

Designing Sound Identity: Providing new communication tools for building brands “corporate sound”

Maxime CARRON
SNCF Innovation & Recherche
40 avenue des Terroirs de France
F-75012 Paris
Maxime.carron@sncf.fr

Françoise DUBOIS
SNCF Innovation & Recherche
40 avenue des Terroirs de France
F-75012 Paris
Francoise.dubois@sncf.fr

Nicolas MISDARIIS
Sound Perception and Design Team
STMS IRCAM-CNRS-UPMC
1 place Igor Stravinsky F-75004 Paris
Nicolas.Misdariis@ircam.fr

Corinne TALOTTE
SNCF Innovation & Recherche
40 avenue des Terroirs de France
F-75012 Paris
Corinne.talotte@sncf.fr

Patrick SUSINI
Sound Perception and Design Team
STMS IRCAM-CNRS-UPMC
1 place Igor Stravinsky F-75004 Paris
Patrick.susini@ircam.fr

ABSTRACT

In this paper we focus through a series of interviews on the relation between sound and brand identity in the context of musical and sound design for the industry. The interviews showed that the sound design process involves stakeholders who have different domains of expertise, which leads to difficulties in the interaction between them. As a solution, we propose a methodological framework for designing sound identity supported by two communication tools: a deck of cards allowing the different stakeholders to share a common vocabulary concerning both brand and sound concepts, and a sound charter which is a way to communicate guidelines for sound design through the use of sound identity semantic descriptors, illustrated by sound examples.

General Terms

Design, Human factors

Keywords

Brand identity, product sound design, design process, communication tool, semantics.

1. INTRODUCTION

One of the most powerful assets in brand strategies is the construction of a brand identity. Unlike brand image, which represents the way the brand is perceived by the consumers [22], brand identity is a concept of emission, which reflects how the brand owner wants the people to perceive the brand [37]. The characterization of brand identity has been explored by several studies, including Aaker’s definition of the brand personality [1]

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee.

AM’14, October 1–3, 2014, Aalborg, Denmark. Copyright ©2014 ACM

inspired by the psychological models for describing human behavior. In his studies on brands analysis, Kapferer presents a model to describe the six facets of brand identity: physique, personality, relationship, culture, reflection and self-image [13]. The most tangible one is the physical facet of the brand. Indeed, the physical aspect of a brand (i.e. colors, shapes, products, brand music...), as a vector of emotional response in customer’s mind, is directly related to the perception of this brand. Therefore the visual appearance of the brand (logos, communication...), is often designed regarding its values, as well as the product’s colors, shapes, packaging and materials. Audition is a sense that can also be involved in brand perception: a consumer experiences not only the sound environment of a point of sale but also sounds emitted by the products of the brand. In the following, we investigate how product sounds could be designed to fit the brand identity.

2. FROM BRAND IDENTITY TO PRODUCT SOUND DESIGN

Musical design is a well-known field of marketing consisting in choosing or composing music for ambiances or communication purposes in adequation with the brand. It has been shown that customers spend more money in a wine store when classical rather than pop/rock music is played in the background [3]. Jingles and sound logos are also designed to fit the brand identity [39], as well as music for events and advertisements. However, non musical sounds are also part of our sound environment and can also have a strong impact on consumer’s mind. For instance, it has been found that the sound of a coffee machine played an important role in the perceived taste of the coffee [14]. **Sound design** is the process of working on the sound of an object on first stages of his development in order to convey desired information or emotions. According to Özcan and Van Egmond, there are two types of product sounds: consequential sounds and intentional sounds [17]. Consequential sounds are emitted by products as a result of their functioning. For example, hairdryer, vacuum cleaner, washing machine sounds are considered to be consequential sounds. Intentional sounds are mostly digital sounds added to the product to support its function. Microwave oven finish bells, alarm clocks, oven setting feedback sounds are some of the examples. More

