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Implicit Interaction in Collaborative Music Performances

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Abstract

The use of physiological signals in Human Computer Interaction (HCI) is becoming popular and widespread, mostly due to sensors miniaturization and advances in real-time processing. However, most of the studies that use physiology-based interaction focus on single-user paradigms, and its usage in collaborative scenarios is still in its beginning. Our research explores collaborative music performances where interactive sonification of brain and heart signals take place. We hypothesize that the representation of physiological signals through physical objects (*physiopucks*) in a tabletop interface may enhance motivational and controlling aspects of music collaboration.

Here we show a multimodal system, based on electro-physiology sensors (*Enobio*) and the *Reactable*, a musical tabletop interface. Performance and motivation variables were assessed in an experiment involving a test "Physio" group (N=22) and a control "Placebo" group (N=22). Participants in Physio Group worked in pairs using two methods for sound creation: implicit interaction through physiological signals, and explicit interaction by means of gestural manipulation. In Placebo Group, no real-time sonification was provided as the system was driven by pre-recorded physiological signals. Users in Placebo Group were unaware of such effect.

The results show that pairs in the Physio Group declare less difficulty, higher confidence and more symmetric control compared to the Placebo Group. We also discuss the correlations within pairs for different performance and motivation measures in Physio and Placebo Groups. The results show that our new multimodal system do not impose major difficulties for music collaboration. On the contrary, the similar ratings of distribution of control that were given by the Physio Group (but not Placebo) show that the proposed implicit interaction model encouraged symmetric music collaboration between participants.

These results support the feasibility of introducing physiology-based interaction in multimodal tabletop interfaces for collaborative music performance. Together with the creation and control of sounds, brain and body signals may be powerful indicators of performers' emotional and cognitive states during collaboration, guiding music anticipation and interpersonal synchronization.