

NOOBIE: THE ANIMAL DESIGN PLAYSTATION

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Noobie

Abstract

For a year and a half, I lead a group of researchers in building an alternative to the

traditional computer terminal. Instead of building a design workstation complete with keyboard and mouse, we built an animal design playstation complete with fur, feathers, and an iridescent fish tail. We used the tools of puppetry, animation, and computer electronics, to build what is now called *Noobie* (short for "New Beast"). By sitting or standing in the lap of this computer creature, a child can build fantasy or real animals. When one squeezes a part on Noobie, the selected animal part can be seen on the screen in Noobie's stomach, and a sound can be heard.

This paper documents the ideas behind the conception and creation of Noobie, along with how it fits into the short history of the Vivarium research group. This group is a collection of people, ideas, and projects that focus on creating a multi-media environment for children to learn about animal behavior.

Keywords

Vivarium, Noobie, user interface, animal behavior, furry computer, playstation, squeezing.

Vivarium History

The Vivarium took shape at MIT in the Fall of 1985, when a seminar was given at the Media Lab by Alan Kay, Senior Apple Fellow at Apple Computer. From this seminar, students with project ideas came forth. The work fell within the following categories: curriculum design, user interface development, graphics and animation research, and moist models (computational learning models). Alan Kay felt that it was in the combination of these four areas of research that the Vivarium could emerge.

For the past two years, our work has lead us to question what the next generation of computer tools will be. In doing so, we have begun to develop a multi-media environment for children to learn about animal behavior. What this environment will include, how it will be used in the future by students and teachers, and what effect it will have on education in general, remains to be seen.

What we in the Vivarium can agree upon, at this point, is that the computer tools we invent should not take the place of film, television, books, live animals, or people. Children should be exposed to many different ways of presenting ideas. One of the most consistent findings in literature on media in education is the superiority of multi-media over

single-medium presentation. It's been found that each medium, because of its unique representational system and technical capabilities, emphasizes different kinds of information, and therefore offers the child different representations to process. ¹

With this in mind, we have continued to experiment, research, and develop new tools for a new type of educational environment.

Noobie's History

It was during the fall of 1985, that I initially proposed the idea of the "furry computer"; an alternative to the traditional computer terminal. I wanted to build a place where you could hug your tools and build your fantasies. I wanted to squeeze my stuffed animals, and have them appear on my computer screen. I wanted to learn about animals, by playing with them.

How did my fantasies became a "furry computer" named Noobie? At times I believe it came from a childhood filled with Muppets, Disney magic, and video-game-mania. At other times I believe it was founded in the words of Alan Kay, back in 1985. At still other times, I believe it grew out of my art school sketchbook of creatures.

Whatever the origins, I began my search for what my part in the Vivarium would be by making a list. This I called my "Vivarium Should Be List". It consisted of all the things I believed the Vivarium should become.

THE VIVARIUM SHOULD BE...

1) ...the crayons, the clay, and the building blocks of another world.

- 2) *...a treehouse to build sandcastles in.*
- 3) *...an environment that can direct exploration, or allow exploration to be directed.*
- 4) *...a place to share, or individually explore.*
- 5) *...a Disneyland in which to learn.*

I suppose in between those words, I found my goal: to build an animal design playstation; an environment where computer animals can be played with and explored much in the same way real animals are; by touching. In doing so, I have created a new place where people and computers meet; a place that is not confined to a hard plastic box, keyboard, or mouse.

Animal Agents for Children

Many people have asked us in the Vivarium, "Why use animals?". "Why not study human behavior?" "Why not use robots?" Those are hard questions to answer. For as many times as they are asked, there seem to be as many different answers to be heard. This may be because the Vivarium research group is a collection of people, with varying ideas, working on projects in many different areas.

Alan Kay sees our use of animals as, "...a nice control on the child's sense of quality.

Whereas doing robots, you could get away with almost anything and say that's what a robot does. The representation has to be finely textured, and move and act believably. We have to generate complex behavior from simple modules." ²

For Alan Kay, it seems, the use of animal agents is a wonderful way of stretching what

we already know about representing animal behaviors, as well as what we know about rendering and animating figures. Therefore, if we are able to give children the tools to explore animal behavior, then we as tool-makers may learn just as much about our tools as about animal behavior.

For me though, the use of animal agents was an obvious choice when you want to combine childhood learning with fun. Animals fill our storybooks, our TV, our films, our amusement parks, and of course our zoos. Many of the special things I remember from my childhood were connected with animals in some way. In books, Winnie-the-Pooh and the Cat-in-the-hat were drawn with words and pictures; on TV Big Bird, Kermit, and Miss Piggy took the furry form of muppets; in film Bambi and Braer Rabbit were animated colorful creatures; in amusement parks Mickey Mouse, Donald Duck and Goofy were large costumed characters; and in zoos the ponies, monkeys, and turtles were real.

