

INTERACTIVE EXPERIENCES

Corrie Bergeron

NAB Multimedia World 1999

“Interactive” is a great buzzword, but what does it really mean? Academic researchers have come up with a dozen different ways to slice and dice it. Their analyses are highly detailed and of

interest mostly to developers of educational material. The model presented here is much simpler, in an attempt to provide a basic framework for a discussion of interactivity.

WHAT IS INTERACTION? – A BROAD DEFINITION

If you look at the products that are called “interactive,” there seem to be many ways to define *interaction*. Some sites call it interactive when the user can choose between going to this page or that page.

According to Wordnet, an online dictionary¹, interaction is “a mutual or reciprocal action.” This is a critical point, as it points out that interaction is not a solo activity. It is communication. We’ll come back to that idea shortly.

Going a bit deeper, we see that the word has two parts: *Inter-* and *action*. *Inter* means “between” or “among.” *Action* can be defined as “an event that causes change.” So for our purposes, an interaction is a **shared event that causes change to the entities involved**.

By that definition, cheering a football game when you’re watching on TV is not interactive because you can’t influence the action. Cheering at a live game, however, is interactive. So is watching a game on TV with friends, because you influence each other.

There are many ways to categorize interactions. In “Interactive Multimedia

Instruction”² Schwier & Misanchuk outline a three-dimensional model:

- Levels (reactive, proactive, mutual)
- Functions (confirmation, pacing, navigation, inquiry, elaboration)
- Transactions (keyboard, touch screen, mouse, voice)

In “Interactivity: A Forgotten Art?”³ Rod Sims expands on that, outlining ten types of interactivity:

- Object
- Linear
- Support
- Update
- Construct
- Reflective
- Simulation
- Hyperlinked
- Non-Immersive Contextual
- Immersive Virtual

Sims then goes on to describe a two-dimensional model of interaction, with the axes being Engagement and Control.

We will return to the concept of Control shortly. First, however, let’s take a deep breath, take step back, and simplify.

TYPES OF INTERACTIONS

Basic communication theory outlines a sender, a receiver, a message, and a channel. The number of communication paths between sender and receiver and the number of senders and receivers has a large effect on the complexity of the interaction. This analysis could be quite complex, but for our purposes we can simplify it down to four basic types of interactions: One-to-one, one-to-many, many-to-one, and many-to-many. Each is described below.

One-to-one (conversation)

A one-to-one interaction is like a telephone conversation. There are only two parties involved, each taking turns sending and receiving. Note that a computer can be a tool used by two people, or it can itself be one of the parties in the conversation.

Examples of conversation interaction include video games, email, and most computer-based training products.

One-to-many (broadcast)

A one-to-many interaction is like a broadcast. There is one sender and many receivers. Strictly speaking, a one-to-many communication is not interactive unless there is feedback from the many back to the one – an interaction described below.

Examples of broadcast communication include broadcast and cable TV, movies, speeches, and lectures.

Many-to-one (voting)

When the audience of a broadcast sends a return message, they engage in voting.

Examples include Nielsen or Arbitron ratings, sales figures, constituent mail to a government figure, or even “flame mail” to a person who airs an unpopular opinion.

Many-to-many (party)

In a many-to-many interaction, the members of a group communicate among themselves, as at a party. There may be a number of one-to-one, one-to-many, or many-to-one interactions occurring simultaneously; what distinguishes a many-to-many interaction is that all of the interactions are available to all of the parties. Anyone can leave or join at any time.

Examples include parties, of course, as well as online chat sessions and discussion groups.

Note that synchronicity (synchronous = in real time, e.g. telephone conversation, asynchronous = not in real time, e.g. a bulletin board or newsgroup) does not factor into the discussion. The time between message and response makes a difference in some interactions, (buttons should give an immediate indication that they’ve been clicked) but in general, most interactions can be just as effective asynchronously as synchronously.

CONTROL, ACCESS, AND LEVELS OF INTERACTION

To interactive-multimedia developers *control* means, “who’s in charge of the results of the interaction – the system or the user?” It’s almost universally

assumed that learner control is good, system control is bad. That assumption must be challenged. Especially in instruction, there is content that the

designer needs to conceal from the viewer until some other content has been seen. The same is true in narrative – you don't want the reader skipping ahead to the end of the book to find out whodunit (although with an old-fashioned analog book, readers are free to do just that). However, research clearly shows that learners who *perceive* themselves as having control over the pacing and order of the presentation learn better. Actually giving control to the learner may not be the best advice, however. Users have to be motivated and well-oriented in order to benefit from having control. Unless those pieces are in place, the learner will only feel lost and frustrated.

The design challenge is how to give the user enough control to feel empowered without abdicating the responsibility to present a coherent experience.

The notion of “coherent experience” brings up a second important dimension of interactivity: linearity. A *linear* program begins at the beginning and goes to the end. You might be able to pause, fast-forward or rewind, but your navigation is one-dimensional. A *non-linear* (sometimes called random-access) program has a much more complex structure, with links and branches leading to multiple destinations.

Either linear or non-linear structure can provide a coherent experience, but the more control you give the learner, the greater risk you take that they will create an incoherent experience for themselves. Of course, poor design of a system-controlled product can ensure an incoherent experience!

The combination of control and linearity in a program can be used to describe five *levels* of interactivity.

