THEATRE DESIGN & TECHNOLOGY MAGAZINE

1988 FALL ISSUE - SOUND COLUMN

# A SOUND FUTURE (PART 2)

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In the first part I talked about how computers tell designers what they are doing and we saw (hopefully) how sometimes the most intuitive way of doing this may not necessarily be the best or most efficient. Of course, the reason for this is most likely the physical limitations of the presentation medium (the video screen size and resolution) or possibly just the physical limitations of the space in which the designer has to view the data. Similar limitations are imposed by non-computerized sound systems which require a full complement of physical hardware in order to display system status. The advantage that computer presentations have is that enormous amounts of information can be viewed in a small space, but not concurrently.

Just as displayed information can be selectively viewed, enlarged and focused upon for greater detail, the computer controlled sound system can provide the designer or operator with a vast variety of control input capabilities using a few precision input devices which may be assigned to control any desired system parameters. The same input device may even be the one to both select the parameter to control and then to control it. The most common device of this type these days is the mouse.

The major imperfection with the mouse (according to audio mixers) is that it is not capable of controlling several 'analog' parameters simultaneously and cannot be made to simulate operating several different straight-line audio faders in distinctly different ways using a number of fingers simultaneously. If this is required we usually have to provide a number of conventional faders which may be either permanently assigned to specific audio functions or may be assignable within the system's programming capabilities.

But I'm getting ahead of myself... Let's go back a bit and look at the task we are attempting to accomplish: how a human can tell a computer what they want it to do. In some respects this is an easier thing to do than the reverse, i. e. when the computer is communicating back to the user, it must present virtually all information in which the user might conceivably be interested and it must be presented in a logical, priority-related manner providing quick access to all desired data. As a matter of fact, telling the computer which data you wish to see is a fundamental subset of the other side of the coin.

This other side can be defined from the user's perspective in a very simplistic way if you wish: "What I want it to do is very simple; I know exactly what it is, it's only one thing and I want it to do it now with a minimum of effort on my part." Many computer users cannot understand that this statement ignores the fact that the user's brain has already filtered every single bit

of information they have learned since they were born and is currently ignoring every sensory input impinging upon them except for the glowing screen in front. The task of providing an adequately responsive environment for persons with these demands is the software and hardware developers' greatest problem.

This would be simpler than presenting all data simultaneously if computers could read people's minds. Have no fear, this will come, but for now we have to use other techniques. Humans have developed elaborate ways of communicating the wishes of their brains to their environment. If the environment understands speech, the voice could be used.

Voice pattern and speech/word recognition are actually being used widely in industrial computer applications. In the theatre there are two primary difficulties with this: (1) response time and error potential is still too great for the speed and precision we require - the audio operator must be confident the correct command will be given at precisely the right time; and (2) vocal commands given by the audio operator in the house during a live performance may not be appreciated fully by the audience (or the director).

Delving into non-verbal communication brings us to body language. As we are all being currently taught, these movements and expressions can be extremely telling and accurate. Whether or not a computer operator could maintain precise enough control over them to run a show has yet to be shown. Currently under study for the purpose of furthering of our knowledge in this area are complex experiments based on head and eye movements. In psychological and physiological testing, cameras track the focal point of the subject's eyes to accurately determine specific areas of visual interest as they scan typical scenes and images in the performance of average human tasks. Computer analysis of this data is so complex and time-consuming it must be done frame by frame with powerful interpretive software running on expensive mainframe computers. Maybe someday it will be in our ball park.

On a more practical level, the movement of a jet fighter pilot's head is translated directly into gun aiming information so that the plane's cannon are always facing the same direction as the pilot. Obviously this is done very quickly, albeit with some rather expensive computer equipment, and has already been translated to film use in the design of servo-controlled robots which precisely follow the movements of a 'wired' actor. What we have so far not been able to imagine is what normal movements of a sound operator would precisely translate into which standard sound system responses, but we're definitely open to suggestions.

Moving into the more mundane levels of computer control, we have two devices widely used for pre-programming, but which have not gained much favour for live control: the digitizing tablet and the light pen. The digitizing tablet is extremely precise and well liked for drafting and architectural drawing. Its major disadvantage is that one is constantly looking back and forth between the tablet (where the input is done) and the screen (where the results are viewed). This distracts, slows input speed and creates slightly more margin for error. Current

opinion is that new software for mouse-based environments will make the digitizing tablet obsolete.

