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# Collocated Social Interaction through Music: Cooperation and Collaboration

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**Abstract**

We want to share the concept of our work-in-progress study that was to observe the user experience of collocated social interaction through music play by using mobile devices. Three players play music by swing their mobile or smart watch to create music. Bumping gesture between users creates highlight part by enhancing the sounds of instruments. Through the user study with children, we extract differences between cooperative inputs and collaborative inputs. To provide more intimate social interaction, collaborative inputs are necessary.

**Author Keywords**

Collocated social interaction; Music; Cooperation; Collaboration; Children

**ACM Classification Keywords**

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous;

**Introduction**

Sherry Turkle's book *Alone Together* starts with this question: why do we expect more from technology and less from each other[8]? As communication technology develops, we usually use our cellphones to communicate with others. Even in the home, we often use short message service (SMS) or mobile messenger to talk with family members. Of course, the social distance between



Figure 1: PolyMetros create musical sequence from each pad and result will combined on the center hardware.



Figure 2: Toucbox provide body touch technology to play a music together.

people far apart is getting shorter. In contrast, there is no doubt that the social distance between people who are facing is getting bigger. Rogers calls this phenomenon the digital bubble. The digital bubble is a metaphor of the isolation experienced due to digital technology, especially telecommunication technology[6]. Everyone looks at their cellphones when they are together, and talking is substituted by messengers. In this manner, a number of studies are trying to make the social distance closer through novel interaction technology. Majority of those researches focuses on the system configuration not the user experience of users. To bring more efficient and meaningful social interaction through mobile or wearable device, we need to extract the elements of social interaction in the collocated situation. In our work-in-progress study, we suggest a collocated social interaction through co-playing music by using mobile devices and conduct a user study with children to extract design elements.

### Related Works

There are some researches that use music as a medium of collocated social interaction [1,2,3,5]. They use musical elements because music induce motivation of user as well as Music is one of the naive ludic activity that provide hedonic experience[7]. Moreover, music does not affect to the awareness of other players. Screen based interface taking an attention from users and it cause decrease of awareness. Therefore music is suitable source for a social interaction[9].

The Polymetros is one example of collocated social interaction by using music[1]. The Polymetros provides the pads for each person to control the music. Players create sequences of notes through the pad. The sounds

created by each player are collected to the center module and played. The social interaction occurs in when the sounds are played together. The actual act has personal characteristics but the result is social.

The Touchbox is collocated musical interface that uses body touch technology[3]. Two persons hold electrodes and touch each other to create sound. Sounds are changed according to the touching surfaces. If they touch more, pitch will be increased. These interfaces use bodily interaction with touch, so it actively engages people to the interaction. The creation of sound also induce the exploration of users so that users will touch each other more.

Those works suggest new interfaces for collocated social interaction through music, but the discussion about social aspects or behavior changes are limited.

### Cooperation and Collaboration

The difference between the Touchbox and the Polymetros can be explained by differences between cooperation and collaboration. Kirschner et al. explain the difference in cooperation and collaboration[4]. He refers to the American Heritage Dictionary. Cooperation means we worked "together toward a common end or purpose". But collaboration means we initially worked "in a joint intellectual effort". In other words, cooperation is the sum of individual works and collaboration is the initial group works. The interaction method of the Touchbox is collaboration because to create the music, people have to have contact and co-acting. On the other hand, the interaction method of the Polymetros is cooperation, because each user creates their own sequence and the system merges the sound.

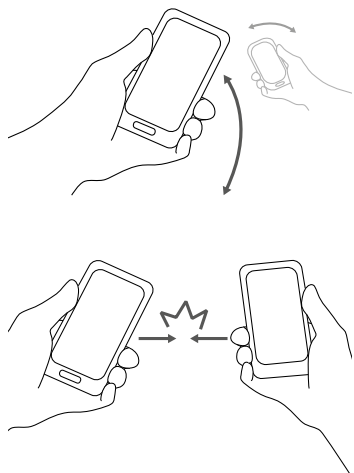


Figure 3: The cooperative input and the collaborative input (bump) used in the study [10]. By swinging mobile phone, users can create the beat with chosen instruments. By bumping, user can create highlight sound



Figure 4: Children playing with the interface. They laugh when collaborative input successfully create highlight sound.

The collaboration will provide more rich social interaction compared with cooperation. However, only a few works provide collaboration. Moreover the works are limited on the body touch interaction. To design the more meaningful social interaction we need to study about co-located social interaction using collaboration.

### Research method

We designed two interfaces that can provide both cooperative inputs and collaborative inputs. The interfaces provide four different percussion instruments: Drum, Maracas, Cymbals, and Triangle. By swinging a mobile phone, each player could play the beats of an instrument they choose. When the collaborative mode is on, the bump function is activated. When users bump each other's mobile phones the sound of instruments are exaggerated. If two player choose same instruments and bump together then highlight sounds will appear.

With the interface, we conducted user study with 9 children. 5 boys and 4 girls participated and their ages are between 8-10 years old. 3 children make 1 group.

Each group experiences 15 minutes of cooperative play and 15 minutes of collaborative play with bumping function. After the user study, we conduct semi-structured interview with children.

### Result

The Overall results show an interface that provide collaborative inputs creates more dynamic user behaviors. Children showed verbal and non-verbal cues of social interactions during the user study especially in the collaborative setting.

#### *Counting for a precise collaboration*

In the collaborative mode, children tend to count a number to make more precise collaboration. They count "three-two-one!" and bump together. Compare with the cooperative input situation, the verbal communication dramatically increased at collaborative setting.

#### *Interrupting others*

In the cooperative play situation, children did not interfere other children's play. They played independently.

However, after the bumping gesture was activated, children interrupt other's play. "Choose cymbals!", "Don't play with triangle!" Through the interfering they trying to explore more combinations of instruments.

#### *Observing other players*

In the collaborative mode, children trying to listen other players' sound, and change their instruments. Some of player select same instruments with other players and trying to bump with him or her. And some children choose different instruments with others to create harmonized sound. The interesting point is these behavior did not appear in the cooperative situation. Though this point, we assume that the collaborative play enhances not only aware of others but also self-reflection during playing.

#### **Wearables and collocated social interaction**

The study was conducted with hand-held mobile devices. Therefore there are limitation on the gesture inputs. To create more dynamic collaborative inputs, we have to provide more degree of freedom to the inputs. With wearable devices, we could suggest diverse range of collaborative inputs for example clapping, mimicking the posture, hugging and even eye-contact.

To explore more effective social interaction through collaborative inputs we have to embed wearable devices to the collocated social interaction through music.

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