

---

# Tangent Society – Persistent Mobile Multiplayer Activity Logging Game

**Kai Kuikkaniemi**

**Ilkka Kosunen**

**Toni Laitinen**

**Max Vilkki**

Helsinki Institute for Information  
Technology

PO Box 19215, 00076 Aalto,

Finland

<firstname>.<lastname>@hiit.fi

## **Abstract**

Based on our earlier experiments and prototypes with affective games and biosignal adaptive applications we have identified that the major obstacle of understanding the biosignal adaptive gaming is lack of longitudinal experiments. In order to achieve this goal we have developed a persistent mobile multiplayer game that utilizes biosignals and can allow organization of experiments where subjects use the game repeatedly over long time period. In order to achieve this we have invested special attention on the games communication architecture, game story and visual identity.

The game is called Tangent Society and it will be launched in beta during the Spring 2011. The game is based on real-time web environment and it utilizes simple biosignal capturing sensors (e.g. Polar Bluetooth heart rate band) in addition to the phone's inbuilt sensors (accelerometer and camera).

## **Keywords**

Activity logging, body blogging, pervasive gaming, multiplayer mobile gaming, biofeedback, design research

---

Copyright is held by the author/owner(s).

*CHI 2011*, May 7–12, 2011, Vancouver, BC, Canada.

ACM 978-1-4503-0268-5/11/05.

## **Background**

We believe that there is great promise in utilizing biosignals in computing. So far most of the applications are limited to either medical or therapeutical use, short interaction experiments, or sports. Furthermore, usually affective computing focuses on how the computer system can be improved to match better human needs. However, the benefits of biosignals are not only limited to better human-computer interaction, but computers can help humans to control themselves (biofeedback loop) or enhance social situations (for example inter-personal biosignal synchrony). During last five years the utilization of sensors in computing has exploded (accelerometers, GPS, image recognition, volume cameras, sound analysis), but still besides heart rate bands for athletics and medical applications, there are practically no widely used physiological sensors in the business-to-consumer markets.

We started our biosignal experimentations with EmoTetris [1] and EmoShooter [2]. These games were single player games that explored different ways to use GSR, EMG and respiration signal in game control or in game adaptation. After early single player prototypes we have shifted our focus on developing multiuser experiments. We have developed the following multiuser prototypes that utilize biosignals: Presemo – participatory presentation and workshop environment with biosignal annotation interface, Emopoker – biosignal augmented poker [3], Synchro-experiment for modeling inter-personal biosignal synchrony, Ooze Attack – public display game that utilizes heart rate as a complementary interface [4] and Listen to Yourself and Others [5] – multiuser biosignal sonification platform.

In most of our biosignal experimentations we have witnessed some kind of learning curve. Hence, users have been either able to improve their performance, or they have changed somehow their behavior around the biofeedback. Based on this observation we have concluded that in order to understand better the design principles of biocybernetic interaction loop and especially the affordances of biosignals in social situations, the experiments need to be longitudinal. Long duration is important since we want to give users time to learn the nuances of this novel interaction paradigm and see what happens after the learning curve levels out. We believe that combining social interaction and biofeedback can eventually produce new kinds of social applications.

However building a longitudinal multiuser biofeedback experiment is not an easy task. Scaling up current experiments is not a feasible solution since there is scarcity in advanced sensor devices, usability of systems is often poor and it is hard to get access to sufficient amount of subjects.

After we learned about the experiences of Gilleade's body blogging [6][7], we decided to follow bit similar path and eliminate design patterns that require synchronous social activity, or very accurate online data collection, and focus on setups that can be used with commercial sensors that support continuous logging in live conditions. Furthermore, two events pushed us to follow a design approach that puts special emphasis for a research prototype on graphical design and fine tuning – first we organized a workshop for our industry partners and their message was unanimously that we need to push our prototypes to more commercial direction in order to achieve natural usage

patterns. After this, a location aware game called Shadow Cities became the most downloaded app in the Finnish iPhone App Store [8]. This game basically utilizes game designs that are familiar from many earlier pervasive gaming studies, but ultimately more refined implementation helped this game to make a breakthrough and become widely used. Based on this background we came up with the following prototype requirements:

- Game can be distributed through app-stores
- Supports Bluetooth-based biosignal sensors, but can be used without any external sensors in order to achieve critical mass of use
- Fully mobile, do not require other devices, but can be extended with external sensors
- Supports features for community forming, communication and sharing
- Supports also single player experience
- Game content that can engage players for long-term use

### Tangent design

The goal of the Tangent is to create a balance between engaging game and capability to experiment with biofeedback in multiuser situations. Mobile phone software is developed using QT and QML, phone client is connected to the server through XMPP service, which is basically an advanced real-time messaging platform. We chose this server-side solution, because it enables both synchronous and asynchronous communication between clients, and between client and server, and because there exists robust framework implementation for XMPP. Following picture shows some screenshots of the game interface.

