Empathy, Artificial Intelligence, and the "Navitar" App.

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Therapeutic Empathy

"To sense the client's private world as if it were your own, but without ever losing the "as if" quality—this is empathy" (Rogers, 1957, pp. 98). Empathy is considered a necessary condition for constructive therapeutic personality change and is positively correlated with therapeutic outcomes (Rogers, 1975). The empathic process is one that is constantly developing between therapists and their clients as their clients discover new areas of their experience. The positive correlation between empathic process and therapeutic outcomes is likely due to a number of factors, including: a decreased sense of isolations/alienation, feeling understood, and decreased self-judgment. Fostering a broader and more open understanding of one's ongoing flow of experience (i.e., mindfulness) can lead to more directed and intentional future behavior (Pincus, 2015; 2016; Rogers, 1957).

Mobile Mental Health

Mobile health (mHealth) applications have become a popular supplement, and potential replacement, for traditional mental health care. mHealth is cost effective because there is only the initial investment of developing the software, eliminating ongoing expenditures for the user (Olff, 2015; Lui, Marcus, & Barry, 2017). Other potential practical benefits include higher patient disclosure, early identification of a condition, and greater utilization. Evidence shows that assessments delivered through mHealth increase patient disclosure and honesty. This is because mHealth has no face to face contact which reduces shame and stigma (Olff, 2015). Moreover, for those with less severe symptoms who would otherwise not be motivated to seek treatment, mHealth may provide a means of direct relief and prevention of larger problems from emerging over time. Applications that address anxiety, mood disorders, post-traumatic stress disorder, schizophrenia, and substance abuse have all been found to yield positive outcomes for their users (Lui et al., 2017). However, there are some practical and ethical issues that mHealth must overcome. Practical barriers include common technological failure, quality control, and anomalies between interacting with a machine versus a human. For example, people have less guilt and negative emotions when they interact with a machine versus a human being which may lead to problems with assessment (de Melo & Gratch, 2015). Various steps must be taken in order to mitigate the effects of the issue. Ethical issues regarding the collection and analyzation of large sets of data also arise. There is an illusion of privacy when inputting personal information into a smartphone, and sensitive information must remain truly confidential in order to guarantee anonymity (Vallverdú & Casacuberta, 2015).

Emotion In A.I.

Using computational models of appraisal, it is possible to create virtual humans that can express emotion. One model, *Emotion and Adaptation*, relies on the idea that human emotion comes from the person-environment relationship, that is peoples' appraisal of their relationships with the environment. Virtual humans operating via this model can produce adaptive emotional reactions (Arsella & Gratch, 2014), including verbal and non-verbal reactions involving gaze, facial expression, and gesticulations (Swartout et al., 2006). It is crucial that virtual humans look and feel as much like real humans as possible in order to get the desired results. Humans have a natural tendency to identify machines to have less of a "mind" than other human beings. This gap is diminished when virtual humans show agency (capacity to plan and act in an intentional way) and experience (capacity to sense and feel) (de Melo, Gratch, & Carnevale, 2014). Rapport, the experience of synchronicity and flow felt during a conversation, has been shown to be another vital factor in making virtual humans seem more real. Feedback relating to what the speaker is saying/doing, or contingent feedback, was found to have the strongest effect on rapport. This is consistent with human-human interactions based upon the *embodied communicative* model, which suggests bodily positions in interactions influence emotions, attitudes, and cognitive appraisals (Tschacher & Pfammatter, 2016). Responsive virtual humans able to create rapport have more engaged conversations with the user. Users spoke longer and used more words when they talked to a responsive virtual human compared with an unresponsive one and even a real person (Gratch et al., 2007).

