of functional roles between the onscreen character and Barney was established to avoid interface confusion, as well. The onscreen character relays all relevant computer control interface information to the child: where to click, the goal of the task, and so on. Barney's role is that of 'cognitive coach,' his reactions and comments are all about the child's performance: giving hints, praising the child's actions, articulating patterns, and modeling performance.

### Barney with the Television

Research on learning from television has established that young children understand more program content when the comments and questions of older peers or adults supplement their viewing [3,4]. This form of interaction, referred to as 'co-viewing,' is almost completely verbal. In TV mode Barney performs this function through the use of specially encoded videotapes and a transmitter attached to a VCR. Barney promotes children's comprehension of video content in a variety of ways. He models participation in the show by singing along with songs, counting along with onscreen characters, and reciting the alphabet with them. He queries the child about events onscreen to promote thought in the child (e.g., "What's that?"). He also teaches vocabulary by labeling objects onscreen such as letters and numbers, and identifies the colors or names of specific objects, as appropriate.

TV mode raised a tricky design issue for Barney: What was the appropriate role for his freestanding functions such as songs? A song on demand during TV viewing would not

be integrated into what was on the screen; it would be a distraction, creating exactly the opposite of what was intended in the co-viewing educational model. Deactivating his sensors during TV mode was quickly ruled out as a solution based on research results indicating that Barney's lack of responsiveness actually became a distraction in itself. Subsequent testing revealed that children would be satisfied with a friendly comment from Barney if a hand or foot sensor was triggered ("I like watching TV with you!"). However, testing also revealed that children still expected that Barney would respond to having his eyes covered - especially during an activity that depended on being able to see. To accommodate this specific interaction, Peek-a-boo remained fully functional in TV mode, and TV-specific comments such as "I can't see the TV!" were added to his Peek-a-boo repertoire in this mode.

### CONCLUSIONS

The pretend playmate interface evolved into its final form through a constant interplay between design goals and research evaluation to be developed. The social and pretend basis of the interface design required context-specific changes in the interface, changes that had to be based on both empirical assessments of actual user behavior and expectations as well as the principles of the design model itself. The final product reflects the effectiveness of this integration of research and principle, and demonstrates the benefits of a close relationship between design and evaluation for new product development.

### REFERENCES

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