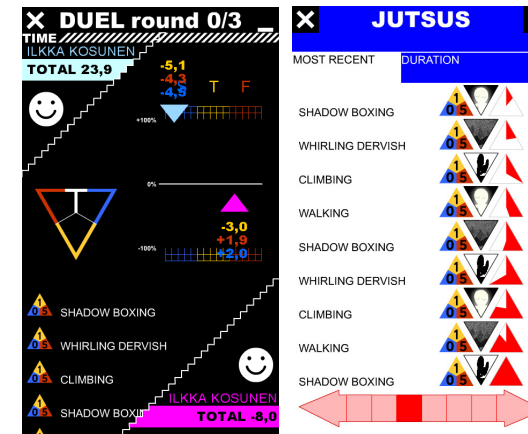


Figure 1: Screenshots of Tangent game – Duel screen and Jutsu main selection view

Since the Tangent is activity-logging game, we formulated the game on top of single units of activities. We call these activity atoms as Jutsu. The name was chosen since we wanted to make a distinction from generally used terms such as action, spell (popular in games), move, exercise or turn. A Jutsu can be either a short or a long-term activity ranging from Wii Fit style gestures such as making spins, to a long marathon-scale running exercise. Then again Jutsu can be a heart rate controlled relaxation exercise or long-term stress minimization task, which utilize heart-rate band. In addition we have designs for other Bluetooth-enabled physiology sensors such as Neurosky Mindset. We decided to split the game in to discrete action units instead of monitoring continuous activity for three reasons: 1. Creating game, and especially social game, is easier from discrete performance units, 2. Sensors and mobile phones do not support robust 24/7 activity-

logging in a user friendly manner, 3. It is easier to create a qualifying algorithm for discrete time unit than classifier algorithm for continuous data.

Following list describes how a two-person duel mode works in the Tangent game. The game supports also single player mode, which is functionally somewhat similar to applications that support physical training, but extends beyond traditional training tasks.

1. Player chooses duel type (duration and how many rounds) and opponent (friend, unknown, waits for other player to challenge).
2. Opponent accepts challenge.
3. Each player has a goal, which is defined by his previous game history or preferences
4. During a single round both players can perform Jutsu's as they prefer during the limited time (Jutsu can have a fixed duration or open duration, each Jutsu is scaled on a three dimensional scale)
5. After a round both players scores are summed together and duel situation is defined by difference between players predefined goal and current score-sum
6. Finally, the duel is won by the player whose goal is closer to the duel's score-sum

Hence, our aim is to persuade people to repeat these Jutsus many times over a weeks and months. We collect system usage data, distribute questionnaires and interview some of the players. Research objectives are divided in to two: 1. details of system design and design process (design research perspective), 2. How user performance changes during the test period – biofeedback training, and what are the overall

interaction preferences and usage patterns compared to accelerometer signals and biosignals (HCI perspective).

### **Acknowledgements**

The Tangent prototype is developed in Emokeitai project, which is funded by Finnish national innovation Agency Tekes and supported by partner companies Nokia, Polar, Ball-IT and Tieto.

### **Citations**

- [1] Kuikkaniemi, K., Kosunen, I., Progressive System. Architecture for Building Emotionally Adaptive Games, *Brainplay 2007, ACE 2007 Salzburg*.
  - [2] Kuikkaniemi, K., Laitinen, T., Turpeinen, M., Kosunen, I., Saari, T., Ravaja, N., The Influence of Implicit and Explicit Biofeedback in First-Person Shooter Games. *Proc. CHI 2010, Atlanta*.
  - [3] Yamabe, T., et al. Emopoker. WIP. *Fun and games 2010, Leuven*.
  - [4] Kuikkaniemi, K., Ravaja, N., Korhonen, H., Nacke, L., Position papers in Biosplay (Biosignal adaptive Social gaming) workshop (to be published). *Fun and Games 2010, Leuven*.
  - [5] Kuikkaniemi, K., et al. Listen to yourself and others. Demonstration. *Pervasive 2010, Helsinki*.
  - [6] Gilleade, K., Fairclough, S. H., Physiology as XP – Bodyblogging to Victory. BioS-Play Workshop at Fun and Games 2010. Leuven, Belgium
  - [7] The Body Blogger – website.  
[http://www.physiologicalcomputing.net/wordpress/?page\\_id=461](http://www.physiologicalcomputing.net/wordpress/?page_id=461)
- Shadow Cities: the game that knocked Angry Birds off the #1 spot  
<http://www.pocketgamer.co.uk/r/iPhone/Shadow+Cities/news.asp?c=25083>