Soundscapes: A prescription for managing anxiety in a clinical setting

Abstract
Our interdisciplinary team, the Transforming Pain Research Group, focuses on inventing and reconfiguring multimedia technologies for the estimated 1 in 5 people in North America who experience chronic pain. In this paper, we introduce a new approach to managing anxiety and chronic pain in a clinical setting using soundscape compositions based on soundwalks. Although this research is in its nascent stage, the use of media, including music and sounds, pervade several well-known approaches to pain management and anxiety. The general purpose of the proposed experiment is to investigate the potential stress-reducing effects of patients listening to soundwalks using headphones in the waiting room of clinics. Since some patients might experience anxiety and stress while waiting, can a change in environment help minimize the level of discomfort? And furthermore, can such a stress-reduction system assist patients in communicating their symptoms more clearly to doctors?

Author Keywords
Soundscape, Chronic Pain, Soundwalk, Binaural, Field Recording

ACM Classification Keywords
H.5.1 Multimedia Information Systems: Audio input / output
General Terms
Design, Experimentation

Clinical Environments
For many patients, clinical environments bring about anxiety, stress, uncertainty, and sometimes fear [1, 2, 3]. Studies have shown that high anxiety levels can cause a breakdown in communication between patients and doctors [4, 5, 6]. Since most of the diagnostic information is derived from the doctor-patient interview, the miscommunication can impede positive health outcomes [7, 8]. Although there have been attempts made to improve the atmosphere of facilities, there has been little exploration of ways to improve the mental state of patients while they wait to see the doctor. A study has shown that a well-designed healthcare facility may increase positive emotions, which may improve the patients’ health and wellbeing [9]. Although doctors and other healthcare providers are aware of this problem, implementing a system that is easy, affordable, and non-disruptive to the pattern of healthcare can be very challenging [10]. In addition, designing a system that is user-friendly and provides affordance to patients who vary in age, medical symptoms and exposure to technology can be extremely challenging. Therefore, our novel approach is one of the first attempts at improving the psychological experience of patients in clinics by immersing them in a virtual environment using an easy and non-invasive method.

Soundwalk
Soundwalking is one resource that may help to improve patients’ experiences of clinical settings. Soundwalking is a framed exercise in active listening. A soundwalk could take place anywhere such as a park, restaurant or the city block. Soundwalks have been organized for various groups, including New Music concert seasons, urban planning and ornithology gatherings, and conferences on sound. Soundwalk methodologies have also been manifest in a “virtual” context; that is, where the participant experiences the acoustic environment as a three-dimensional recording played through headphones. The goal of the soundwalk is to prioritize the act of listening in order to become receptive to the sounds of the environment.

Soundwalks consist of 3 diverging parameters: time, space, and event. These become the parameters for deriving meaning from the sonic environment. During a soundwalk, the environment can be experienced from a performative perspective, wherein the listener becomes an active participant listening and attentively moving through the space. The sounds emitted are not limited to the environment and include the sounds produced by the participant, such as footsteps or breathing. This in turn leads to a real-time soundscape composition that is unique to the individual participating in the soundwalk.

Soundscape Composition
The premise of a soundscape composition is to re-contextualize or re-embody the environment. It provides the possibility to place focus or specificity on producing an imaginative space that the listener can associate with and evoke memories. A soundscape composition can be created using recordings captured from soundwalks. To create a sense of three-dimensionality, binaural microphones are used to record the sounds of the environment. It is an effective way of reproducing and replicating what the ear would
hear in a natural situation. This type of playback may promote active listening and improve the experience of immersion in a virtual context. The field recorder and binaural microphones used for this study are illustrated in figure 1.

**Figure 1.** A Korg MR1000 with Sound Professional Binaural Microphones are used for recording the soundwalks.

For the purpose of this research, the soundwalk recordings were created similarly to how music is composed. The soundwalks are structured and are broken into three sections: an introduction to establish context, the journey walking, and finally the return home. The soundwalks were recorded in the Metro Vancouver area.

We experienced several challenges when recording the soundwalks. The goal was to focus on creating a sensorial journey that promoted relaxation. The first challenge was maintaining a walking speed that did not induce anxiety during playback. We also did not want the walking to sound, "rushed". In addition, head movement had to be kept to a minimum to reduce the feeling of nausea when listening to the recordings.

Additional challenges had to do with picking appropriate locations. We wanted to maintain a calming and naturalistic sound devoid of noises manifested by machines and humans. The biggest culprit was the sound of jet planes passing by and traffic noise. Even though, we had selected remote locations, it was very difficult to avoid these sounds bleeding into the recordings.

**Figure 2.** Specific environmental sounds such as ocean waves are captured as part of the soundscape composition.
**Clinical Study**

Typically, the wait time for patients to see a doctor in a clinic is under 45 minutes [11] but this increases dramatically to 4 hours in hospitals [12]. Since, our study is focused on patients in clinics, it was decided that each composition should be no longer than 15 minutes. This was sufficient enough for patients to experience a complete soundwalk without distraction and also avoid ear fatigue. The additional time would be spent on completing the background and post-questionnaire.

For this study, patients from the Vancouver Arthritis Research Society and a Complex Pain clinic are being recruited to participate in the study. The patients that will participate in this study are adults who are either diagnosed with chronic pain or have various types of arthritis pain. Half of the participants will listen to soundwalks using headphones; the other half, the control group, will listen to recordings of a clinical waiting room. Participants will be asked to complete a background questionnaire. This questionnaire provides a picture of the mental state the patient is experiencing while waiting to see the doctor. Specifically, we focus on understanding the level of anxiety and pain they are experiencing. Studies have shown that there is a correlation between levels of anxiety and the severity of pain experienced [13, 14, 15]. Therefore, based on their pain and anxiety levels, the patients are subdivided into 3 categories, low / medium / high, pain & anxiety levels. This is to understand how effective the use of soundwalks are for managing anxiety and pain as patients wait to see the doctor.

After completing the questionnaire, the patients will listen to the soundwalk composition. After the listening session, they will be asked to complete a post-questionnaire. In the post-questionnaire, patients are asked again to rate their anxiety and pain levels. This allows us to see if a change in their psychological state has occurred. In addition, we ask patients qualitative questions regarding the soundwalk such as specific sounds they found pleasing, sounds that caused discomfort and physiological changes experienced while listening, such as a change in breathing pattern.

In order to understand if an improvement in communication between doctor and patient has occurred, the doctors are also provided with a brief questionnaire that asks them how relaxed the patient was as they were being examined and furthermore the accuracy of symptoms explained by the patient.

**Conclusion**

At the moment, we have recruited several patients for the study and they have reported a reduction in stress and anxiety. A complete clinical study at the Arthritis Research Center and the complex pain clinic will take place in March of 2013 in which 60 patients will be recruited as part of this study.
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References