recently, intentional sounds are used in interactive contexts to convey information and meaning of an interaction with objects, interfaces and spaces [26]. Designing product sounds is quite complex as it requires several different skills and knowledge such as acoustics, engineering, psychoacoustics (the study of how sounds are perceived), psychology and even musicology. Whereas in the past century, the great majority of acoustic studies have concerned noise and annoyance reductions, several psychoacoustic studies now focus on improving the sound quality of industrial products, meeting consumer expectations. Different methods such as sensory evaluation, sorting tasks or dissimilarity evaluation have been used to characterize a large variety of product sounds like interior car sounds [32], car door closing sounds [24], vacuum cleaners [11], refrigerators [12], air-conditioning noise [29, 34], coffee machine sounds [15] and even soundscapes of train stations [36]. Intentional sounds such as alarm sounds [30, 31], sonic HCI [5, 8, 33] and car horn sounds [18] have also been explored. Sound quality studies often investigate perceptive characterization related to preference and pleasantness of product sounds and look for correlations with acoustic properties of the sounds. However, except for easily understandable brand values like luxury [16] or sportiveness [20] few methodological work have been done to integrate product sounds design in a brand identity perspective. In the present paper, we try to understand how musical and sound designers are working from their clients' requirements, in order to propose a general framework for the design of sound identity.

3. WORKING ON SOUND IDENTITY

In the previous section, some examples were presented showing that sounds can contribute to the expression of brand identity. We also underlined some professional domains related to the sound design process. Building a brand sound identity is a delicate task, as brand intentions and values have to be perceived by the consumers who experience the products. In order to understand practical issues of a sound designer regarding the design of a sound identity for a client's need, we conducted a series of interviews with professional musical designers and sound designers. In the following, the term "client" refers to the client of the sound or musical designer (in most cases a company or an association).

3.1 Method

In a previous study investigating issues encountered in sound design process, Hug and Misdariis gathered some information from professional sound designers [10]. Following their work, we conducted semi-structured interviews of seven professionals in sound design or musical design. All interviews were recorded using a digital voice recorder (Olympus VN-4100) and were transcribed on computer to constitute raw data for further analysis. The interviews were mostly supported by a common guideline consisting in a list of twenty questions, structured in three parts. The first part served to introduce the participant and the agency or the company he was from. The nature of his job and the clients he was dealing with were also investigated. The second part of the interview focused on the concept of sound identity, which was defined in the first part of our paper from a marketing point of view. We asked the participants for their own definition of sound identity and for their relationships with this concept regarding their work. In the last part on the interview, we investigated how sound designers were interacting with their clients in a sound design process. As the previous work by Hug and Misdariis identified some difficulties met by the designers in terms of

communication with the clients, we focused especially on the nature of the problems the participants were confronted with. The aim was to understand which kind of tools could provide some help in the context of a sound identity design process. The interviews were conducted quite freely and the guideline was just helping us to orient our questions. Depending on the participant and on the context, the structure of this document was not strictly followed during the interview. The participants were:

- Charles- Édouard de Surville, owner of the sound design agency "GetSound", France
- Emmanuel Deruty, independent sound designer and composer, France
- Michael Boumendil, audio branding expert, founder of the agency "Sixième Son", France, and composer of SNCF audio logo
- Perrine Philippe, owner of the musical design agency "Dissonances", France
- Roland Cahen, composer, sound designer and professor in charge of sound design studio at ENSCI les Ateliers Paris, France
- Daniel Hug, a sound designer and researcher on interactive design at ZHdK, Zurich
- Laurent Worms, owner of the sound and musical design agency "DecibelConsulting, France"

In order to have better understanding of the relationships between the designers and their clients, we also met people from the industry concerned by sound design issues. The aim of these meetings was to see in which form they give specifications to an acoustician or a sound designer, and to gather their impressions concerning interactions with the sound designer in a sound design process. Since the applications of our study will concern mainly the SNCF brand, we chose to meet in priority people working in this company. We also met people from Renault which, as a car manufacturer, is historically much more concerned by sound design issues [4]. Meetings with the following people were organized:

- Dominique Bruneau, sound identity department at SNCF, the French railway company
- Bénédicte Lenindre, product department at Renault, the French car manufacturer
- Sylvain Jolivet, a designer working at the SNCF marketing department

3.2 Results

In the following we present the outcomes of the interviews which are relevant for the issues raised in this paper. These results emerged from the analysis of the second and the third parts of the interviews.

3.2.1 Three Main Approaches to Sound Identity

As the global context of our research concern sound design regarding brand identity construction, the first people we met were musical designers for brands. These experts are in most cases marketing professionals, so they understand the concept of sound identity as the extension of global brand identity through sounds and music. **The marketing approach** was exposed in the first part of this paper. Concerning product sound design, it is important to mention that there seems to be a significant difference between musical and non-musical sound. Indeed, music can convey emotions much more easily than product sounds, which are more difficult to make directly congruent with the same brand values as those expressed in the brand musical identity, because those sounds are often uncontrolled, short and non musical.

