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An Analysis of Behavior on Kinetic Interactive Arts in Terms of Kansei-engineering

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Recently many researchers are interested in interactive arts. The term "interactive art" have been used, since 1980's, as a general term to denote such an art category that reactions of the audience of an art can affect or change the art itself. The trend that an interactive art becomes popular more and more will must be continues in the future. If we can acquire and utilize rules about why and how in designing an interactive art as amusement, it becomes easy to adapt the user to treat augmented reality environments and to understand abstract information physically. However, any rule can not be found yet while it is supposed that some rules lie potentially in an interactive art.

The purpose of this study is to investigate how artifacts called "kinetic interactive art" attract the users. In this study we intend to extract rules from log data recorded in interactive processes between the user and an interactive art. We call this approach "Kansei-engineering" because it tries to bridge a gap between user's mental state and physical behavior. There are two basic steps that we make the experiments to attain our final goal. In the first step we should identify human's behavioral patterns in the interaction between kinetic interactive arts and human. Because it is not clear how users handle such artifacts and furthermore, how users' mental state is represented in terms of the scientific approach. The most parts of this paper are devoted to the analyses of them. If humans' behavior on the kinetic interactive arts is expressed qualitatively, we are able to make some hypotheses of factors inducing such behavior as the second step. It is beyond the scope of this paper to verify them, However, we will suggest a framework for designing such artifacts based on the results of the first step.

This paper consists of five chapters. In chapter 1, purpose and background of this study are described.

In chapter 2, we analyze the characteristics of user's spontaneous behavior on kinetic interactive arts in order to express user reactions qualitatively. The analysis is divided into the parts, that is subjects' physical movement level and subjects' intention level. The former is analyzed based on logs of subjects' physical motion. The latter is analyzed based on protocol data corresponding to the motion. From the results of the experiments, we obtain the followings.

- (1) Subjects' behavior includes some clusters each of which is a sequential repetition of similar behavioral patterns, and which are transitional as time.
- (2) There is a possibility that clusters containing same behavioral patterns appear more than twice.
- (3) As the number of appearances of clusters increases, the time during which users spontaneously touch kinetic interactive arts spontaneously increases to some extent.

We also discuss subjects' intentions causing the behavioral patterns found in chapter 2.

The behavioral characteristics resulted, however, don't belong only to spontaneous behavior. In chapter 3, we show that the behavioral pattern on tasked interactions are similar to spontaneous behavioral patterns, Therefore it is difficult to detect whether subjects are interested in only from behavioral patterns.

In chapter 4, we consider a framework for designing artifacts making the interaction a pleasure. Three levels are identified for this consideration. First, the capacity level is mentioned. In this level a form of the artifact can be suggested based on users' behavior characterized by sequential repetition of similar behavioral patterns. Second, the awareness level is mentioned. Here all possible operations should be exposed to the user. Third, the invitation level is assumed but it is beyond the scope of this paper to illustrate this level.

In conclusion, results of this study will give a novel direction and idea in a field of human interface design and they will be effective as another way of developing principles except for metaphor oriented design principles.