

Combiform: a Combinable Social Gaming Platform

Edmond Yee*, Josh Joiner, Andrew Dang, Andy Uehara
University of Southern California, Interactive Media Division

*edmond.yee@usc.edu

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1. Introduction

Combiform [see Fig. 1 *center*, video: 4-1] is a novel digital gaming console featuring four combinable handheld controllers. In particular, multiple players may freely combine and lock together their handheld game controllers, thereby creating a very flexible collective and transformable tangible interface. It can be understood as an emerging gaming system attempting to expand the co-located (the same confined physical space) social play experiences introduced by platforms such as *Nintendo Wii*, *Microsoft Kinect* and *Hasbro Bop-it*. Most co-located video games direct players' attention to the screen but not to the other players. This arrangement counter-acts the natural affordances required for social interaction [1]. Combiform is especially designed to drastically improve co-attentiveness during co-located play. The system and its 10 games emphasize tangible body-to-body interaction via a flexible combining and decombing mechanism. This new interactive technique affords an exceptionally strong re-enforcement for player to pay close attention to other players. In addition to significantly improving focus attention, players could now feel and direct each other's movements and gestures via these tangible links between controllers [video: 4-2].



Figure 1. *left: joint gesture control, center: Combiform controllers right: players bodies facing each other while combining*

2. From Co-located to *Tangible Co-attentive* play

Gajadhar. et. al. [2] found that “co-located co-player settings significantly add to the fun, challenge, and perceived competence” in gaming compared to both meditated (online play) and virtual co-play (single player mode). However, there are many factors that could influence players' excitement level even if playing against human players in the same confined space. Interpersonal distance, body orientation, physical interaction, gesture, verbal communications, facial expression, etc. are all important factors in determining the level of social engagement [1]. These could be summarized as a form of attention between players, in which we call “co-attentive” play (see Fig. 2). A recent study has shown that natural-mapping interfaces used in system such as *Nintendo Wii* and *Microsoft Kinect* improve player co-attentiveness during play [3].

Combiform attempts to improve co-attentiveness from a new perspective. Players are required to actively choose to attach and detach their interfaces in some games; thus, they must pay close attention to others while playing. Since players have to move closer and away from each other for combining, interpersonal distances are dynamically changing as illustrated in [video: 4-5]. Players are required to move their arm (or even jump) together after they have combined, achieving a natural-mapping synchronized interface that draws face-to-face and body-to-body attentions among players. It also amplifies players' gestures which enhance social presence in gaming [3, video: 4-2].

One very unique aspect of Combiform not found in any other previous work is the ‘tangibility’ it possesses. Combiform creates a physical link among players to directly feel each others' gestures and movements. This opens up possibilities for directing other players' movements during play. Communication during play can even be done via this tangible link in non-verbal form [4-3]. The combining mechanic also affords players to tap into other people's play space in competitive games. Attaching and detaching the controllers is a highly visible action for all players. This visibility of movements increases possibilities for immediate physical response from other players as seen in [video: 4-5]. These emerging actions can be interpreted as tangible means of augmenting digital gaming through the introduction of the flexible attaching and detaching interface.

3. Hardware Design and the Affordances

Combiform's configuration (see Fig. 1 *center*) is especially designed to encourage players to pay close attentions to others rather than to the screen. When all four controllers are combined, the players' bodies face each other (see Fig. 1 *right*). The neodymium magnets provide about 10lb of perpendicular pull force. In addition to the attaching mechanism, all assets of the controller are physically *enlarged* and *simplified* to maximize direct visibility and transparency of in-game actions. Detailed information about hardware design could be found in the *Supplementary Text Document*.

4. Game Design: Enriching Co-attentive Play

We would highly encourage readers to view the videos online along with the description of the games in the *Supplementary Text Document*. We are presenting 10 different game experiences that range from purely active social-fun (e.g. *Blow-It Up*) [4-2], to full-body twisting challenge (e.g. *Switch*) [4-3], to board-game-like social experiences (e.g. *Match!*) [4-4], to serious games for improving Mathematics skills (e.g. *Pop Quiz*) [4-6]. Note that all of these games can be mapped in a continuum of social presence that could lay a foundation for later studies.

References

- [1] de Kort, Y. et al., 2007. People, places and play: A research framework for digital game experience in a socio-spatial context. DiGRA 2007 Proceedings "Situated Play"
- [2] Gajadhar, B. et al., 2008. Shared fun is doubled fun: player enjoyment as a function of social setting. In P. Markopoulos, B. de Ruyter, W. IJsselsteijn, & D. Rowland, Fun and Games (pp. 106-117). New York: Springer.
- [3] Vanden Abeele, V. et al., 2009. Gaming Naturally is more Fun Together: the Influence of Controller Type on Player Experience. ACE 2009
- [4] Video Links
- [4-1] Promotional Video <http://youtu.be/r92cDygrDiM?hd=1>
- [4-2] Blow-it up <http://youtu.be/aGZG5hGJuDw?hd=1>
- [4-3] Switch <http://youtu.be/L94odcsVWHI?hd=1>
- [4-4] Match! <http://youtu.be/U5QS-e2G50M?hd=1>
- [4-5] T.A.I <http://youtu.be/I2BNBu7aMYI>
- [4-6] Pop Quiz http://youtu.be/tV_HWMqlenI