Level 0 – Linear, system control

Radio and TV broadcasts, movies, plays, concerts, and most speeches and lectures are linear, with no opportunity for the user to control the presentation (except to turn off the set or walk out of the theater.)

Level 0 is easy to do but often leaves the user behind.

Level 1 – Linear, user control

Videotape, audio CDs, and books give the user control of the pacing and to some extent the order of presentation. You can skip ahead, pause, and go back. You can listen to tracks out of order, or read chapter 3 before chapter 2, but the tracks and chapters are linear.

Level 1 interactivity is easy to do – just record a TV program to watch later.

Level 2 – Linear + non-linear, system control

Most training, including computer-based training (CBT), is Level 2. The content is basically linear, but a few side-trips or branches are available. There may be more than one ending to this kind of a non-linear story, but there *is* an end. The user may be given control over pacing, but the system controls which branch is taken.

Another example of this is adaptive CBT, where the material gets harder if you get the quiz questions right and easier if you get them wrong.

Level 2 interactivity must be designed into the system from the beginning, but authoring tools and presentation software often reduces the need for a programmer.

Level 3 – Linear + non-linear, user control

Most websites are examples of Level 3 interaction. Most of the content is linear, though it is typically organized in a non-linear fashion. The user has complete control over order and pacing. Some simulations are also Level 3, especially those that teach defined step-by-step procedures.

Level 3, oddly enough, is easier to do than Level 2, since the decisions are left to the user rather than being designed into the system.

Level 4 – Non-linear, system control

At first glance, this might be considered a Level 0 interaction, since from the user's perspective it has a beginning, middle, and end. But the crucial difference is that under the surface, the material is organized in a non-linear fashion, and what happens is in fact dependent on the user's actions even though the system is controlling the results. Many games, such as *Myst* or its sequel *Riven*, are Level 4. The learner does not know the relationship between their actions and the system's reaction. The mystery of figuring out "why did it do that?" is a large part of the appeal.

Level 4 interactivity is the most expensive, since it must be very carefully designed into the product from the very beginning, and usually requires sophisticated computer programming.

Level 5 – Non-linear, user control

Web browsing, museum exhibits, and many simulations are Level 5 interactions. There is a large quantity of non-linear information available, and the user is in complete control over the order and pacing. This level of interactivity is daunting to many users, which explains the popularity of live and tape-recorded museum guides. (Exercise for the reader – What level of interactivity are live and taped museum guides?)

Navigation and orientation are critical. Poorly designed websites often leave the visitor feeling lost and confused, wondering "where am I? How did I get here? How do I get out?"

Level 5 interactivity is absolutely needed in reference works, since the designer cannot know the needs of the user in advance. Like Level 3, it is easy to implement although the organization of the content is crucial.

TRIVIAL INTERACTIONS? (MY SOAPBOX RANT)

This is the part of the paper where I get to play Andy Rooney. There's an unfortunately popular phenomenon on the Web that I call "Mallory Multimedia," named after the man who climbed Everest "because it was there." There's an awful lot of stuff included in CBTs, games, and websites simply because it is technically possible, not because the user has a need for it. Three things in particular stick in my crop:

Click a button and watch a movie

Especially a LONG movie. The advent of RealPlayer and AVI have helped somewhat by standardizing Level 1 control for most web-based video. But most video on the web isn't worth the wait time for the download.

Rollover effects on buttons

I don't need you to light up the button when I move my mouse over it; I can *see* the cursor.

Sure it *looks* neat, but it doesn't help me use the site, and I have to wait twice as long for the graphics to download.

Buttons that indent when you click

I've seen more than one site that made me go to another site, download and install a plugin, and restart my machine to activate the plugin, just so that the buttons would indent when I clicked

them. The benefit does not justify the cost.

Technically all of these interactions really are interactions as we've defined the term. They cost real money to add to a product (ain't *nothin'* free, honey). And button actions do confirm to a user that the object just clicked felt the click and is doing something with it. (The hourglass cursor does the same thing at no cost.) But in my opinion, to call a product or site "interactive" when it has *only* these kinds of interactions is cheating.

ABOUT THE AUTHOR

Corrie Bergeron has been involved in the multimedia industry since the 1980's, when "multimedia" meant a slide show with a soundtrack. He got in on the ground floor of the instructional-computing revolution, writing an early aviation simulation for the Apple II. As a designer of custom multimedia training, he developed videodisk training for IBM and created an interactive game teaching object-oriented programming for 3M. He spent five years helping move the venerable PLATO[®] system into Windows and onto the Internet, and

was the project manager on the award-winning series *PLATO[®] Math Problem Solving*. Currently he is the Director of Courseware Development for Capella Education Corporation (formerly Learning Ventures & The Graduate School of America) where he leads the creative and technical teams that are re-defining online learning. He holds BS and M.Ed. degrees in education from Texas A&M University. A longtime member of IICS and ISPI, Corrie has served on the local chapter boards of both organizations.

REFERENCES

¹ Wordnet

<http://www-inf.enst.fr/~milc/wordnet.html>

² Schwier, R.A. & Misanchuk, E. (1993). *Interactive Multimedia Instruction*. Englewood Cliffs, NJ: Educational Technology Publications.

³ Sims, R. (1995) *Interactivity: A forgotten art?*

<http://www.gsu.edu/~wwwitr/docs/interact/>