Chapter 23

Impact of Olfaction on Information Recall: Perspectives from an Empirical Study

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ABSTRACT

Multimedia lies on an infotainment continuum, using multiple forms of information content to both inform and entertain users. In other words, multimedia applications are usually intended to add to the knowledge of the user; via its information content, as well as to keep the user entertained, i.e. interested or amused. In previous work, the authors have presented details of studies carried out to study the influence of using olfactory media content to augment multimedia applications on user perception and particularly focusing on users’ enjoyment of the multimedia experience. Thus, in this respect, the authors have studied the influence of the use of olfaction in multimedia applications on entertaining users. Consequently, in this chapter, they focus their attention on the influence of using olfaction to augment multimedia applications with regards to the informational aspect of multimedia systems and applications.

INTRODUCTION

It is often the case that there is usually a predominance of either informational content or entertaining content in multimedia applications. Nonetheless, information processing and, to a lesser degree, information recall is still required whether the intention of the multimedia application is to reach out to the user on an informational, entertainment or infotainment level. For example, multimedia gaming applications, which are strictly entertainment applications, the player is often...
required to recall certain elements and aspects of the game in order to play successfully. On an informational level, an example may be a multimedia training application where the main intention is for the user to process the information conveyed by the integrated media objects and to be able to recall this information as may be appropriate at some later time. In this chapter we focus on the effect that olfaction has on information recall when olfaction is used to augment multimedia applications.

**OLFACTION, THE SENSE OF SMELL**

Olfaction, the sense of smell, is the ability to use the nose to notice or discover the presence of an odorous substance in the air, that is, an odorant—a chemical compound that has a smell or odor. It works by transmitting the signals produced when the odorants perceived dissolve in the nasal mucous. These then bind with the cilia found on the olfactory neuron receptors projecting down from the olfactory epithelium into the mucous membrane. These neurons are responsible for transmitting the detected signals through their axons to the olfactory bulb, whose neurons in turn transmits the received signals to the olfactory part of the cortex. The olfactory information received in the olfactory cortex is then distributed to other areas of the brain, ultimately leading to the perceptions of odors and their emotional and physiological effects. At this point, odor signals are relayed to both the brain’s higher cortex, which handles conscious thought processes, and to the limbic system, which generates emotional feelings.

The majority of olfactory signals produced when smells are detected by the olfactory system travel in the way described above to the brain, that is, through what is called the orthonasal pathway. However, some smells also travel through a passage at the back of the mouth, experienced particularly when eating—flavour perception, called the retronasal pathway (Kaye, 2001; Shepard, 2006). For this reason, the olfactory system is sometimes described as being dual in nature, that is, it can sense odorous signals originating externally (orthonasal) and internally (retronasal) to the body. In the former case, orthonasal stimulation occurs when odorous substances are sniffed and travel through the nostrils or nasal cavities located in the external nares. In the latter case, however, retronasal stimulation is experienced during food ingestion when volatile molecules are released from the ingested food and are pumped from the back of the oral cavity up through the nasopharynx to the olfactory epithelium.

**OLFACTION AND AUDIOVISUAL CONTENT**

The first recorded attempt of combining artificially generated smell with audiovisual content dates back to 1906 when an audience was sprayed with the scent of roses while watching the screening of the Rose Bowl football game (Longino in Kaye, 2001), however, there is no mention of what the audience reaction to this was. The next significant development in the use of scented media in the film industry happened in 1943 (Kiger & Smith, 2006; Smith & Kiger, 2006), when Hans Laube, who had earlier discovered a technique for removing odors from an enclosed place, such as an auditorium, was also able to reverse this process to release selected odors into similar places at specific times and durations. Using his newly discovered technology, and with the help of his colleague, Robert Barth, they produced a 35 minute ‘smell-o-drama’ movie called Mein Traum in which 35 different odors were released to accompany the drama presentation. However, the technology behind the production of the emitted smells enjoyed more success than the scented drama presentation itself, with the audience agreeing that while the smells emitted were promptly released and subsequently