

Interactive environments

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What is interactivity?

At first I'd like to define the differences between interaction, interactive and interactivity. The paper about "*Understanding Interactivity*" by Svanaes (2000) gives a good overview of these terms: in the context of human-computer interaction, the human is *interacting* with the computer. We could define an instance *interactive*, if it allows for interaction. *Interactivity* is then the property of that instance.

Just to give a better understanding of these terms, I added some definitions:

- **Interaction** - a response experience in which both actor and reactor are engaged in a mutually affecting experience. (www.nathan.com/ed/glossary/index.html)
- **Interactivity** - the term "look and feel" is often used to refer to the specifics of a computer system's user interface. Using this as a metaphor, the "look" refers to its visual design, while the "feel" refers to its interactivity. (<http://en.wikipedia.org/wiki/Interactive>)
- **Interactive** - capable of acting on or influencing each other. (<http://www.thefreedictionary.com/interactive>)

Interactivity is one of the buzzwords of trendy discussion of innovations such as two-way television, computer and audio conferencing, viewdata, teletext and videotext (Rafaeli, 1988). True, if you want to sell a new fancy gadget or just to pay more attention on that, call it "interactive". Rafaeli's article which was published 20 years ago, gives even today a good perspective of interactivity. At these days there was no WWW and mobile services, which are the main keywords for today's interactivity. Could we say that we live in the age of interactivity? Why I have made that statement, is because nowadays everything is more-or-less interactive:

- studying at school (e-learning systems)
- shopping (e-shops like Amazon.com interact with the customers by offering them books they probably would like to buy)
- communicating with each other (chat rooms for example)
- art (interactivity has given the artists a new perspective)
- playing games etc

The question is about the level of interactivity. Rafaeli (1988) mentioned that even a face-to-face conversation is interactive in the traditional meaning of interactivity. Could we call it interactive? In some sense, yes.

Levels of interactivity

According to Crawford (2006) there are all together 5 levels of interactivity which could apply online or offline games, learning, web surfing or any other activity. The levels are:

- **Observation.** This level requires no input from the participant (for example watching TV). Although there is no “look and feel” aspect, but could be considered as the very first level of interactivity. I do like this idea, because usually when we watch a movie, we still do think and feel emotions - the movie interacts with us.
- **Participation.** Participation requires some involvement from the participant. One example would be standard e-learning, where the computer “listens” for the participants activities and saves the data inserted.
- **Action.** Action takes us one level further, meaning that the computer not only saves the data, but also modifies it and gives back some results. One example could be sorting: the participant chooses the inputs and the computer gives back the sorted output.
- **Agency.** Now, significant input from the participant is needed. For example some simulations, where the actions are related to results that would be expected in the real world. The output of the computer for example has to be realistic enough, so that participant feels like he/she is interacting with the real world.
- **Ownership.** This step is beyond learning, where the participants use the output in advantage to create real world results. Crawford (2006) calls it as the ultimate level of interactivity.

As we can see, interactivity has quite a many levels we have to consider. Each of them has been classified by the participants amount of input.

Types of interactivity

Besides these levels, there are many other ways how to classify interactivity. One traditional way would be to classify interactivity by the types:

Human-to-human interaction

We could say that a face-to-face communication is interactive. When you say something to your friend, and your friend answers you, then we can see some kind of interactivity. Rafaeli (1988) has a good point in human-to-human interaction: it is only interactive, if the flow of the conversation is affected by the previous answers and topics. It means, a conversation is interactive, if the previous answers and sayings have been taken into consideration while giving your next answers.

Human-to-computer interaction

This is a typical kind of interaction we everyday face: whether using the computer to manipulate data or playing some games on your mobile. We, as participants, send the input to the computer, and the computer generates us the output. Human-to-computer interaction has been developed into new levels and today we have the technology to design very complex solutions. A good example would be the system, that tracks the participants eye movement and takes this as an input. A video of this project found at YouTube.com: <http://www.youtube.com/watch?v=QnEKP-eKLpk> . Fascinating.

Human-to-computer interaction has been studied quite much and besides the interaction itself, the design of interaction nowadays plays a huge role. In the beginning of the 90's, when people used the computer-based devices for work, the design of the interface was just invisible (Manovich, 2006). But, as the digital media players, mobile phones, PC's and digital cameras started to come into our everyday life, the design of interaction was taken

into serious consideration. I'll come back to this interesting topic in the "Interaction design" part of this paper.

