

A Virtual Human Agent for Training Clinical Interviewing Skills to Novice Therapists

CyberTherapy 2007

Patrick Kenny

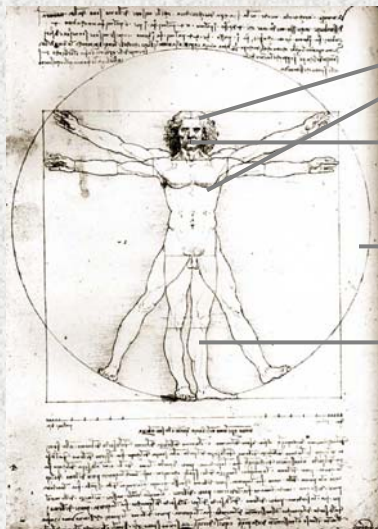
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Jonathan Gratch, William Swartout



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Virtual Humans Group at ICT Researching Artificial Intelligence in fields related to building Artificial Humans



Cognitive and Emotion Modeling

Mind

Speech Recognition Dialog and Discourse

Natural Language Understanding

Simulated Worlds /
Integrated Systems

Non-Verbal Behavior

World

Body

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Virtual Humans to Virtual Patients

- Re-use our Virtual Human technology and apply it to the medical field
- Built an interactive Virtual Patient
 - The intention is to use it to train:
 - Clinicians Interaction
 - Interviewing skills
 - Diagnosis skills
- Virtual patients are virtual ***interactive agents*** who are design to ***simulate a particular clinical presentation*** of a patient with a high degree of ***consistency and realism***

Unfunded Project put together
Over 3-4 months

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Justin – The Virtual Patient

- Teenage Boy with Conduct Disorder
- Trainee acts as a clinician that needs to perform an Initial Intake Interview - history and diagnosis

Idea is to train interpersonal skills such as:

- Leadership
- Cultural Awareness
- Negotiation
- Interviewing
- Communications



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VHumans need to be

- Responsive
 - Able to interact and talk in a timely and natural manner (Verbal and Non-verbal)
 - Behavior not pre-scripted
- Interpretable,
 - Able to understand them and they you
- Believable
 - Act and look like real people (Cartoons characters are ok also *Realism* <> *Believability*)

Virtual humans: Need to act the role they are assigned

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Virtual Humans at ICT



Tactical Questioning
In Immersive Environments

TacQ



Question / Answer Characters

C3IT




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TacQ
Emotional Dialog Modeling




Rapport
Evaluation of Nonverbal Behavior Influence

ELECT
Bi-Lateral Negotiations



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Doctors without Borders Cognition and Emotion Models



SASO-ST
Bi-Lateral Negotiations

SASO-EN
Multi-Lateral Negotiations



• In the SASO system, a trainee interacts with a virtual human representing a “doctor without borders” doctor to negotiate the move of the clinic, as it is in the middle of a strategic operational area.

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SASO-EN

- Show Video



*"The difference between fiction and reality? Fiction has to make sense."
--Tom Clancy*

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Modeling Rational Behavior



Modeling Irrational Behavior

Virtual Humans

Virtual Patients



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DSM-IV: Conduct Disorder Domain

- A patient that has a conduct disorder is characterized by (3 or more of):
 - Aggression to People and Animals
 - Destruction of property
 - Deceitfulness or theft
 - Serious violations of rules
- Chose someone with this problem, because if he didn't respond properly then it would be attributed to the disorder and not technology related

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Building a Virtual Human

Create the
Character

History and background
Artwork
Character
Environment



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Building a Virtual Human



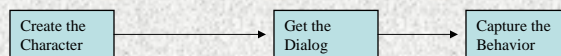
Roleplaying
DSM-IV
Wizard of Oz Tests

- Roleplaying in the Domain
 - Role play between people
 - One plays the Clinician
 - Other plays the Patient with conduct disorder
 - Skip Rizzo naturally fit this role, so he played this part
 - Structured and un-structured

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Building a Virtual Human



Roleplaying
Videos
What makes sense

–The goal is to capture the dialog interchange,
the verbal and non-verbal behavior

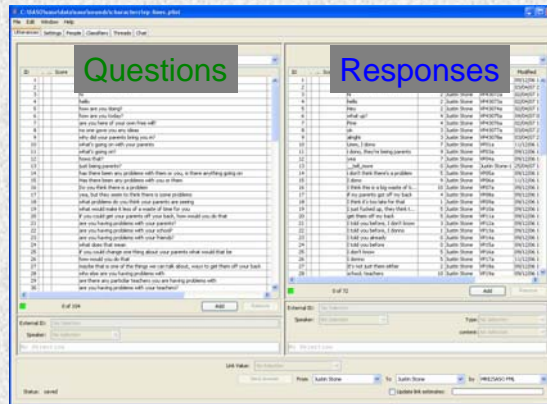
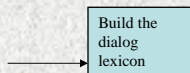
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Building a Virtual Human



Dialog is also used to build the lexicon for the speech recognizer

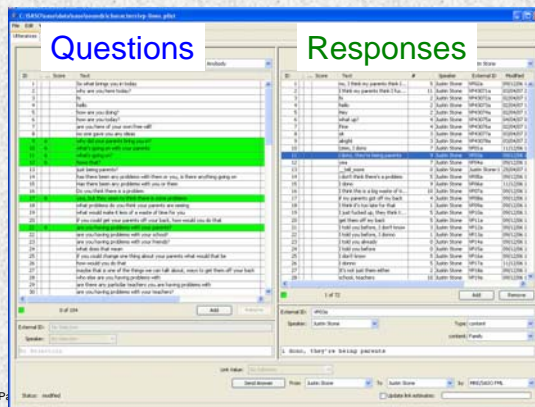
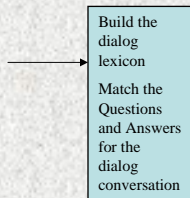


