Hand puppet as input device for 3D virtual chatroom

explore nonverbal signals in computer mediated communication

Li Xin, 3D user interface, MediaLab, 2007

Brief introduction:

- A tool for social emotional communication in CMC(computer mediated environment)
- Explore the expressiveness of nonveral signals in CMC
- A tool extends physical social play to virtual social play
- An experimental interface design, seeking the role of interface in virtual social interaction and behavior

Research Questions:

- Which kind of nonverbal signals are essential to human communication?
- How to intuitively express human guesture, emotions and other non-verbal expression in CMC?
  - What kind of input system would improve nonverbal expression in CMC?
  - How to represent expression and behavior on screen?

Background study: theory and benchmarking

Non-verbal signals in Face to face communication:

- **Kinesis**: bodily movements, gestures, facial expressions, posture, gaze
- **Vocalics or paralanguage**: pitch, loudness, tempo, pauses, and inflection
- **Physical appearance**: clothing, hairstyle, cosmetics, fragrances, adornments
- **Haptics:** use of touch, including frequency, intensity, and type of contact
- **Proxemics:** use of interpersonal distance and spacing relationships
- **Chronemics:** use of time as message system, punctuality, lead time, etc.
- **Artifacts:** manipulable objects and environmental features that may convey messages

Burgoon and Hoobler (2002)

Computer-Mediated Communication:

- Some non-verbal signals are **relatively easer** to simulate in CMC.

  Vocalics (e.g. skype voice conversation)

  Appearance & Artifacts : Limited to virtial appearance and virtual artifacts (e.g. 3d graphical chat room)

  Kinesis:motion tracking (body tracking, eyetracking, gesture input), simpliied representation of facial expression (Smiley / emoticons)

- Others non-verbal signals are **difficult** to simulate in CMC

  Haptics

  Proxemics

Inspiration:

- Skype emoticon:

- Smiley:

:-) :-D :-(

- One way of express a thinking pause

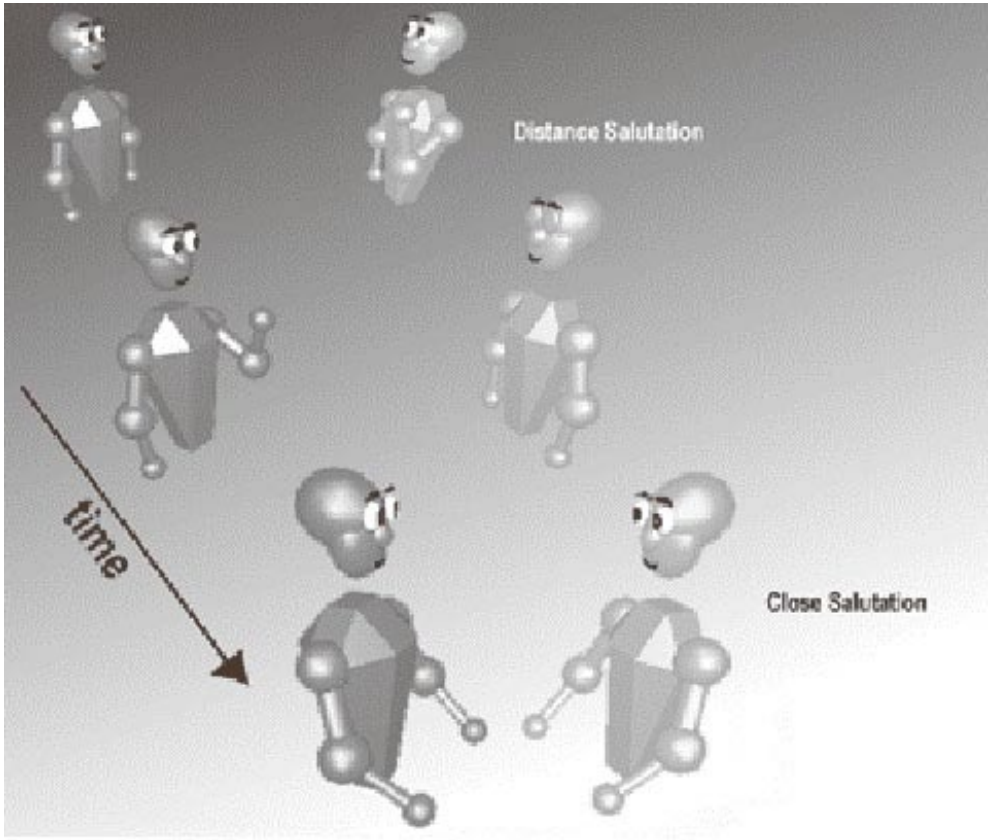
Mmmmmmmmmmmm…

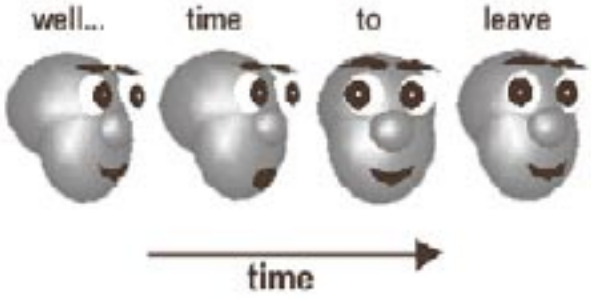
Inspiration:

Second life: missing the point

How I can control the behavior of my avatar is far more interesting to me than how I can dress my avatar

Inspiration:





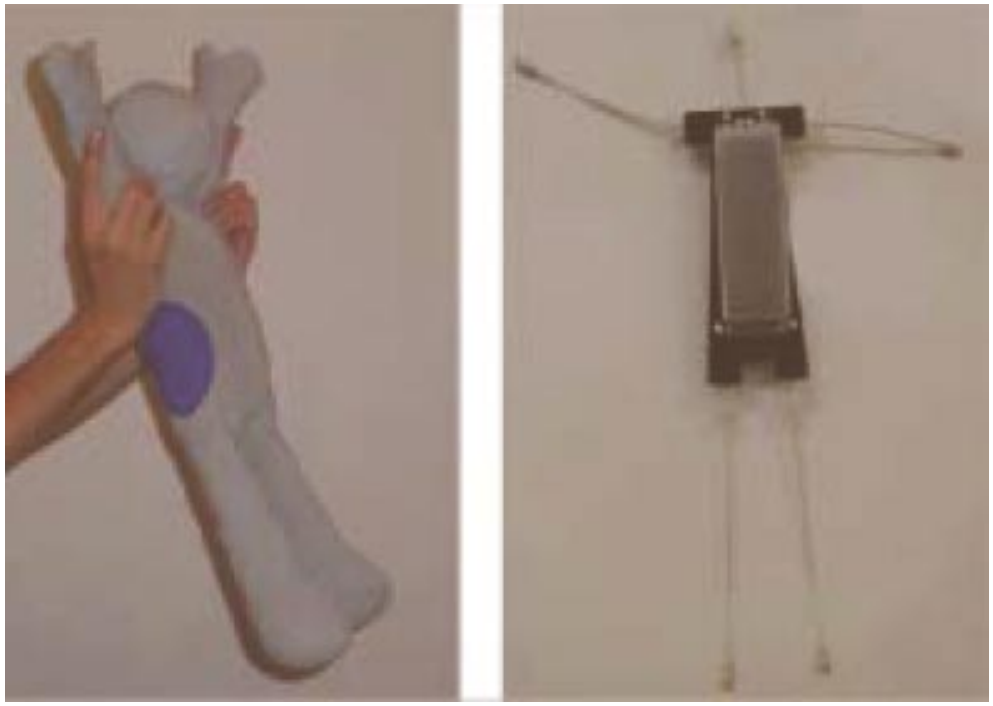
BodyChat:

A system that allows users to communicate via text while their avatar is automatically animated according to the context of the conversation

the avatars automatically animate attention, salutations, turn taking, back-channel feedback and facial expression, as well as simple body functions such as the blinking of the eyes.

MIT, Gesture and Narrative Language Group1998

Inspiration:



SenToy:

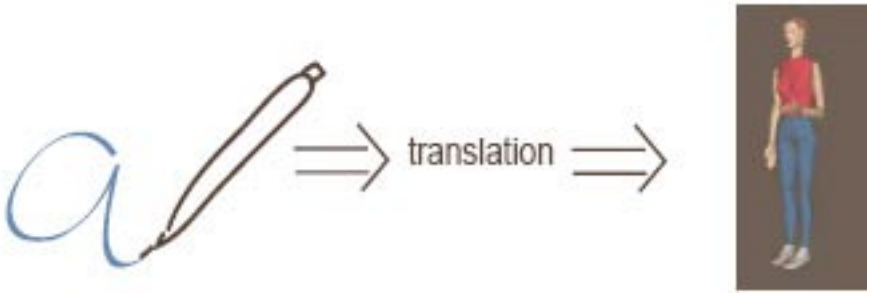
SenToy is a doll with sensors in the arms, legs and body, allowing the user to influence the emotions of her character in the game.