The second approach is **the ecological approach**, inspired by the work of the composer and environmentalist Raymond M. Schafer in his essay “The Tuning of the World” [27]. The idea is to study the relationship between human beings and their environment through sounds from a socio-ethnomusicology and phenomenological point of view. One important idea in Schafer’s work is the concept of “soundmarks”, which can be defined as sounds which are strongly representative of a soundscape. The Big Ben bell, the sound of closing doors of the Paris Métro or the sound of a foghorn are good examples of soundmarks. The concept of sound identity can then be applied to a place such as a town, a building, a country, or even to a season. In terms of sound design, it means that the environment of the product must be taken into account when its target sound is defined.

The third approach to sound identity is **the functional approach**, which is the most design-oriented one. It concerns mostly product sounds design and user interface design. While the first two approaches were focused on the product context (i.e. the natural environment of the product, and the brand) the functional approach aims to design the sound of a product regarding its function. The sound of an object can thus reinforce its usability while being characteristic of the object itself. IHM feedbacks or the ringing sound of a microwave oven are good examples.

The three approaches are complementary, and for experts, a brand sound identity must be global so it has to irradiate the product sounds in the same way as music for communication or advertisement. According to some sound designers, a few brands begin to work with both musical and sound designers to build a “corporate sound”.

3.2.2 Major Steps of a Sound Design Process

The analysis of the third part of the interviews showed that in most cases a sound design process can be decomposed in three distinct steps: the brief step, the debrief step, and the validation step. The difficulties met during the interaction between the clients and the sound designers occur in each of these three major steps. **The brief step** is the initial phase of the sound design process: the client formulates his need in his own terms to the sound designer. The first problem encountered is that at this stage, the clients requirements are often poorly defined, so the sound designer has to help the client to develop it and to transcribe it in terms of sound characteristics or musical components. This step can be very long if there is no common understanding between stakeholders. According to the sound designers, it is difficult to talk about sounds with some clients. A didactic approach on sound could thus improve the exchange.

The next step, **the debrief step**, consists in a series of meetings between the designer and the client, where conceptual sound sketches are presented and discussed. There are no

standards ways to present these sounds, but some sound designers make “soundboards” which are inspired by moodboards in graphic design. Verbal descriptions and sound concerns are illustrated by sound samples, which can give inspiration or guideline for next steps. This debrief is crucial in the design process, but according to Hug and Misdariis, it is also highly problematic as clients can not always understand the conceptual nature of moodboard sounds. Besides, the sound designers all agreed that their clients mostly trust their personal judgment on presented sounds instead of objective choice criteria. This outcome emphasizes the need to have a solid framework to support discussions on sounds.

The validation step has been commented by only few participants, essentially as a missing phase in the whole process. The client sometimes conducts consumer evaluations, but only as a part of a whole product-evaluation process, so they are not specific to sound issues. Some designers also mentioned the lack of clear methodology in the validation step, when it occurs however. Here again education on methodological concepts from experimental psychology and ergonomics shared by the clients and the sound designers would be helpful.

3.2.3 Toward a Sound Initiation

The clients knowledge on sound and music is a critical factor in a sound design process, both for the brief and the debrief steps. The main problem encountered by the sound and musical designers is a communication problem occurring when talking about sounds. Therefore we identified the need for a strong design methodology, supported by sound design tools that will serve the interests of both clients and designers. We isolated three main axes concerning the development of such a solution:

- **A brief tool** that could help the client to formulate his requirements
- **A communication tool** which could support the interaction between the designer and the client
- **A didactic tool** which could help the stakeholders to know more about sounds

Several designers raised the idea of a glossary dedicated to sound. Words to describe sound concepts and textures are not well-defined and are mostly belonging to the own language of each designer. In most cases, they use metaphors, emotions and even onomatopoeia to describe their ideas. According to the participants, the establishment of a generic sound lexicon could be very helpful. In the following, we will present how we tried to build a whole sound design methodology taking all these outcomes into account.

