

A MULTIMODAL BEHAVIOUR ANALYSIS TOOL FOR BOARD GAME INTERVENTIONS WITH CHILDREN

Board games are great tools to create interaction scenarios with children, and many board games have been adapted for therapeutic purposes by psychologists working with children (Shapiro 1993, Matorin & McNamara 1996). One issue with board games is that although they can provide valuable information, the amount of time when such information is present is relatively small during the play (Gardner 1986). Since annotation of data is costly, this poses a problem to psychologists who would use board games as interventions. With rapidly developing behaviour analysis approaches in computer sciences, it becomes possible to automatically process large amounts of gaming data and prepare indices for the therapists, thus significantly reducing the time required for the analysis, as well as adding visualizations and analytics functionality to the cues that can be automatically extracted from the child during game play. Since thousands of new board games are being produced every year, a toolkit that will help analysis through board games will enable many possibilities to child therapists. It will also help developers of games for specific therapeutic functions by providing quantitative measurements of behavioral indicators during play. It is known that games serve as assessment tools, and provide the therapist with behavior patterns, cognitions, attitudes (Frey, 1986; Nickerson & O'Laughlin, 1980).

The purpose of the project is to develop a platform for board game interventions. Specifically, the platform will include the sensory setup (cameras for recording the players, as well as wearable sensors), the data collection and storage architecture, data access and annotation facilities (partly by external annotation software), analysis modules that will enrich the collected data with signals (such as facial expression detection, gaze, valence and arousal measurements, etc.), and visualization for pattern discovery and analysis.

Our aim in the project is not to evaluate a particular game as a therapeutic intervention, but rather to create a digital toolset for psychologists using board games as therapeutic interventions. However, we will use several games to test the platform. According to Schaefer and Reid (1986), there are four categories of games for therapeutic use: communication games, problem-solving games, ego-enhancing games, and socialization games, respectively. We plan to focus in this project on two types of games. The first one is communication games, in which competition plays a smaller role, and inter-player communication is the key (Zagal et al. 2006). We propose to work on analysis tools that would help the psychologist to observe the successful and unsuccessful communication and interactions during these games. The second one is the ego-enhancing game, which stresses competition and challenge. This also -potentially- leads to conflicts between game players, creating emotional states like frustration, disappointment, anger, but also relief, triumph, elation, etc. Socialization games are typically used in group therapy, and also emphasize communication. A particularly interesting aspect is the opportunity to see how the child deals with conflict situations. We will investigate tools for this purpose. The developed analysis tools can also serve other play scenarios, such as affect analysis for play therapy (Halfon et al., 2016).

Tentative work packages

WP1 - Software architecture: Multiple sensors will record from a gaming session in a robust and time-synchronized way.

WP2 - Analysis: Off-the-shelf analysis tools are integrated to provide basic and essential feature extraction. Openface (Baltrušaitis et al. 2016) is one example.

WP3 - Annotation: The manual annotations, typically provided by experts, will be performed using mostly off-the-shelf annotation tools. We will require students with psychology background to provide some annotations, for which we will develop

WP4 - Database collection: Multiple board games will be used to collect data for testing the system.

WP5 - Person analysis: New sets of affective states will be explored, specifically tailored for game play, including (depending on human resource) frustration, triumph, boredom/detachment, disappointment, concentration, excitement, anger.

WP6 - Interaction analysis: Interaction features will be assessed, including ganging against a player, communication problems between two players, synchrony and rapport between two players, assessment of expertise in the game, exclusion of a player in the game.

Involved researchers

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Prospective Researchers

Participants with the following expertise and/or interest are welcome:

- Board game design
- Social signals
- Affective computing
- Paralinguistic analysis
- Multimodal interaction
- Sensor based data collection
- Computer vision and pattern recognition
- Psychology
- Interaction design

References

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