Inspiration:

Cursive:

A pen gesture interface for controlling virtual avatar's gesture

handwriting characteristics---the speed and size of writing---are mapped to expressive qualities of the avatar gesture movement..



http://www.cs.berkeley.edu/~jfc/fbarr/public_html/Cursive/index.html

Inspiration:

Yong-Shin-Gud (“Calling-Dragon-Spirit”)

n interactive 3D-animation installation that has a virtual puppet mimicking the interactor’s voice and gestures

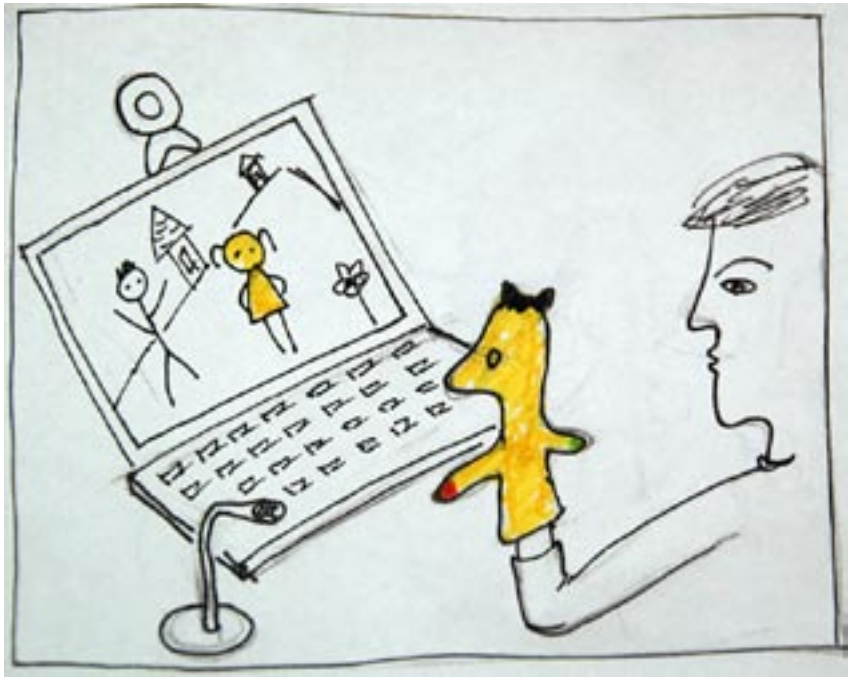
www.newmediacaucus.org/…/ v02/n02/Sp06_Ryu.htm

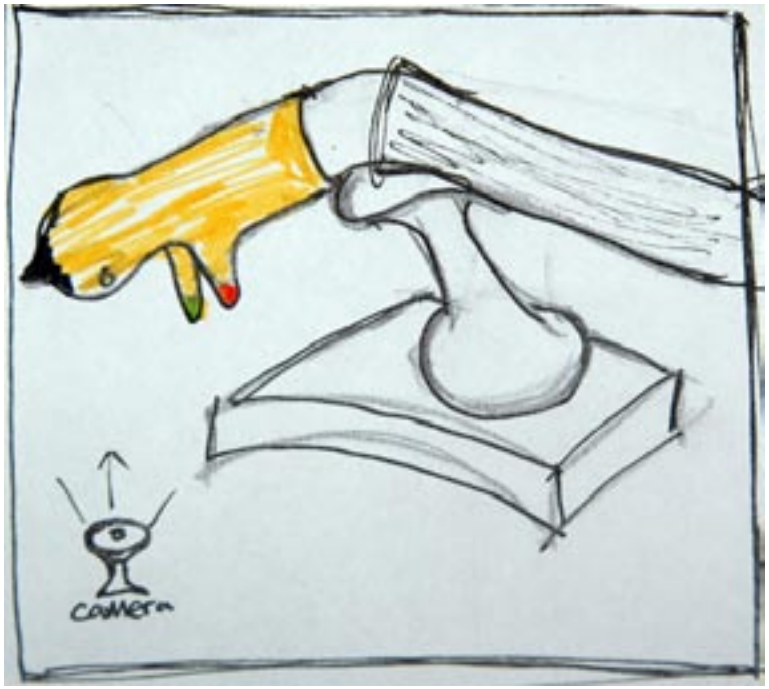
Problems:

Most of current avatar-based virtual world, especially chat rooms are:

- dependent on **mouse and keyboard t**o interact with avatar.
- using **automated generated animation** for avatar movements and expressions
- heavly dependent on **text information**.