4. A CONCEPTUAL FRAMEWORK FOR DESIGNING SOUND IDENTITIES

The outcomes of the interviews underlined the need of tools and methodologies supporting sound design process, especially in the interaction phases. In this section we propose a global framework for the design of a sound identity supported by two different sound design tools. As we wanted to take a marketing approach to sound identity into account, the aim of this framework is to provide a scientific methodology to transcribe a brand identity into conceptual guidelines for sound design. The sound identity design process we set is presented in figure 1. The

inputs of our model are the marketing/communication department and the acoustic research department, but other departments (product department, design ...) could be added depending on the company organization and the context of the project. The outputs of our process are the people who will work on the sound conception: sound designers, acoustical engineers, musical designers... The framework we propose here involves two major steps, each one supported by a sound design tool inspired by both the outcome of our interviews and a review of existing design tools and methodologies.

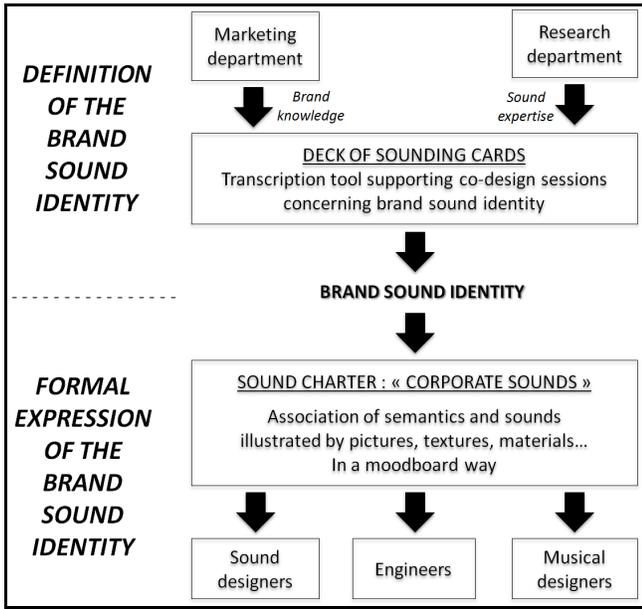


Figure 1. Generic framework for a sound identity design

The first step is **the definition of the brand sound identity**. The idea is to match brand identity knowledge (marketing department) and sound expertise (research department) in order to explore how the brand values can be conveyed in terms of sounds. This step consists in exploratory sessions involving people from different departments. Since the stakeholders have different fields of expertise, these sessions will be supported by a communication tool (a deck of cards, c.f. 4.3), allowing participants to share their ideas and their expertise. This tool will be built upon elements belonging to the different fields of expertise involved in the process : sound semantics, brand identity knowledge and related emotions, pictures, sounds samples... Outputs of the first step will provide specific elements for the construction of the sound charter in the next step.

The second step is **the construction of a formal expression of the brand sound identity**. Once the transcription of brand identity into sound concepts has been made in the previous step, the outcomes of this work have to be gathered and formalized in a proper way regarding sound design issues. Reasoning by visual and tactile analogies, we propose a sound charter as a brief tool. As a graphic charter give identity guidelines for visual expressions, the sound charter will explicit the “corporate sound” defined in the previous step, by showing sound samples and associated words, pictures, materials... The sound charter will therefore be given as a guideline for the musical and sound designers and for the acoustical engineers.

In the following, we explore the tools we propose for supporting a sound design process, and we expose some perspectives for further researches developing this framework. As our starting point was the outcomes of the interviews with professionals, the first tool we focused on was the sound charter because it is the one which is directly related to sound and musical designers. The definition of this tool and its constitutive elements was then the basis for elaborating the whole process, including the definition step and its supporting tool, the deck of sounding card. Therefore we chose to present elements of the framework in that order.

4.1 The Sound Charter

The key-element of this framework is the sound charter. This concept was both inspired by graphic charters and moodboards. As a specification tool, the aim of the sound charter is to transcribe the brand identity and values into guidelines for sound purposes. In visual design, a graphic charter will provide product designers for requirements in order to ensure that the appearance of the desired product (mostly shapes and colors) will fit the brand identity (fig.2). As we saw in the first part of this paper, product sounds can be designed as well as product visual identity. However, we didn't find any mention of identity guidelines for sounds in published works. Assuming they exist, such elements would be difficult to obtain from a company or from a designer because the development of brand strategy and brand identity is often highly confidential.



