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A SEMIOTIC APPROACH TOWARD PRODUCT SOUND QUALITY

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ABSTRACT

For quite some time the opportunities to enhance the quality of a product by means of an appealing sound design have simply been overlooked. Product sound was mainly taken as an annoying bi-product in the sense of 'noise' rather than as a quality element that bears creative power. Only recently an awareness of the 'sound' as a quality element of products has developed. The sound has actually been recognized as the acoustic visiting card of a product, the better designed, the more it is supporting overall product quality. Although this statement may sound trivial, it does not preclude the fact that it is indeed an extremely demanding task to design high-quality product sounds. Not that the tools for product sound design have not been available - there is simply a lack of knowledge on what actually makes a product sound good. This paper considers some relevant aspects of the problem.

1. INTRODUCTION

The concept of sound implies two poles, a sound-generating source and a listener. The sound is an auditory (perceptual) event and, as such, it can only be accessed through a listener. Consequently, for product sound quality assessment it follows that product sounds cannot be understood without considering the listeners who actually use the product. The auditory event of a product in use is just one component going along with perceptual, emotional and cognitive events in a complex individual setting of activities. A product is touched upon, looked at, acted on, used, and - of course - also listened to. Since the said events are not independent of each other, the auditory event of the listeners as well as their judgments on product sound are moderated by non-acoustical factors.

It follows that a product sound has no quality per se - its quality is assigned to it by the acting and listening product user. To put it in different

words: The quality of product sounds can be conceived as vectors composed from a variety of perceptual, emotional and cognitive components.

If we want to stimulate an awareness for the different aspects of sound quality and to effectively support future design efforts, it is, thus, of paramount importance to consider some basic aspects of quality, in general as well as specifically from the point of view of production and perception. One of the most relevant questions in this context is: How is a product sound designed best?

2. PRODUCT SOUND AS A SIGN

Although often attempted, product sound cannot be reduced to a purely acoustic (physical) fact. Any approach to design products to sound good has shown that a sound can neither be cut off from the listening subject nor from its source, i.e. the product itself. A product sound is an auditory event which carries specific information about the product which emits the acoustic waves under consideration. The product sound, in fact, becomes thus effective as a 'sign', specifically, as a 'technical sign', i.e., a sign the substance of which is technically generated acoustic waves.

Speaking in a more general way, a sign carries a meaning. Whenever acoustic waves are perceived as a sign, this sign refers the recipient to a 'referent'. In this context it is helpful to distinguish between the surface structure of a sign (the acoustic waves) and its deep structure (its referent). The relation between surface and deep structure of signs can be either indexial, iconic, or symbolic: An index is a sign with a causal relation between two events (e.g., fire is causing smoke), an icon shows some similarity with its referent (see the well-known pictograms), and a symbol is chosen arbitrarily, i.e. there is no obvious dependency between surface and deep structure - as holds for the elements of most languages [cf. Eco 1976].

In the cases of individual, purely-technical acoustic signs the surface structure of the signs is not arbitrary. Actually, it is caused by technical processes and operations, and for most cases these signs are indexes. Consequently, the relationship between technical acoustic signs and their sources is inseparable. As long as there are no conventions on that the technical signs may carry an additional meaning, the information they convey is entirely constrained by the sound generating sources.

Yet, as a rule, acoustic waves that are generated by technical products are no distinctive acoustic entities (as, for example, the tick of a metronome). Instead, they usually constitute a conglomerate of different entities. Each of these may differ in sound pressure, spectrum, time structure, etc. In summing up, all these different physical entities form a particular acoustic scenario, and as such, a new technical-acoustic index which has a character of its own.

The listeners' intention is to understand this sign. To this end, among other things, listeners may try to break down the complex acoustic waves into components stemming from individual sound sources engaged (so-called source separation). Yet, they certainly often fail in translating the complex acoustic waves into a scenario of separate sound sources with some precision. Nevertheless, they are mostly able to still take the complex acoustic sign as an indicator of complex information. They may, for example, recognize a specific product and its current state of operation.

