

Auditory Icons in an Information Space

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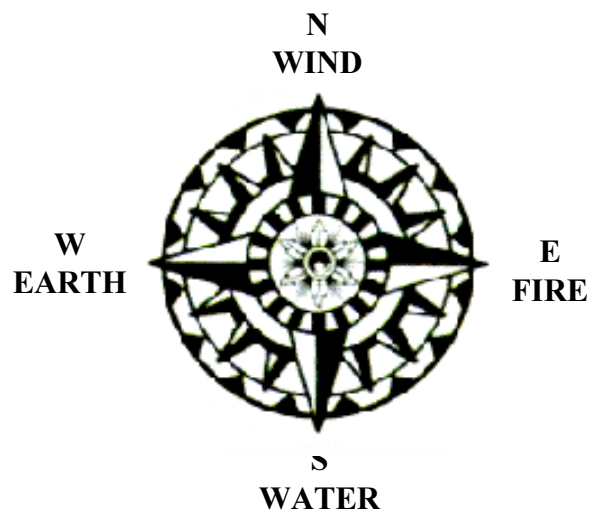


Figure 1. Directions and elements
inspired by North American shamanism.

ABSTRACT

This paper presents a basic structure where sounds and auditory icons helps the user of technical products to handle different kind of information. The structure is based on a wheel, inspired by native religions and North American shamanism (figure 1) where the four elements representing the four directional points that creates a strong symbolic platform

Keywords

Auditory icons, information space, sound symbols, native religion.

INTRODUCTION

In the world of today, we are overloaded with visual information. Surrounded by technical products in which we have the problem of understanding where we are, where to go, and how to get back again. Technical products tend to be more complex when multi functions are added.

Ubiquitous computing and “smart objects“ moves HCI (human computer interaction) out from terminals into physical reality [Ishi and Ullman 97]. At the same time virtual reality will be more real and complex. This will demand more from the interface.

In an effort to complement visual impression we have chosen to concentrate on sounds. Sounds, that have the unique quality to give us information from all the directions, make us able to rapidly change focus and to handle different sounds on different levels of consciousness at the same time.

A BASIC SOUND STRUCTURE BASED ON NATIVE RELIGIONS

When trying to find a basis for an easily understandable personal information structure based on sound, we came across the world-view of native religions and North American shamanism [Reagan 94] [Sunbear and Wabun 80].

This North American shamanism is based on a medicine wheel with the four directional points. The cardinal direction of North, South, West and East and the non cardinal direction of Northwest, Northeast, Southwest and Southeast. Each direction symbolises a unique quality based on the four elements (Figure 1) or a combination of the two of them, the noncardinal directions. Upon these medicine wheels the natives have built their world view, and can place any subject on this wheel and looked at it from eight different point of views. In this way many wheels are built on each other. This gives every direction many strong symbols. It is because of these strong symbols that we find this system so interesting.

From these four directional points, we have developed four sounds that represent the four directions of north, south, west and east. These sounds form the basic structure on which our audio space is built, and are designed to aid users when navigating in technical systems.

For example, the element of wind is placed in the north: imagine the cold fresh wind on a winter's day. This feeling is the essence of the north, and we might associate it with keywords such as clarity, mind, receptivity and visions. Thus, this direction is symbolised by a high and clear, but subtle tone.



This sound structure will aid the user to navigate in technical systems and it is possible to build many different kinds of interfaces from it.

THE USER IN THE STRUCTURE

It is very important that the user of a technical system can make a mental picture, or map, that indicates the current location and activity. Different people have different ways of learning and remembering things. When creating a system it is very important to have this in mind.

Today most technical systems are built on the same kind of hierarchy system and unfortunately many people blame themselves when they have problems with learning and remember how to work with the system.

Our structure, based on a wheel, can be employed to handle any kind of technical system or product.

The structure can be used in a two or three dimensional way. Either by being in a 3-D space or seeing everything from above in a 2-D way. In any case you are provided with a strong sense of forward and backward, left, right and in the 3-D space up and down. This gives most people a stronger sense of how to orientate themselves.

The interaction between the user and the structure can be of any kind. It can be voice command,

writing, drawing, pointing or by physical commands. This interaction should of course be built on the same principles as the system.

In this structure we have, so far, developed one sound structure that helps the user to orientate in it. One sound structure out of many possible. The structure is suitable to work with visual information, information in the form of sounds and both together.