Figure 2. SNCF visual identity guidelines and applications

Looking for the structure of such a tool, we investigated several design tools and methodologies and we confronted the outcomes of our researches with sound and musical designers issues. As both a communication and an inspiration tool, moodboards seemed to be the most appropriate method for our concerns. A proper definition of moodboards is given by Lucero in his PhD work exploring moodboard making: « Moodboards are an idea development tool used by designers and their clients to communicate, think, and share their different views that emerge from the design brief while defining future products or trends. Although different type of media can be used, they mostly consist of images used in different level of abstraction to tell a story about the company, product or audience, and setting direction for design. » [21]. Following these indications, the chosen form of the

sound charter was sounds, images and words associated on a same interactive board. The purpose of these associations is to illustrate the same sound concepts in different ways. Indeed, using only verbal language to talk about sounds would not be sufficient, as it is less universal and less rich than other ways of expression such as showing pictures, listening sounds... For instance, a huge number of colours are perceptually distinguishable, but human languages have only a small range of accepted color names [6].

4.2 Sound Descriptors and Associations

As the sound designers underlined the lack of a global sound vocabulary, the first issue we decided to deal with was the construction of an *illustrated sonic language*, easily understandable by all the stakeholders involved in a sound design process. Since sound design is an interdisciplinary field which involves non-acousticians stakeholders [23], this vocabulary must belong to a metaphorical level in sounds description. Thus, timbre descriptors (such as *clear, round, harsh, bright...*) will be preferred to acoustic terms such as *loudness, spectral centroid...* Many psychoacoustic studies focus on the semantic description of sounds, and semantic differential methods has been widely used to describe the timbre of musical instruments, environmental sounds, and product sounds [35]. A review of these studies was done to select a shortlist of words. Three main categories of verbal sound descriptors were identified based on different studies. In a primary study « Research on Psychological Parameters of Sound » [25], participants described verbally pure tones, multitones, white noise, speech, musical and environmental sounds. The usual words from the literature such as *high, low, bright, soft...* were used freely by the participants, but surprisingly only about one-third of the participants used it for real sounds. Other participants used terms relative to object, action and event. In another study on verbal description of instrumental sounds timbre [7], two kinds of portraits were obtained to describe sounds, one related to the features of the sound, and the other to the characteristics of the source or action. According to Gaver [9], it is related to the two strategies of listening, respectively musical listening (governed by the features of the sound) and everyday listening (governed by the characteristics of the source). A third mode, semantic listening, is related to meanings conveyed by the sound and associations made in people mind [38]. These findings have recently been confirmed by Lemaître et al. [19]. Based on these works, the three categories of descriptors proposed here are:

- **Sound quality descriptors**, related to abstract way to describe sounds, mostly based on visual and tactile analogies, like *round, dry, clear, harsh, velvety, warm, shrill...*
- **Causal descriptors**, describing sound effects related to the way the sound is produced, like *blowing, sizzling, rattling, impact sound...*
- **Association descriptors**, describing either emotions (*relaxing, amusing, unfamiliar...*) or evocations caused by the sound (*forest, breakfast, danger...*)

The two first categories are the basis for our further researches on the sonic vocabulary since there are less subjective than emotions and evocations, and thus easier and more pertinent to illustrate. However, they still have to be transposed in the context of designing a sound identity, which could lead to the explicitation of subcategories. For instance, identifying the source of the sound

(*“a car door sound”*) refer to everyday listening as well as describing the action which is responsible for the sound (*“blowing”*) or the materials involved in the sound production (*“metallic”, “wood” ...*). However they could have a different role in a sound-oriented discussion. Besides, dynamic aspects of the sound (*steady, crescendo, reverberation, oscillating...*) could be included in the first category as well as they could form a third category. In his treatise on musical objects, Pierre Schaeffer proposed a generalization of what is usually heard as musical sounds by considering all kind of **“sound objects”**, ignoring their origin [28]. He proposed a general sound typology according to seven morphological criteria: three matter criteria (mass, grain, harmonic timbre), two form criteria (dynamics, pace) and two variation criteria (melodic profile, mass profile). These fundamental works could help us to explicit our first category, as well as visual analogy (sound shapes, sound textures, sound colors...).

In future works, these sound descriptors will be illustrated by elementary sounds. Association tasks involving a large corpus of sounds can be done, as well as images associations, to provide us for the raw material which will be used to build the brand sound identity through the construction of the corporate sound charter.