Design: concept and sketches




camera


AH

Early user study:

The goal of the user study was to obverse how people play with a hand puppet

- Obverse how people interact with a puppet in a short conversation.
- Ask people using puppet to express a specific emotion

My approach regarding to input system:

physical hand puppet as the main input device:

- Control large movement of the avatar by directly manipulating the physical puppet
- Automatically animating facial expression and other small movement according to context and user preferences
- Using voices input

My approach regarding to input system:

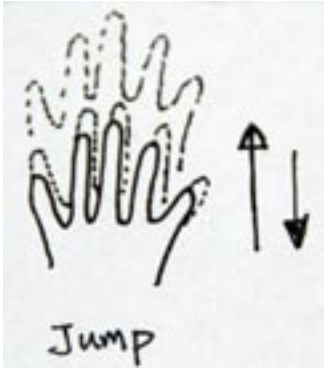
Why puppet:

- Puppets are expressive and fun to play!
- Many common functions share by physical puppets and virtual avatar
- The feeling of direct manipulation

My approach regarding to input system:

Controling large movements of the avatar by directly manipulating the puppte:

- Leave space for users to freely improvise
- give user direct feedback of avatar control



My approach regarding to input system:

Generated animation for small gestures and facial expresions:

- According to contexts:

  Conversational Phenomena

  what kind of large movements the avatar is making currently

  Avatar position and face direction in virtual world

- According to puppet training by users

My approach regarding to input system:

Voices input:

- Nonverbal sound could **clarifies** the user's intention of the meaning certain gesture
  - Similar movements has different meanings according to contexts and personalities
  - Nonverbal sound, such as whistle, giggle and sigh indicate users moods
- Replace text typing conversation with voice conversation
- Voice modulation
  - Anonymousness

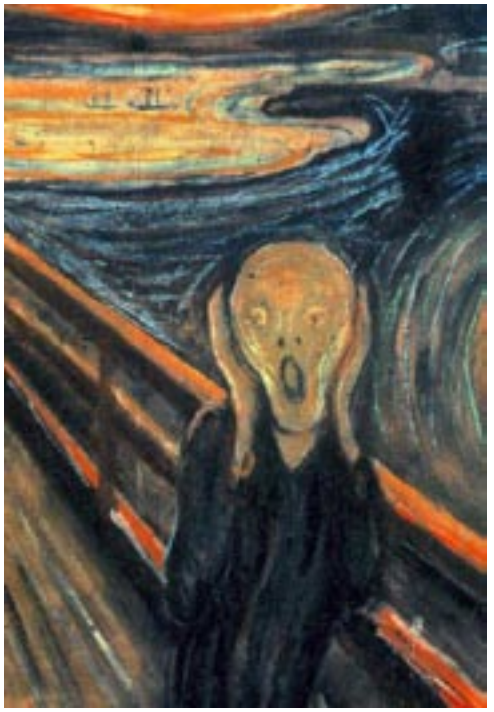
My approach regarding to output system:

Focus on representation:

- Does the representation meets the intension of message sender?
- Does the representation understandble by message reciever?

My approach regarding to output system:

focus on expressiveness:



Regarding to User testing:

Testing with multi-user situaltion:

- How is the flow of conversation? (statistics, observations)
- How users interpret the mediated conversation?(observation, interview)
- What kind of impression users form about each other?(observation, interview)

Conclusion:

The affordances and constrains of the interface have large influence of how people communicate in CMC

- The puppet input device allows different channels of **nonverbal expression**, which could form different types of conversations compare to text-based interface.
- The affordance of nonverbal signals would aid emotional comunication, encourage users to be more expressive
- The playful puppet and direct feeling of manipulating avatar invites users to play, to explore.

Conclusion:

The puppet interface clearly separate social conversational mode to working mode in CMC.

- It engages users to be more involved in a conversation, encourages users to **explore** the virtual world they inhabit and people who coexist in this world

Conclusion:

Problematic issues:

- The generated animation for facial expression and other small movement of avatar might not match users intension in some siuations
- Although the system uses voice modulation, voice might be still revealing too much users personal background.