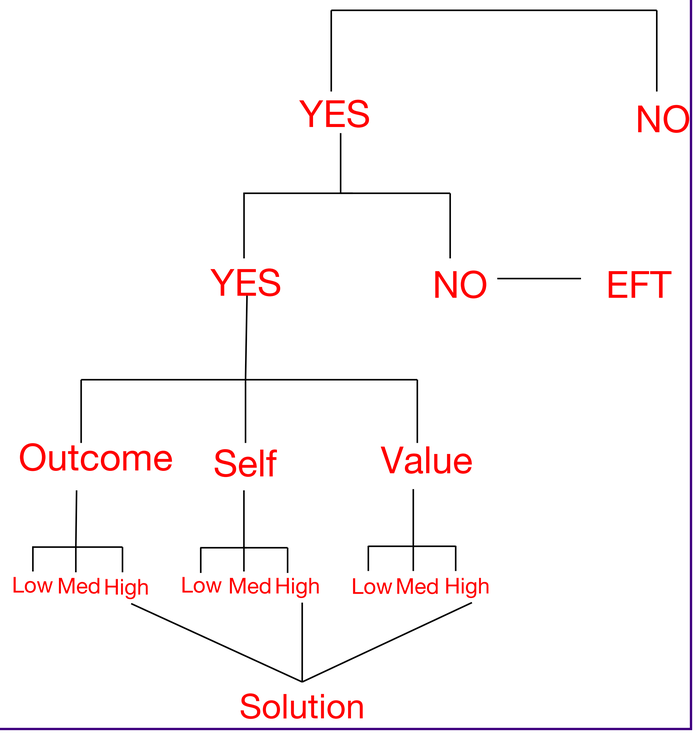
Empathy In A.I.

The goal in utilizing emotional responses and expressions is to establish empathy with the user. Facial expression and voice recognition software assist a virtual human in identifying what emotion a user is feeling. A virtual human will then adjust its own behavior based on its understanding of a user's emotions and will use emotional gestures and posture to show the user a sense of mutual understanding (Vallerdú & Casacuberta, 2015). An empathic appraisal is generated based on a virtual humans interpretation of a user's feelings. This is completed through emotion recognition (picking an emotion that matches emotional cues given by the user) and self-projection appraisal (virtual human uses its own appraisal mechanism and applies it to the user's situation). The intensity of the generated empathic emotion is based on various relational and personal factors such as similarity, social bond, mood, and personality (Rodrigues, Mascarenhas, Dias, & Paiva, 2014). Unfortunately, because virtual humans are so similar to real humans in appearance and interaction qualities, their mistakes are weighted more heavily. This is a phenomenon known as The Uncanny Valley that states things that are extremely human-like have lowered familiarity and their mistakes cause a strong aversion to that thing (Hodgins, Jörg, O'Sullivan, Park, & Mahler, 2010).

Navitar

Navitar is a psychotherapeutic problem solving application in the early stages of development in the CASPR Lab in the Crean College of Behavioral Sciences. The Navitar architecture aims to simulate empathy in the simplest, most elegant manner possible in order to reduce the costs of production, to reduce the likelihood of simulation errors, and to avoid most of the ethical challenges involving personal disclosure of sensitive information. Navitar takes the user through a series of close-ended questions arranged within a branching root architecture until the user arrives at one of several possible interventions, including behavioral habit changes, increased emotional awareness intervention, and acceptance-based strategies. Over time, Navitar will record individual users' patterns of movement through the question sets, creating an experiential map of the user; maximizing assessment efficiency and accuracy of future interventions. Most importantly, by recording users problems, emotions, and habits, the Navitar will be designed to simulate empathy in a manner most consistent with Rogers' (1957) foundational definition, producing an ongoing process in which the user experiences the A.I. attempting to understand his or her experience. The goal is to pull for better user engagement, greater levels of disclosure, and more accurate recording of experiential patterns over time. From there, emotional appraisal may be added to the application to deepen the experience of engagement even further. Interventions may then be aimed at increasing the structural integrity (e.g., connections) and flexibility (diversity) of habits, thought processes, and emotions of the user – producing greater psychological resilience over time (Pincus, 2015; 2016).

Branching Architecture



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