Haptic Design with Objects and Actors

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Abstract
We describe the design of the *Haptic Wave*, a device enabling audio producers with visual impairments to “feel sound" haptically, akin to how sighted producers see sound via visual representations. The evolving object(s) of design became important in working with users with visual impairments, their materiality forming an integral part of our dialogue. We envision the design process itself as being “haptic", with objects “pushing back" against users, departing from the often visual techniques of Participatory Design (PD).

Author Keywords
Haptic Design; Accessibility and HCI, Participatory Design, Haptic Interfaces, Research Through Design

ACM Classification Keywords
H.5.2 User Interfaces: Haptic I/O []

Introduction
We use the concept of *haptic design* to describe the design of the Haptic Wave and its iterative development with audio engineers with visual impairments, utilising PD, Design Workbooks [1] and Research Through Design (RTD) [2].

Figure 1: The waveform of a section of David Bowie's "Let's Dance".

The Haptic Wave

Audio editing has became highly visual since computers have come to dominate music studios. Sighted producers gain much information (eg silences, loud points) from the waveform (a visual representation of a recording showing amplitude over time, Fig 1). However, for audio engineers with visual impairments, this information is not easily accessible. Responding to this, the Haptic Wave gives direct, tactile access to digital recordings. A motorised fader indicates amplitude at points in time on the y-axis, and can be moved left to right along the x-axis to scrub through audio.

Haptic Design

Through workshopping [3] and prototyping we iteratively refined the Haptic Wave with our users. This resulted in a form of *material thinking*, the exchange of ideas involving a *conversation through the object*. We draw on sources including Paterson's haptic knowledge [5], proposing a method of "haptic design" where objects "push back" against users, allowing us to prototype for their specific sensory capabilities. Whilst traditional PD techniques can fail when participants are visually impaired, objects are focal points. The process involved dialogue and exchange between heterogenous groups or "actors": the "end users" (audio engineers with visual impairments); researchers in music and HCI; and designers and engineers. This dialogue involved interviews, exchanging objects, and studio trials. The object(s) themselves remained central through different iterations and exchanges. We discuss this in [4].

Conclusion

We present the idea of "haptic design" and a haptic device, describing a project where both the design process and "product" were haptic. This was borne partly out of the sensory abilities of our users, but has implications for iterative design utilising dialogues around material interactions with objects; conceiving of design as object-centred and haptic is of use to many in HCI. We will present a full paper on the Haptic Wave at CHI 2016 and bring a Haptic Wave to the workshop.

References

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