These animal-filled activities sustained my attention, filled my imagination, and peaked my curiosity. If the Vivarium could build on this childhood fun, I believe we could create no more powerful a learning environment. As Marvin Minsky once wrote, "Enjoyment, which has been banished to the realm of entertainment sciences, may be the most powerful influence of all on how each person learns." ³

The User Interface

Few hardware interfaces have taken

keyboards and mice away from computer monitors encased in hard plastic boxes. According to Nicholas Negroponte, director of the the MIT Media Lab, "The human interface with computers is the physical, sensory, and intellectual space that lies between computers and ourselves. Like any place, this space can be unfamiliar, cold, and unwelcoming. But it can also be like some other places, those we know and love, those that are familiar, comfortable, warm, and most importantly personal." 4

Even with words like these and labs like the Media Lab, hard plastic computer boxes still prevail. Let me join in asking with Alan Kay, "What kind of emotional contact can one make with this new stuff, if the physical access seems so remote?" 5 The only answer seems to be in changing the "user interface", "the place where people and computers meet". 6 But people so often forget that people meet computers from the moment they see and touch them; not just from the moment they actually interact with the software. The user interface "...is recognized as being primary because, to novices and professionals alike, what is presented to one's senses *is* one's computer." 7

Therefore the question remains, how can we build computer environments that do not deprive our senses? I believe this is, and will continue to be, a crucial matter in the development of the Vivarium; for how can we create an environment for children that emphasizes animals that does not consider the way children most often explore animals?

They use their fingers. Children like to touch animals. "Studies have been done in settings in which there are both things to observe and things to interact with, such as science museums, field trips, zoos, and aquariums. These studies show a predictable pattern: children are attracted to activities that let them become physically involved. In the zoo, for example, they prefer pigeons and squirrels, with whom they can interact, to the more exotic animals isolated behind bars." 8

Then how do we keep our computers from merely being animals isolated behind bars? I believe the answer lies with touchable computers; computers that just ask to be felt. This is not to say that visuals and audio are not important to an inviting environment, but children have already encountered video game graphics, flying logos, and *Star Wars* special effects. The Vivarium should include something more.

Noobie: The User Scenario

By bringing animal agents to a place where computers and people meet, it was my hope to create an animal design playstation. To move my ideas from paper, to foam, to a computer for children was no small task. It took seven people* with specialities ranging from software design, softsculpture creation, electrical

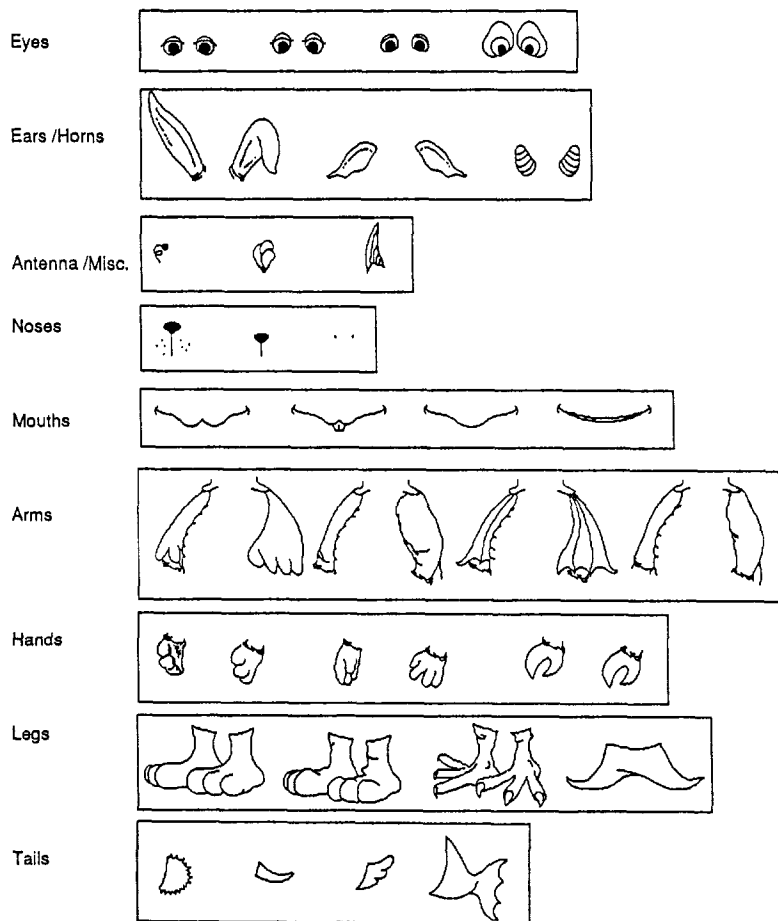
*Those seven people who became the Noobie Design Team were Gwen Gordon, Larry Singer, Hans Peter Brondmo, Tom Trobough, Doug Milliken, Margaret Minsky, and Idit Harel.

engineering, and child psychology a year and a half to build.

