

# An Empirical Study of the Effect of Agent Competence on User Performance and Perception

Jun Xiao<sup>1</sup>, John Stasko<sup>1</sup>, Richard Catrambone<sup>2</sup>

<sup>1</sup>College of Computing

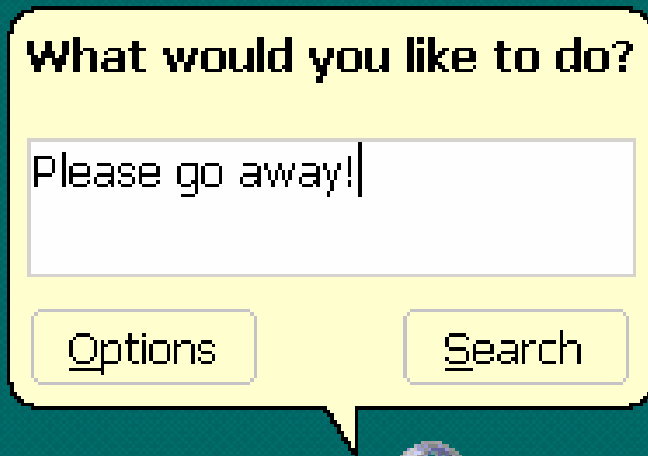
<sup>2</sup>School of Psychology

GVU Center

Georgia Institute of Technology



# Acknowledgement



"I hate it (Clippy). The thing is annoying as hell. It slows everything down and gives a bunch of crap advice. It's hard to get rid of. More importantly, if you have a question, it would give you some stupid answer, like 'I have no idea. I'm just a paper clip.' Finally, I typed in 'How do I make you go away?'" – A user of Microsoft Office assistant



# Terminology

- Agent
  - Synthetic character as interface assistant
  - Proactive/autonomous behavior
- Competence
  - Quality of help
  - Objective manner



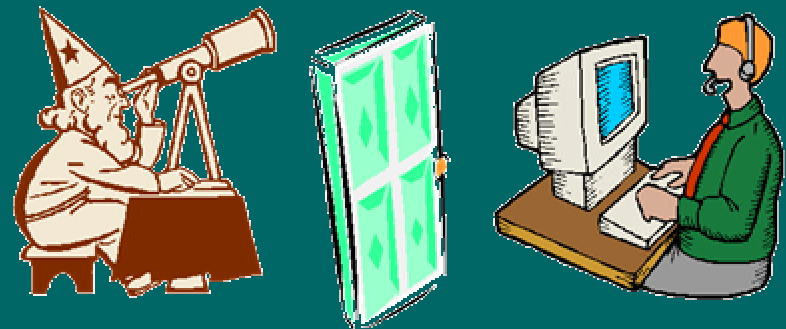
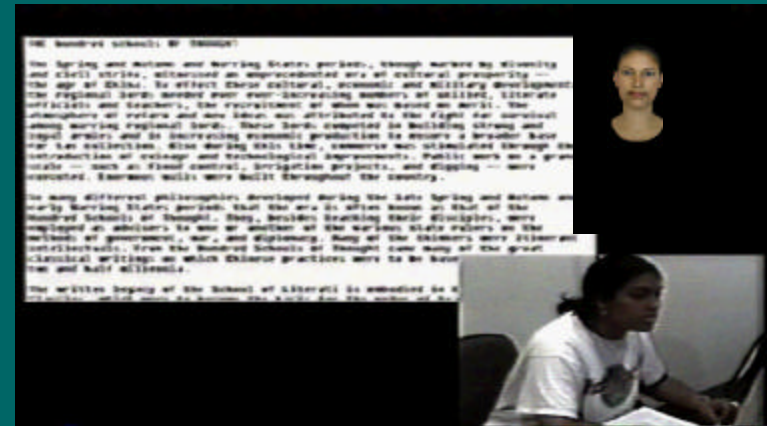
# Objectives

- How do people perceive and react to agents that are competent?
- How will degradation of agents' competence affect user performance and perception?
- Will user preferences of assistance styles have an effect on user performance and subjective assessment of an agent?



