Virtual Patient Psychotherapy Training

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A Dialogue Intervention Simulation Framework to Facilitate Psychotherapy Training

- Kyle Wilcocks, Bill Kapralos, Allen Kalpin, Allan Abbass and David Chandross

- The challenge in providing ISTDP treatment lies on the recognition and handling of verbal and non-verbal interaction patterns as unprocessed emotions are activated in the treatment relationship.

- For this reason, the use of audiovisual recordings of therapy sessions for teaching and supervision is considered very important.

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- Another approach that can be taken to address the limitations associated with the traditional teaching methods for the enhancement of mental health care teaching is the application of virtual patients (VPs).

- V. Guise, M. Chambers, E. Conradi, S. Kavia, and M. Vlimki, "Development, implementation and initial evaluation of narrative virtual patients for use in vocational mental health nurse training," *Nurse Educ. Today*, vol. 32, no. 6, pp. 683–689, 2012.

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- However, realism is a main challenge that VPs are facing, particularly with respect to displaying and detecting of emotions. For example, it was found that users found it difficult to express empathy to VPs thus the learning outcome was less effective when compared to a real patient.

- A. M.Deladisma, M. Cohen, A. Stevens, P. Wagner, B. Lok, T. Bernard, C. Oxendine, L. Schumacher, K. Johnsen, R. Dickerson, A. Raij, R. Wells, M. Duerson, G. Harper, and S. Lind, "Do medical students respond empathetically to a virtual patient?" *Am. J. Surg.*, vol. 193, no. 6, pp. 756–760, 2007.

Phases of Development

- Phase 1: Decision Tree Structure – Brief preset vignettes with limited number of possible interventions.

- Phase 2: Artificial Intelligence Structure – algorithms respond to settings for patient parameters and patient responds realistically (with words, vocal inflection and body language) to large number of possible therapist interventions; no fixed length for a "session."

Phase 1: Decision Tree Structure

- <u>Pre-set decision tree</u> of responses to interventions
- Central pathway is the "<u>correct</u>" intervention-response pathway.
- **Therapist** has choice of <u>3 or 4 interventions</u> to each response of Virtual Patient.
- "<u>Wrong</u>" interventions -> one of the 3 or 4 possible <u>"non-ideal"</u> <u>responses</u> of **Virtual Patient**.
- When the response is "non-ideal" the **Therapist** <u>chooses from 3 or 4</u> <u>interventions</u> to hopefully get back on the "correct" pathway.

Phase 1a: Decision Tree Structure

- No avatar

- Text description of patients verbal and non-verbal responses.

- E.g., Zingtree: https://zingtree.com
  Lucidchart: https://www.lucidchart.com

Phase 1b: Decision Tree Structure

- Avatar (Virtual Patient) speaks with no vocal inflection and no body movement.

- Text description of non-verbal expression.

Phase 1c: Decision Tree Structure

- Adding vocal inflection and body language to avatar.

- "Automating" these changes – creating groupings of vocal inflections and facial and bodily expressions – according to emotional categories.

Phase 2: Artificial Intelligence

- Patient character structure

- Patient response to previous intervention

- Therapist interventions

Phase 2: Artificial Intelligence

Trainee or supervisor sets parameters, selecting a point in spectra, such as:

- Location in spectrum of structural neurosis
- Location on spectrum of fragility
- Character structure: obsessional <-> regressive <-> primitive
- Degree of superego pathology
- Dystonic <-> syntonic
- Degree of resistance
- Anxiety pathways
- Type of active defense (projection, repression, isolation of affect, transference resistance)
- Spectra of these defenses

Model Patient

- Low Resistance Patient
- Allan Abbass: *Reaching Through Resistance: Advanced Psychotherapy Techniques*. pp. 97-99
- Transcript
- Video review
- Alternative pathways

Technical Development

- Developed using the Unity Game Engine, allowing for portability across different platforms.

- https://unity.com

- Avatar from: Autodesk Character Generator; includes multitude of possible facial expressions.

- https://charactergenerator.autodesk.com

Facial Expressions

- 1. Modifying the VP's face through blendshapes along a time line to create various facial expressions (blendshapes are a simple linear model of facial expression allowing for realistic facial animation). These blendshapes are controlled by the SALSA Unity lip synchro-nization asset for 2D and 3D characters.
  - https://crazyminnowstudio.com/unity-3d/lip-sync-salsa/
- 2. Audio is generated from the dialogue text and is saved using the RT-Voice Unity plugin.
  - https://www.crosstales.com/en/portfolio/rtvoice/

Program Demonstration

- https://www.youtube.com/watch?v=yie5ioHLo1k&t=9s

- Ability to manipulate the connections in a decision tree.

- Ability of the text in a box in the decision tree - to be used as text-to-voice - of an avatar.

- Ability to manipulate facial expression of the avatar.

Immediate Next Steps

- SALSA would be used to create groupings of facial expressions, such as "sad," "angry," etc.

- Vocal inflections – using e.g., Mary Text-to-Speech System.

  - http://mary.dfki.de

- Animator and programmer – create upper body movements, making use of existing programs.