What we created is described in the user scenario that follows:

Two children crawl into the lap of Noobie. They sit facing the screen, contained in Noobie's stomach. An adult switches on the Macintosh Plus and hard disk, by reaching behind and inside Noobie's torso. The startup movie begins. With music and animation, it shows the children what kinds of animals they can make with the different animal parts in the database.

After the startup movie is finished, an animal (Noobie Jr.) is left on the screen. Its parts can be changed by pressing a microswitch in the same animal part on Noobie. (Those parts that can change include: eyes, ears, nose, antenna, horns, mouth, arms, hands, legs, feet, and tail) Each time a child squeezes a part, a particular sound is heard, and a new animal part appears on Noobie Jr. There are up to four choices that can be cycled through for each animal part. The children can make animals which include parts from either the same animal database (i.e.; all parts belonging to a dog), or from different ones (i.e.; a rabbit



Noobie Animal Parts

mouth, fish eyes, dog nose, bird feet, fish tail, etc.). As of now, the selection of animal parts is only a small fraction of what could eventually be created.

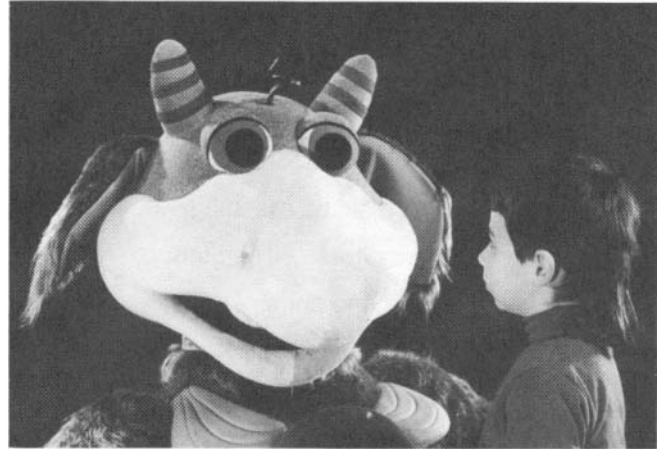
If one child is to use Noobie, it may be difficult for him or her to see the screen while pressing the parts. Therefore, the movable arm will be useful. By positioning the cursor on the screen over an animal part, that part will change when the thumb button is pressed. In this way, a tail or leg, for example, can be changed without having to leave the view of the screen. Another option is to see the startup movie again. If a child wants to review the animal combinations available, he or she can do so by pressing the bellybutton, located in Noobie's stomach pocket.

Noobie: The Construction

To write the software application that creates this scenario, we used the VideoWorks animation driver, given to us with special permission from MacroMind Inc. Our C application runs on an Apple Macintosh Plus, with a hard disk, wired to a Yamaha synthesizer and amplifier. All of this hardware is located in Noobie's softsculpture belly. The keyboard keys were replaced with microswitches that are embedded in each of Noobie's parts, and the circuitry for a joystick/mouse is housed in the movable arm.

The softsculpture that makes foam, fur, and feathers into Noobie was made possible with the expertise of Gwen Gordon, a former Muppet builder for Sesame Street. In four months, Gwen adapted the Muppet

techniques established at Henson Associates, to build a lightweight, flexible, yet sturdy exterior.



Noobie with Child

Explorations with Noobie

In February of 1987, we began a formative study with Noobie and children from the Fitzgerald After School Program through the Department of Human Services in Cambridge. There were 15 children ranging in ages from 5-8, ranging in grades from kindergarten through 4th grade. The children were broken into groups that contained 2, 3, or 4, children. Each group was given no more than 15 minutes to interact with Noobie.

We used these sessions with the children to focus on five main areas that we thought would later help us to evaluate the user interface of Noobie. These five areas included:

- (1) *Comprehension*: How much time did it take to figure out what to do with Noobie?
- (2) *Ease of Use*: How easy was it to use Noobie for this short period of time?