AUDITORY ICONS AND SOUND SYMBOLS

Within this basic sound structure it is possible to place other sounds, that can be auditory icons [Gaver 93a]. Auditory icons are sounds from the everyday environment that help users understand what kind of information they are dealing with. The auditory icon is the physical sound, and what the user thinks of or feels when hearing the sound, is a sound symbol. To understand sound symbols it is important to know how the ordinary person perceives in everyday situations [Gaver 89, 93b].

It is also important to understand there association with the sound.

It is possible to get a lot of information from physical sounds. If someone drops a coin it possible to hear what kind of coin it is, what kind of surface it is falling on and from what height it fell. It is even possible to hear how it moves after it hits the ground, how far away this happens and in what kind of room.

The lack of sound give us also a lot of information as when we close the fridge and the last closing sound made by the rubber list does not come, we immediately react and turn around to close the door properly.

This tells us that you can get out a lot of information from simple everyday physical sounds. It is in this way auditory icons can be used.

In this work we have divided the sound symbols in three categories.

- Sounds that creates an instant body reaction.

If you open a bottle of soda and the sound indicate that the pressure is to high you close it very fast .

- Sounds that create a mental picture of the source of the sound

This is a large group and could be the sound from a door that closes.

- Sounds that creates a emotional state of mind.

The sound of a fire and of course music.

Sound symbols are an intuitive language and some sound symbols are shared by most people, like the sound of a wasp; others are more personal like the sound of grandmother's cookie jar. The cultural aspect can divide the understanding of sound symbols into bigger and smaller groups of people. From a whole continent to a few people in a subculture group.

SCENARIOS

In the following sections we describe two sample scenarios of the structure in use.

Scenario 1: "On the road"

Imagine this: When out driving your car, you hear sounds from your left and right that tells you which way to turn to get to your goal. In front of you, you hear a clear voice that informs you that a car soon will pass you from behind. For each car that passes the voice will get simpler and simpler, too finally be just a clear single tone in front of you.. A signal from a telephone call comes from the behind and informs you that it is a not so important private call and you decide that the voice mail can take it. You start feeling tired and decide that sounds should amplify

important road marks. Suddenly you hear a wasp and you become more alert. Ahead of you, you see a car that has just become loose, and you can smoothly and safely drive past it.

Here your personal system has interacted with four different companies. First it was the company that provides you with traffic and orientation information. Your telephone company. The company that is responsible for the road and road marks and the interaction between the road company and traffic company.



The auditory room in the car is creating the feeling of this product, car, and is a very important and governing factors in the total driving experience.

Here we understand the importance of being able to sort out different sound components. At the same time the whole sound environment in the car needs to be unified to create the total driving experience [Stockfelt 91].

Scenario 2: “In the supermarket“

You have an allergy and have an agent running on your personal wearable computer that is communicating with intelligent objects in your surroundings. When shopping in the supermarket a sound, which you have specified yourself, comes from behind and to your left. This sound tells of a suitable product for your requirements. You turn and the sound directs you to a can on a shelf. You have to be careful of what you eat because of the allergy and you check the ingredients just to be sure. It is safe for you to eat and seems inviting. A signal from the company that supply you with customised news indicate that something important has happened. You listen to it and realise that you have to return to work immediately.

CREATING A AUDITORY INTERFACE

To create different sounds within different sound atmospheres we find it important to have a language for communication to create the qualities for the sound and place it within the frame of a product or a system. Here [Gabrielsson 79] has categorised 60 adjectives that can be placed within eight fundamental characteristics. This is an excellent tool when designing sounds.

Every sound of a product should work together with and speak the same language as the physical form of the product.

Since many products of today are developed for special customer groups it is important that this language can be understood by these groups. Especially since the meta product, the non material value of a product is the strongest competitive edge in today's market place

One way to make it easy to orientate in a system is to base the system on the physical reality. Here we find knowledge from architects that work with sounds [Hellström] very helpful.

How we perceive and read the environment is of great importance for orientation and identification. [Lynch's 60] shows us five form elements of how we perceive the city. Path, node, landmark, edge and districts. These elements help us to understand the environment. They are also good building blocks when creating an auditory environment

We also find it important when creating auditory interfaces to understand how the user can develop his/her listening abilities, to help the user to grow into and use the auditory interface in a more conscious way. Here Schafer gives us some good examples [Schafer 92].