The light pen avoids the digitizing tablet's biggest problem, the perceptual gap between input and output, but creates new ones: it has much lower resolution (in fact considerably less than its corresponding video display because of physical interface limitations) and it can be tricky to use without making mistakes. The light pen is still popular in some areas but has basically been superceded by the mouse.

Now if all this sounds like I'm going to say the mouse is great, you're almost right. The mouse has solved some of the more obvious disadvantages of its predecessors. But, just like the search for the holy grail, the closer we get to totally intuitive computers, the further we have to go. The biggest encumbrance at the moment, believe it or not, is that the mouse is too mobile. It never seems to be just in the right place; always just a little too far to the left or right, or perhaps even lost momentarily because someone pushed it aside to make room for the script. A petty complaint maybe, but certainly not one which is normally levelled at the keyboard.

To be fair, an 'inside-out' mouse called the trackball is available which solves this problem yet again creates others. The trackball has a personality all its own which is surprisingly different from the mouse: in its various forms it tends to be heavy, slow, awkward and/or somewhat inaccurate. As well, it has not yet incorporated other controls such as buttons or switches nearly as successfully as the mouse.

Actually, the positioning problems with the mouse could be solved to a large extent by changing the way the screen pointer responds to the mouse. By using a phantom 'absolute mouse position' pointer that continues beyond the screen's boundaries, the mouse would not always find itself 'running out of room' as it currently does. This would naturally require a new approach to the way all current mouse-based operating systems are written plus create a whole new set of operating difficulties. One new function required would be a quick way of 'finding the mouse and putting it back on the screen' when it wanders too far away (this brings to mind the difficulties sometimes experienced in finding the beam on a badly misadjusted oscilloscope!)

There's also a 'new kid on the block,' the touch screen. It's been around for a long time in expensive interactive video systems, but relatively new in PC environments. There are a number of new developments in this area allowing the addition of touch screens to existing video displays as well as completely integrated touch screen terminals with extremely sophisticated capabilities. Immediate reaction to the touch screen is always positive: here finally is a highly interactive device capable of receiving input and displaying response at exactly the same physical location, requiring only a press of the operator's finger to respond to an on-screen request.

But, of course negatives exist in this world as well. Even though the touch screen is capable of very high display

resolution, its sensitivity to finger touch is very coarse, somewhat touchy (intentionally) and necessarily slow (to eliminate false triggering from any but firm responses.) Still, the best current approach for precise, intuitive, fast and trouble-free computer control of audio systems is probably a well developed combination of the best kind of mouse control integrated properly with good touch screen technology.

The mouse would control devices requiring precise, smooth and wide range response such as faders, masters and other types of 'analog' controls, while the touch screen functions could be easily applied to many other functions such as on-screen button selection, menu selection and a multitude of programmable capabilities in which the choices are explained in higher resolution text and the method of choosing is to simply point at the desired choice. Additional physical devices such as straight-line faders operating in a manner familiar to the operator would be required for complete live control of multiple audio channels. These controls could be normal audio devices or could actually communicate directly with the computer to provide flexible software-based control of assignable parameters.

Of course, we have been making the assumption so far that the kind of control desired is analogous to turning knobs, pushing buttons and sliding faders on a phantom 'console' which now would only be perceived as such on a video screen. We must also include by default a standard keyboard to facilitate the labeling of controls and cues as well as providing a few important direct system 'functions,' but live communication via typewritten commands should be eliminated.

Conveniently, we will soon have an ideal opportunity to test this combination of user controls since a new system with these features is currently being installed at Det Norske Teatret in Oslo, Norway. This system uses a portable mouse- and keyboard-controlled programmer's work station for designing and auditioning designs in the theatre. This computer actually comprises the entire sound system control centre and controls all system hardware which is permanently mounted backstage. The operator at this station has complete control of all editing and live system control functions.

At the same time, a remote touch screen work station and conventional physical fader panel is located at the stage manager's desk. These controls provide complete live control over the volume of 16 audio channels (chosen in a programmable fashion) plus a fast and simple touch screen menu of 64 programmed system presets for instant selection and execution. All main system 'function' buttons plus start and stop controls for eight sound sources such as tape machines are presented on the touch screen. This requirement exists because there is no sound operator during performances. The stage manager operates the sound system entirely through these facilities and requires a simply presented yet comprehensive range of controls.

So finally we are beginning to deliver ourselves from the dilemma of having to use systems which are not fundamentally intuitive by using special configurations of powerful and affordable

technology to create a system which performs as a transparent extension of our intuitive desires; a tool needing no interpretation between wish and result.

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