Computer-to-computer interaction

This type of interaction could be seen in many modern technological gadgets. For example, a GPS navigational system has computer-to-computer interaction, while it's constantly sending signals to the satellite and then according to the answers recalculating your position. Computer-to-computer interaction happens without the participant's reaction, there are sensors that indicate the level of a feature and then take the actions that have been previously programmed and installed. New smart-houses have quite a lot of computer-to-computer interaction. There could be smart switches that turn on the lights for example, if the sensors send a signal that it's getting too dark already etc.

Interactivity is everywhere?

As mentioned before - interactivity has influenced many different fields: from architecture to art. I've been following an interesting blog about interactive architecture (<http://www.interactivearchitecture.org/>), that brings out new experiments in interactive architecture design. While the technologies nowadays enable the architects to create as complex buildings as they wish, the architecture has been taken into new level.

Actually the interactive architecture is quite closely related to interactive art: the artists like architects have now the challenges to use the interactive touch in their work. Even the Ars Electronica Festival (<http://www.aec.at/en/>) has a category for interactive art, which has given us many serious discussions about the existence of interactive art. At 2004, an installation named "Listening Post" (http://www.aec.at/en/festival2004/programm/project_2004.asp?iProjectID=12585) won the Grand Prix of Ars Electronica Festival. The installation has 231 small displays, that show random text from chat-rooms, online communities and message boards all over the world. A YouTube video (<http://youtube.com/watch?v=lSt2bA2H8CY>) gives a good overview of that installation.

The question is if that piece of work could be called interactive? The interaction with this work is entirely mental, like the experiences of a cinema spectator or an art lover meditating in front of Leonardo's "Last Supper" or Giorgione's "The Tempest" (Huhtamo, 2004). The participant of this installation is not the user consuming this project at an art gallery, but anonymous persons worldwide, who use chat-rooms and message boards.

Anyway, interactivity has reached many fields, where it hasn't been even for example 10 years ago. Everyday we are surrounded by the interactive environment that we sometimes even don't notice.

Interaction design

If we talk about interactive environments and human-to-computer interaction, we also have to talk about interaction design. The more you use a mobile phone, a computer, a media player or another personal information device, the more you "interact with the interface" itself (Manovich, 2006).

Apple is an innovative company, that has led the interaction design of personal computer-controlled devices. First, the user interface was turned from black and white into color, then interactive menus were added and the whole process of how the human interacts with computer was redesigned - the interface now has to be usable and well designed. Why else Mac OS X has been called the most user-friendly computer operating system.

Dawes (2007) has many important aspects to pay attention on interaction design. A computer should be as simple to use, as we use a pencil to write down the words on paper. We do not think, how to use the pencil - we know how it goes and use it naturally. The same thing should be also with using the computers. The pencil gives us "visual feedback" how we should use it, we know how much we could use it (how long the pencil is or how much ink is has inside) and which way to use it (the sharper edge is for writing) etc. This kind of "feedback" let us to use the pencil intuitive, without manuals. The same should be

with human-to-computer interaction - the use of computer-controlled-devices should be intuitive.

New technologies give the engineers new possibilities for interaction design. I've been following some discussions about the Microsoft Window's and Apple Mac OS next generation operating systems and surprisingly both of them allow touch-screen interaction. It means, the interaction with computers does not require devices like keyboards and mouses. How convenient is that? I'd say, the first impressions are very good. A YouTube video (<http://youtube.com/watch?v=rP5y7yp06n0>) about Microsoft's touch-screen interface is fascinating. Is also the touch-screen-interface of iPhone the main success-factor for this revolutionary phone?

On the other hand, Biggs (2008) is in opinion that we shouldn't touch the computers at all. The next step in the "surface" computing metaphor is to remove the surface. Real time manipulation of forms will change the way we think about space.

Conclusion

To sum this up, the human-to-computer interaction has been taken into new levels. We face interactive environments everyday and usually do not think on their appearance. Maybe, it's because they already have been well-integrated into our lives, but on the other hand I'm eager to wait for the next revolution of human-to-computer interaction: the next generations of the popular computer operating systems and other fancy gadgets. Whether they'll only allow us for touch-screen-like interaction or something even more cleverer, we'll see.

References

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