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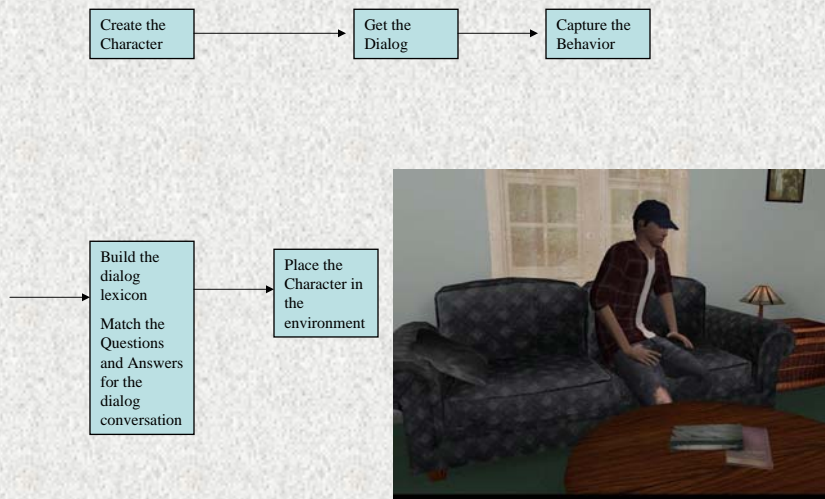
Building a Virtual Human



Responses can be:
On Topic
Off-Topic
Alternate responses
Delayed
Repeat



Building a Virtual Human



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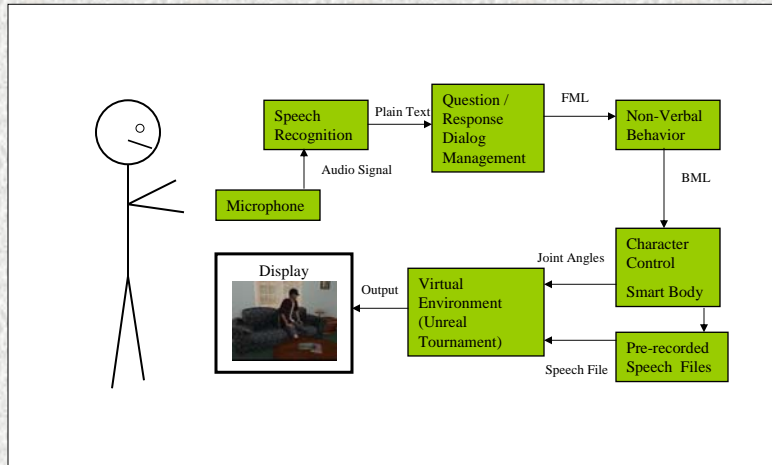
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Interaction with the Virtual Patient



Machine: P3 – Dual Core, Nvidia 7600 Graphics Card, 2 Meg memory,
Dual Monitors, Microphone Speech input

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Subject Testing of the System

- Preliminary subject testing
 - Pre-Questionnaire
 - Assess participants clinical skill level
 - Interview with Virtual Patient
 - 30 min
 - Post-Questionnaire (7 point Likert Scale)
 - 35 questions
 - Assess participants knowledge of the VP's condition
 - Assess interaction and believability of character
 - System in general
 - Additionally there was experimenter over-the-shoulder observation of the participants
- Sample size was 6, but only 3 were of the desired level of clinical competence (*other Vhuman System ~100 ppl*)
- Testing was conducted with the Keck School of Medicine at USC

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Assessment of the System

- What worked
 - Initial results from the survey suggest the system performed well
 - System simulated real-life experience (ranked 5 or 6)
 - The verbal and non-verbal behavior ranked high, between 5 and 7
 - Pace of the interview and response time was good
- What didn't work
 - Some participants found aspects of the system frustrating due to responses not being what they expected and the patient's tendency to repeat some responses too many times
 - Speech model didn't have all the words people spoke, so some lines were interpreted wrong, leading to the wrong response.
 - Patient seemed to be slightly more resistant than anticipated
 - Depth of topics was not adequate, i.e. could only answer a few questions about family matters.

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Improvements

- Increase the size of the dialog set for the speech recognizer and dialog manager
- Include sub-topic area information for each of the conduct disorder areas
- Have patient track more conversation state and topics
- More autonomous behavior than just waiting for the next question
- Create behavior and personality modules
- Tools to build characters more easily

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Building Research vs Applied Systems

- It's always a challenge to take research work and apply it in a real setting
- Things people do that you don't anticipate
- Need to have iterative design, lots of system testing



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Future work

- Seedling Provosts' grant from USC to build a virtual Justina that has been the target of a sexual assault and has to deal with PTSD of the situation – Stuff that is hard to train someone on, hard to talk about.
 - Virtual Humans are powerful training tools
 - Just the beginning and new more analysis on how effective it is



Cyrsis Game
Electronic Arts 2008

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Acknowledgments

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Mission Rehearsal Exercise Virtual Human Training Prototype



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