4.3 A Deck of Sounding Cards

Once the form of the sound charter has been identified, a proper methodology for its construction had to be set up. Inspired by the work of Alves and Roque on a deck of cards supporting the exploration of sound design patterns in video games [2], we conjectured that a deck of physical cards could serve both the learning of our sound vocabulary and the construction of a sound charter. Regarding the context of our study (a process involving both marketing people and sound experts), we have chosen to create different kinds of cards, each related to a different level of abstraction, from brand values to timbre sound descriptors.

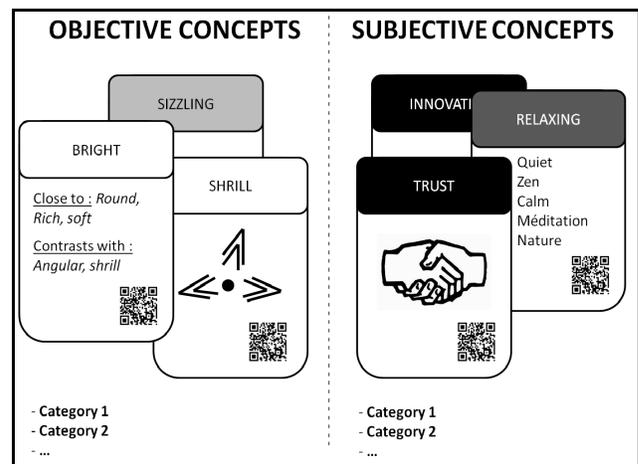


Figure 3. Conceptual sketches for a deck of sounding cards

The aim of the co-design sessions in the second step of the whole process is to make associations between cards from different categories, in order to transcribe brand intentions into sound patterns. A rough sketch of the cards is presented in figure 3. The card will be organized in two main classes. As the deck of cards is a transcription tool, we must differentiate the concepts that are being transcribed from the concepts belonging to the output language.

Objective concepts: These cards concern sound descriptors belonging to our illustrated sonic vocabulary. As presented in the previous section, there are different kinds of semantic sound descriptors, which could lead to the same number of card categories. Yet we identified two generic ways to describe sound (related to musical listening and everyday listening): sound quality descriptors and causal sound descriptors. The “Objective cards” will constitute a pool of elements that will be used to transcribe the subjective concepts in terms of sounds, through an association exercise. At the end of the session, selected cards from this class will constitute the raw elements of the sound charter.

Subjective concepts: These cards concern the intentions that have to be transcribed into sound concepts (mostly brand values and their extension). Here again, several categories could be explicitated, as concepts not directly related to the brand identity could be used at an intermediary level between brand values and sound descriptors. For instance, concepts such as space, winter, quality, nature, relaxation... could form a category labelled as “evocations”. The association descriptors identified in the sound studies mentioned earlier could form the basis for further research in the establishment of such a category

Each card will refer to online resources, ideally by a QR code. These links will allow us to build a strong description for each concept (see figure 4 for an overview), which could be explored by stakeholders before or during sessions. By this way, elementary sounds associated to each objective concept (timbre descriptors, action sounds descriptor...) could be explored, along with concrete examples of everyday sounds

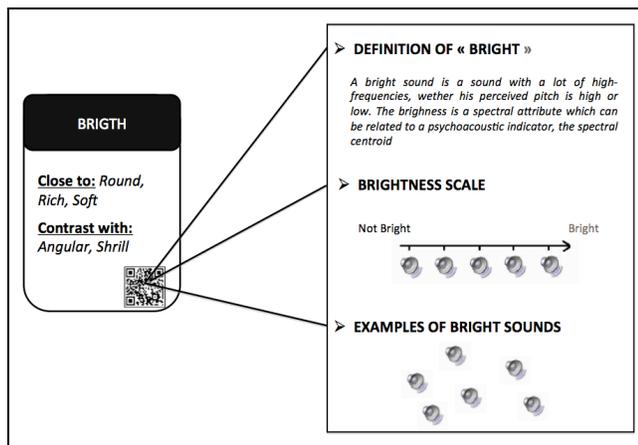


Figure 4. Conceptual sketches for a card detail

For subjective concepts, images and verbal explanations of the concepts could be found on the linked webpage. Indeed, visual identity is a strong component of a brand identity and should be part of the tool as well as brand values and intention. In the same way, cards representative of emotions and evocations could be illustrated by pictures, forms and textures in a moodboard way. The structure of this tool is still under construction, and will be detailed during the presentation.