The more listeners are unfamiliar with technically-generated acoustic signs in the sense of an index, the more their understanding of the signs becomes an individual fact. The auditory events are then interpreted rather that they are translated. The signs are, according to their surface-deep-structure relation, taken either as auditory icons or as auditory symbols.

As explained above, an auditory icon is a specific kind of a sign. The surface form of this sign is reduced (stylized) to some more important characteristics of its referent. If such an auditory icon is able to evoke the listeners' associations with the icon's referent, the information transfer by means of the icon can be considered successful.

In contrast to auditory icons, auditory symbols do not gain their form from their being similar to their referent. In contrast, their acoustic and/or auditory forms are solely based on convention. This convention must be known to the listeners, otherwise they would not be able to decipher the message carried by the symbols. Symbols must be memorized. Their advantage lies in the simplicity with respect to their forms. However, quite some training may be necessary to enable listeners to adequately understand them without disturbing delay.

Whatever a product sound turns out to be, an index, an icon or a symbol, listeners' experience is required. Whilst listening to products people are learning the language of product sounds. Specific product types emit different but, nevertheless, somehow characteristic acoustic waves. Consequently, their sounds can be classified in terms of the corresponding product class. During a process of what could be called 'technical socialisation' product users learn how different products sound, and, specifically, how different they sound in operation. The more a product sound bears prototypical features which their users have learned already, the easier the users will develop a notion of the product - and the shorter will be the time the users need for identification and understanding.

3. CONSEQUENCES FOR PRODUCT SOUND DESIGN

The design of product sound implies active directing of auditory perception. In this regard, product sound engineers are actually a kind of architects of technical acoustic signs. They may often already achieve acceptable results when taking advantage of the familiarity of the product user with paramount acoustic features of the product class. To this end, sound quality

engineers have to know the users' language of product sounds. They must have access to a classified vocabulary of sounds which can be called 'sonemes'. The term soneme is introduced here as being the smallest unit of an acoustic wave that - when substituted - leads to a change in the meaning assigned to the acoustic wave. Thus, a soneme is an abstract entity which is acoustically realized by sounds (cf. the differentiation between phonemes and phones in linguistics). Also, sound engineers must know the basic semantic, syntactic and pragmatic rules of these sonemes - and be able to apply them.

For listeners, a product sound, designed as an acoustic sign, is an integral part of the product. The product sound is perceived as something which is given as a matter of course. It is such to be classified as what is called a 'background event'. Yet, as soon as there are language elements of product sounds involved which are perceived as alien elements, the acoustic sign becomes a 'foreground event'. The sound, then, is an 'attractor' which catches the listeners' attention. For the quality of the product sound this can either be disadvantageous or advantageous. It is of disadvantage when the deviation from the commonly-used language of product sounds bears no special information, i.e., when it does not constitute new acoustic signs itself. On the other hand, the design of a new acoustic form is a positive quality element when it ends in being a carrier of additional information. If this is not the case, the listeners will be misdirected. The mental process of identification and understanding will be made even more difficult. With regard to sound quality, this definitely has to be avoided.

The introduction of a new, unusual acoustic form can, however, also be a product-quality supporting element, namely, when the new acoustic sign catches attention in a positive way. This is, e.g., the case when the listener detects alien acoustic elements, but is still able to understand their role in the product context directly. Understanding, here, is not meant as a cognitive process primarily, but rather as the listeners being pleasantly impressed and/or positively attracted. Whatever product sound design elements are utilized to this end, it is important that they open up a direct access to the listeners' understanding of signs.

In fact, the chances for product sound design as a support of quality do not primarily lie in the 'speaking of the product sound language' as such. Rather, the challenge is to find an appealing 'speaking style of the product sound language', in other words, a new attractive 'dialect'. In order to reach this goal, prominent characteristic features of the referents which the technical acoustic signs stand for (namely, of the particular products under consideration) have to be identified. It is of equal importance to classify the listeners (product users) targeted. Different user groups represent different demands. It is certainly one of the most important quality elements to understand the expectations of the target group of users in order to recognize the opportunities and limits of product sound design in a specific scenario.