EXAMPLES OF INTERFACES

From the basic structure we have developed different interfaces for different products and situations, to ensure that the user can be guided through many different kinds of products, systems and operations.

We show the example of two different interfaces. One that we developed for a website and the other for gathering information and organising personal documents.

Interface one "The site"

From a homepage (figure 2a) the user has four possibilities to continue. Each one is indicated by an arrow that is pointing up, down, to the left or to the right. Each has a related sound, of course based on the basic structure connected to them which is heard when the arrow chosen or when the cursor is held on them.

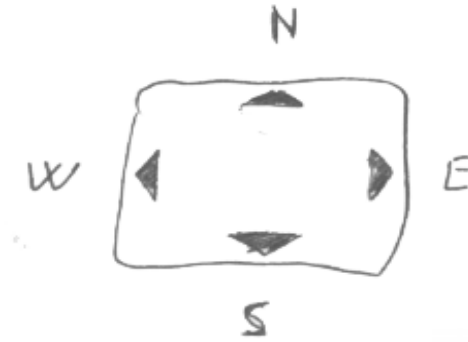


Figure 2a

The user chooses the arrow pointing down and a soft fluid sound is heard.

On the new page (figure 2b), where personal information can be placed, three more arrows are shown. One pointing down towards the left, one straight down and one down towards the right. The sound heard if choosing the arrow pointing down towards the left, has some of the "left arrow sound from the homepage" in it (figure 2a). The user chooses the option down to the right and a sound, with more of the right arrow sound in it, is heard.



Figure 2b

Here the user finds a new page, with the same kind of arrows on it. The page can have a background sound creating a feeling, that the user knows where he/she is in the systems.

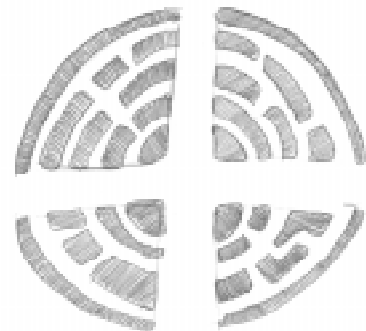
For every step that the user leaves the homepage, the sound will change in some way, for example volume, duration etc. The sound can of course work together with any visual aid for orientation, such as colour, brightness/darkness or symbols. By being able to move four steps from the home page the structure offers 245 different pages. With only four steps to find a certain page, it is relatively easy to remember the sequence to find required information. Extending the structure one more step will give 732 possible pages.

Interface Two "The city"

In this interface, we have chosen a city as a virtual sound environment to be orientated in. The city can be of any structure and we have chosen an medieval city (figure 3).

Looking for new information, we connect to netscape.

The sound here indicates that we are in an open space. Four streets lead out from the centre or starting point. Moving toward: the east, the element of fire, the sound from the blacksmith workshops are echoing between the houses. When crossing a street the sound of a new environment becomes audible and we get a sense of what this new directions can offer us. Turning to the right we soon realise from the sound that this is the wrong environment for our needs. In the other direction we feel more at home and go into houses, listening for a "spacious stone house." Entering this house a sound structure, created by the echoing of our footsteps helps us (orientated) in this new structure. Looking for an old biography, we need to go down to a more dark, narrow and damp seller. Even one more level down, in the horrible prison cell, we find our document, and several others of interest.



In this virtual city structure it is possible to store and organise personal information and documents in the same position we found it.

Expansion, can either be by growth of the city, or by revealing more details. A new city can be created or maybe the different natures around the city, with relaxing sounds.

Different transportation ways as canals, roads, walkways and railroads may indicate what kind

of information the user wants, show things from different angles or maybe just change the experience.

In the virtual auditory environment its possible to place auditory landmarks that works as a bookmark.

A big group of users love to create there personal environment and can spend much time on this, while others are the opposite and want to have everything served and don't want to spend any time learning it. This example can give both groups what they want.

CONCLUSION

We have developed a structure, that can be the basic system in a product, that handle information from other systems, in a personal way that the user understands.

When services like mobilephone, e-mail, computer programmes, calendars and dictaphone start to merge, we see that structures like the one this paper presents that use sound can make things easier for the user.

The shamanic world view has shown itself to be a very good base on wish to build a basic structure. It is simple and easy to understand and at the same time, very complex.

It is possible that the Shamanistic wheel (that creates the basic structure) can serve as point of departure for adaptive systems. These systems may then be applied to other senses.

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