5. CONCLUSION

In this paper we presented a new framework for designing sound identity, supported by two different design tools. Taking the outcomes of musical and sound designers interviews into account,

we proposed a deck of “sounding cards” as a didactic way to build a brand sound identity with both marketing people and acoustic researchers. Associations of concepts borrowed from both brand and sound vocabularies will allow the different stakeholders in the sound identity design process to have a consensus on the “corporate sound”. Once a sound identity has been defined in such way, it could be formalized in an interactive board consisting in sounds, pictures and words associated in a moodboard way. Such a tool could be given as guidelines to the sound or musical designers and to the acoustical engineers.

We also explored the way of describing sounds in order to build a sound vocabulary using scientific methods. Based on previous work, we identified different categories of sound descriptors (those related to the sound itself, those related to the source of the sound and those related to the information provided by the sound), which could be explicitated and used in the construction of our tools structure. Further researches will be done on the construction of this vocabulary and its integration in the development of these two sound design tools.

6. ACKNOWLEDGMENTS

This work is funded by the French railway company SNCF and partially supported by the ANRT (French national agency for research and technology). The authors would like to thank Caroline Journaux-Guerin for her contribution in the brainstorming sessions.

7. REFERENCES

- [1] Aaker, J.L. 1997. Dimensions of brand personalities. *Journal of Marketing Research* 34, 3, 347-356
- [2] Alves, V. and Roque, L., 2011. An inspection on a deck for sound design in games, In *Proceedings of the 6th Audio Mostly Conference*. Coimbra, Portugal. ACM, 15-22
- [3] Areni, C. and Kim, D. 1993: The Influence of Background Music on Shopping Behavior: Classical Versus Top-Forty Music in a Wine Store", *Advances in Consumer Research* 20, pp. 336-340
- [4] Bijsterveld, K. and Krebs, S. 2013. Listening to the Sounding Objects of the Past: The Case of the Car. In *Sonic Interaction Design* by Franinovi, K., & Serafin, S. Cambridge, MA: MIT Press, 3-38
- [5] Blattner, M.M., Sumikawa D. A. and Greenberg R. M. 1989 Earcons and icons: Their structure and common design principles. *Human-Computer Interaction* 4, 11-44
- [6] Eckert, C., Stacey, M. 2000. Sources of inspiration: a language of design. *Design Studies* 21, 5, 523-538
- [7] Faure, A. 2000. Des sons aux mots, comment parle-t-on du timbre musical ? Doctoral dissertation, EHESS, Paris
- [8] Gaver, W, 1989. The SonicFinder: An interface that uses auditory icons. *Human-Computer Interaction* 4, 67-94
- [9] Gaver, W. 1993. What in the world do we hear?: An ecological approach to auditory event perception. *Ecological psychology* 5, 1, 1-29.
- [10] Hug, D. and Misdariis, N. 2011. Toward a conceptual framework to integrate designerly and scientific sound design methods. In *Proceedings of the 6th Audio Mostly Conference*. Coimbra, Portugal. ACM, 23-30
- [11] Ih, J.-G., Lim D.-H., Jeong H., and Shin, S.-H. 2002. Investigation on the correlation between sound quality and