In the context of product sound development the designers have to decide on whether they want to generate a sound in the sense of an index, an icon, or a symbol. The basic question is whether the listeners/users are willing to adapt themselves to the product sound in that they learn to know the meaning of the acoustic sign.

Starting off from analytic data on the sign referent on the one hand, i.e., on the information the acoustic sign is to convey, and on the recipient of the sign, i.e. the product user, on the other hand, the task evolves to investigate how these features and their overall structures can be mirrored by acoustic images.

An aim must be to find out on what issues listeners may have an intuitive, common understanding, i.e., ideally, an understanding which does not require any training. Consequently, it is the task of product sound designers to find out what information they want to convey, who the product users are, and by which specific acoustic means they may succeed in attracting the product user to absorb just the desired information.

Since a product sound is only one feature accompanying a product, i.e. not an object standing for its own, it is even more important that the product sound stays with its specific role, namely, being a background element supporting the overall product quality. Well-designed product sounds refer to familiarity - of whatever kind. The more familiar listeners are with the sound characteristics used, the easier they are able to understand the sign.

4. PRODUCT SOUND AND THE CONCEPT OF QUALITY

In a comparable way as a sound is the auditory event of a listener, a product sound is the result of a judgment of a listener. In other words, sounds and, specifically, product sounds cannot be understood by disregarding the listener as the ultimate sink of auditory information. When talking of product sound quality it is thus necessary to encounter as many aspects as possible which are concerned with the current scope of activities of the user of the product considered. Some of the aspects concerned have already been discussed briefly, yet, a more detailed elaboration of this complex would certainly be appropriate for a more detailed essay. In any case, some conclusions can be drawn here with regard to the term 'quality' in general and to 'product sound quality' in particular. Its definition is:

> *'Quality is a descriptor of the adequacy of the perceived characteristics of an entity with regard to required features. The perceived characteristics of an entity, then, is the totality of detected characteristics of the entity. For the perceiving subject, these detected characteristics constitute the identity of the entity. The entity itself may either be a material or an immaterial object. The required features are formed by the totality of the features of individual expectancies and/or social requirements and/or proper demands. A characteristic, finally, is the identifiable feature, i.e. the feature which can explicitly be named.'*

On the basis of this understanding, the term 'product-sound quality' is defined as follows:

> *'Product sound quality is a descriptor of the adequacy of the sound attached to a product. It results from judgments on the totality of auditory characteristics of the said sound, the judgments being performed with reference to the set of those desired features of the product which are apparent to the users in their actual cognitive and emotional situation.'*

Quality as a general concept can be examined from different points of view. In the context of this paper, namely product sound, it is not the methods and methodologies of assessment which are primarily in our focus of attention, but rather some generic problems regarding quality *design*. For example, it is one of the tasks to analyze which acoustic and non-acoustic features give rise to the perception of pleasantness and which may rather cause annoyance.

An in-depth sound-quality design will not limit itself to the referent 'product' the sound is to be designed for, but will encompass other fields of experience with related elements and/or structures. One example worthwhile to mention in this context is the sounds of animal communication. Lets consider that we understood construction and perception rules of this kind of natural language. Although different from the language of technical products, we might nevertheless be able to learn a lot from it for our specific problems related to the field of product sound design. Considering animal sound in the context of product sound may render some useful hints indeed. The acoustic language of the animal world, with its primary devoted to interindividual communication, could actually also be employed to transmit information about a referent quite different from the animal world, namely a technical product. Such a borrowed surface structure of a sound in the context of product sound might attract listeners positively by which general product quality is improved.

There are, of course, limitations to such a universal approach. Not each language element or structure can be used to construct meaningful product sound variations. The product sound designed for a specific case must fit to the particular context, namely, it must convey prominent characteristics of the product.

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