(3) *Interaction Styles*: How did the kids interact with Noobie and with each other?

(4) *Attention Span*: How much time did it take before they lost interest?

(5) *Expectations*: What did the kids want or expect to do with Noobie?

The answers to our questions were found through observing and interviewing the children while they were with, and were away from Noobie. What follows is a summary of our results:

Comprehension

Regardless of the children's previous knowledge of computers, television, or animation, it took no more than 1-2 minutes for them to understand how they could use Noobie. After seeing the startup movie, generally they all expected to make animals with Noobie, but they were unsure of how to do this. One out of three groups needed an example squeeze before they could figure out what to do. Then all the groups were off and squeezing.

Ease of Use

What every child liked the best about Noobie was how they used it. They visibly enjoyed being able to climb on Noobie, to touch and squeeze the different parts. At times, however, the sensors seemed out of reach and/or hard for them to find because they did not visually stand out. The sounds, on the other hand, were very helpful in letting the children know if they had pressed a sensor. The sounds were also useful in reminding the children what animal part they were changing.

Interaction Styles (children with each other)

Interestingly enough, what we had thought to be drawbacks in Noobie's design were actually instrumental in supporting cooperative behavior among the children. One instance of this was in the location of the screen. Many times when pressing certain sensors, the children were out of view of the screen. Therefore, one child would almost always watch the screen for the animal parts they wanted, while the others would squeeze the different parts.

Another aspect that forced cooperation was the restriction of serial input to Noobie. If the children tried to squeeze different parts at the same time, the computer would simply stack the commands. The children soon realized they had to take turns, or they would lose track of what they had squeezed. In groups of 3 or more, it was quickly obvious that unless one child took a leadership role, the group's interaction was purely chaotic.

Interaction Styles (children with Noobie)

One of the first things we noticed when the children encountered Noobie was that they did not wonder where the keyboard or mouse was. Only one child even looked for the computer hardware. To the rest of them, Noobie was a new kind of creature. This observation was supported by the fact that all of the children, except 3, talked to Noobie. They said "hello" to Noobie, "good-bye", and one group even kissed Noobie. On the other hand, 7 children believed that Noobie was talking to them when sounds were coming out of the synthesizer in the softsculpture belly.

In terms of the children's interaction with the software application, NoobieSoft, they noticeably enjoyed changing the animal parts on the screen. Near the beginning of the sessions, they were asked to let us know when they were finished making their animals. In all cases, there was not one group that let us know they were done. Most likely, this was due in part to how easy it was to continue squeezing parts and changing them. No group became attached to any of the animals they had made on the screen.

Attention Span

We never did find out how long it took before boredom became apparent. In each case, after the 15 minutes were up, all the children wanted to continue to use Noobie. On a later occasion, we were able to work with a few children for 45 minute sessions. Each time they did not want to leave. A more accurate examination of attention spans should be done in the future, perhaps by leaving Noobie in one particular place (e.g., in a classroom, hospital, or museum) for an extended period of time.

Expectations

After seeing the startup movie, all of the groups expected to make animals with Noobie. It was interesting to note that the one group who did not see the startup movie had no idea what Noobie could do. In terms of the software, all the groups agreed that it would be "...great...fun...the best", if their animals on the screen could be animated. Even 8 out of the 15 expected the softsculpture exterior to move as well. Overall, the children did not

expect to do anything more than we ourselves had envisioned for future research.

The Future

Marvin Minsky wrote, "...we ought to recognize that we're still in an early era of machines with virtually no idea of what they may become. What if some visitor from Mars had come a billion years ago to judge the fate of early life from watching clumps of cells that haven't even learned to crawl? In the same way, we cannot grasp the range of what machines may do in the future, from seeing what is on view right now." ⁹

I believe Noobie is most definitely at the clumps-of-cells stage. We need more time, more children, and more research, before we can truly realize what we have built, and what we can build in the future. There are so many areas we need to further explore: color, animation, sound, visual content, new interfaces...

When I think about the future of Noobies to come, I see a lot of blue sky. But with clear weather and some good navigation, we may find ourselves heading in the right direction.

Acknowledgements

This research took place at the MIT Media Lab, supported by a grant from Apple Computer. To those people from MIT and Apple that understood when I needed to build a furry computer, I can only say thank you.



The design team that created Noobie: (from back left to front) Doug Milliken- structural hardware design, Margaret Minsky- hardware consultant, Tom Trobough- music synthesis, Allison Druin- principal designer/ Noobie creator, Larry Singer- electrical hardware design, Gwen Gordon- soft sculpture design, Hans Peter Brondmo- software design.

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