- spectral composition vacuum cleaner sound by using the orthogonal array. In *Sound Quality Symposium*, Dearborn, MI
- [12] Jeon, J. Y. 2006. Sound radiation and sound quality characteristics of refrigerator noise in real living environments. *Applied Acoustics* 68, 1118–1134
- [13] Kapferer, J.-N. 1998. Maîtriser l'image de l'entreprise: le prisme d'identité. *Revue française de Gestion* 71, 76-83.
- [14] Knöferle, K. 2011. *Acoustic Influences on Consumer Behavior*. Doctoral dissertation, University of St. Gallen.
- [15] Knöferle, K. 2012. Using Customer Insights to improve product sound design. *Marketing Review St. Gallen* 29,2, 47-53
- [16] Lageat, T., Czellar, S., and Laurent, G. 2003. Engineering hedonic attributes to generate perceptions of luxury: Consumer perception of an everyday sound. *Marketing Letters*, 14, 2, 97-109
- [17] Langeveld, L., van Egmond, R., Jansen, R., & Özcan, E. 2013. Product Sound Design: Intentional and Consequential Sounds. *Advances in Industrial Design Engineering*, p.47.
- [18] Lemaitre, G., Susini, P., Winsberg, S., McAdams, S., Leteinturier, B. 2007. The sound quality of car horns: A psychoacoustical study of timbre. *Acta Acustica United with Acustica* 93, 457–468
- [19] Lemaitre, G., Houix, O., Misdariis, N., & Susini, P., "Listener expertise and sound identification influence the categorization of environmental sounds. *Journal of Experimental Psychology, Applied*, Vol.16, No.1, 2010, p. 16
- [20] Le Nindre, B. 2004. Brand sound identity: the case of sporty vehicles. Proceedings of *Les journées du design sonore* (IRCAM, SFA), Centre Georges Pompidou, Paris.
- [21] Lucero, A., 2009. *Co-designing interactive spaces for and with designers: supporting moodboard making*. Doctoral dissertation, Eindhoven University of Technology.
- [22] Neumeier, M. 2004. *The Dictionary of Brand*. ISBN 1-884081-06-1
- [23] Özcan, E. and Van Egmond, R., 2009. Product Sound Design: An Inter-Disciplinary Approach? In *Undisciplined! Design Research Society Conference*.
- [24] Parizet, E., Guyadier, E., and Nosulenko, V. 2008. Analysis of car door closing sound quality. *Applied Acoustics* 69, 12–22
- [25] Peters, R. W. 1960. *Research on psychological parameters of sound*, Technical report 6°-249, Mississippi southern college, Hattiesburg.
- [26] Rocchesso, D., Serafin, S., Behrendt, F., Bernardini, N., Bresin, R., Eckel, G. and Visell, Y. 2008. Sonic Interaction Design: Sound, Information and Experience. *CHI EA'08: CHI'08 extended abstracts on Human factors in computing systems*. ACM, 3969-3972.
- [27] Schafer, R. M. 1977. *The tuning of the world*. New York, 1977.
- [28] Schaeffer, P., 1966. *Traité des objets musicaux*. Editions du Seuil, Paris, France.
- [29] Siekierski, E., Derquenne, and C., Martin, N. 2001. Sensory evaluation of air-conditioning noise: Sensory profiles and hedonic tests. In *Proceedings of the ICA*, Rome, p. 342
- [30] Stanton, N. A. and Edworthy, J. 1999. Auditory warnings and displays: An overview. In N. A. Stanton & J. Edworthy (Eds.), *Human factors in auditory warnings*, pp. 3–30. Aldershot, UK: Ashgate.
- [31] Suied, C., Susini, P., and McAdams, S. 2008. Evaluating Warning Sound Urgency with Reaction Times. *Journal of Experimental Psychology: Applied*, 14, 3, p. 201
- [32] Susini, P., McAdams, S., and Winsberg, S. 1999. A multidimensional technique for sound quality assessment. *Acta Acustica united with Acustica* 85, 5, 650-656
- [33] Susini, P., Gaudibert, P., Deruty, E., and Dandrel, L. 2003. Perceptive study and recommendation for sonification categories. In *Proceedings of the ICAD*, Boston.
- [34] Susini, P., McAdams, S., Winsberg, S., Perry, Y., Vieillard, S., Rodet, X. 2004. Characterizing the sound quality of air-conditioning noise. *Applied Acoustics* 65, 8, 763-790
- [35] Susini, P., Lemaître, G., McAdams, S. 2012. Psychological measurement for sound description and evaluation. In *Measurements with Persons*, Berglund, B., Psychology Press.
- [36] Tardieu, J., Susini, P., Poisson, F., Lazareff, P., McAdams, S. 2008. Perceptual study of soundscapes in train stations. *Applied Acoustics* 69, 1224–1239
- [37] Tomasella, S. 2002. *Vers une psychanalyse de la marque et de ses expressions*. Doctoral dissertation, I.A.E. Nice, France.
- [38] Tuuri, K., Mustonen, M.S., Pirhonen, A. 2007. Same sound–different meanings: A novel scheme for modes of listening. In *Proceedings of the 2nd Audio Mostly Conference on Interaction with Sound*.
- [39] Winther, J. 2012. *Sound brand fit - a cross-modal study on perception of fit between sound logos, visual logos and brand*. Doctoral dissertation, Copenhagen Business School.