# Method

- Participants
  - 51 non-cs undergrads
- Editing tasks
  - Learn new text editor
  - Make changes in order
- Agent
  - Haptex character
- Utilize *Wizard of Oz*
  - Reactively answer questions
  - Proactively give suggestions



# Conditions

| Competent                  | Moderate Reactive              | Low Reactive                         | Low Proactive             | Online Help                 |
|----------------------------|--------------------------------|--------------------------------------|---------------------------|-----------------------------|
| •100% correct responses    | •60-70% correct responses      | •50% correct responses               | •100% correct responses   | •100% correct responses     |
| •100% relevant suggestions | •100% relevant suggestions     | •100% relevant suggestions           | •50% relevant suggestions | •100% relevant suggestions  |
|                            | •No repeated incorrect answers | •Randomly repeated incorrect answers |                           | •Help screen also available |



# Assessment

- Quantitative data
  - Performance measures
    - Time and efficiency of doing the editing tasks
  - Likert scale questionnaire
    - Subjective experience with the agent
- Qualitative data
  - Open-ended interview
  - Observation and note-taking



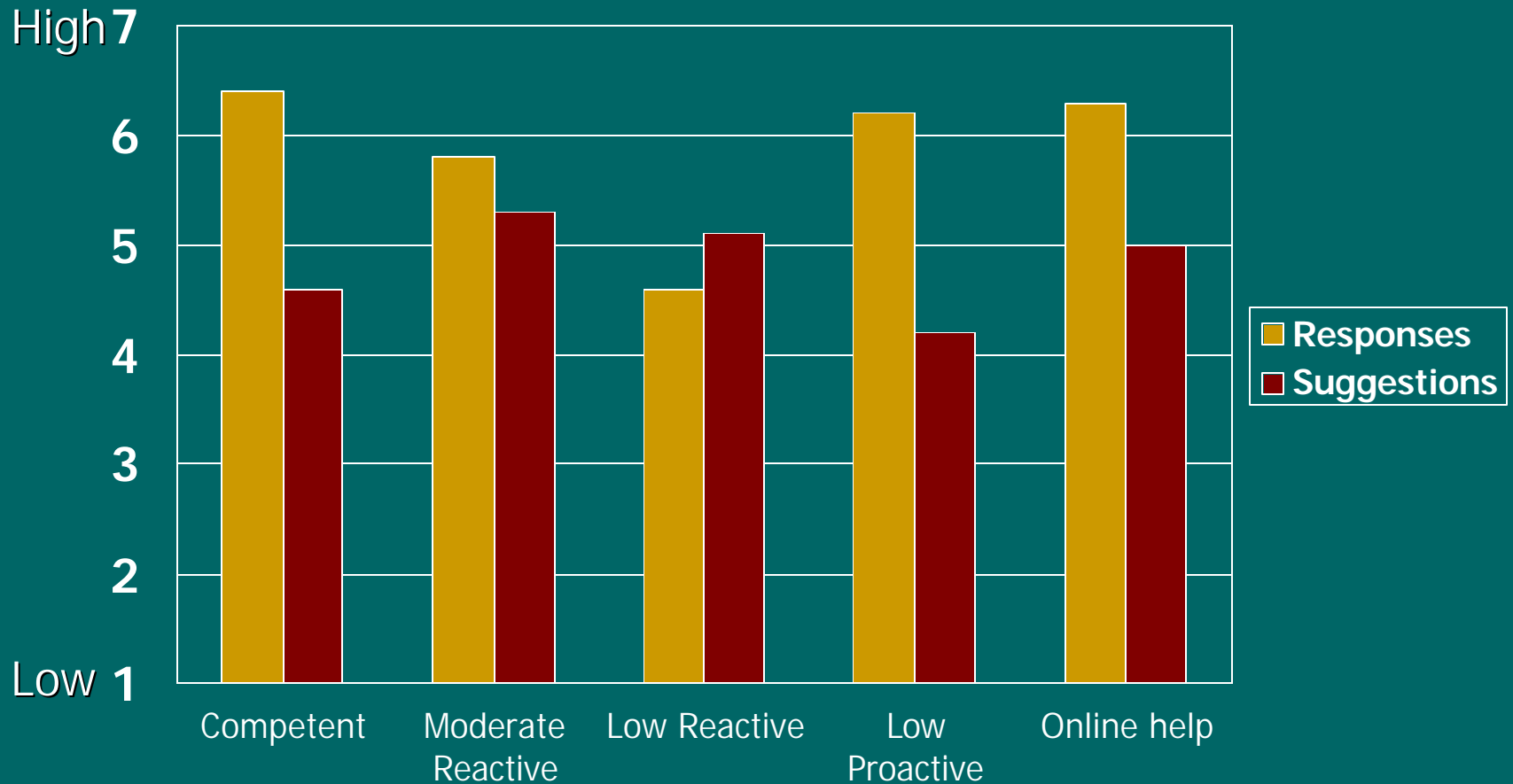
# Finding: Executive Summary

- Perceived utility of the agent was influenced by the types of errors it made
- Participants' subjective impressions of the agent related to the perceptions of its embodiment
- Allowing participants to choose their preferred assistance styles improved objective performance.





# Results: Usefulness of the Agent



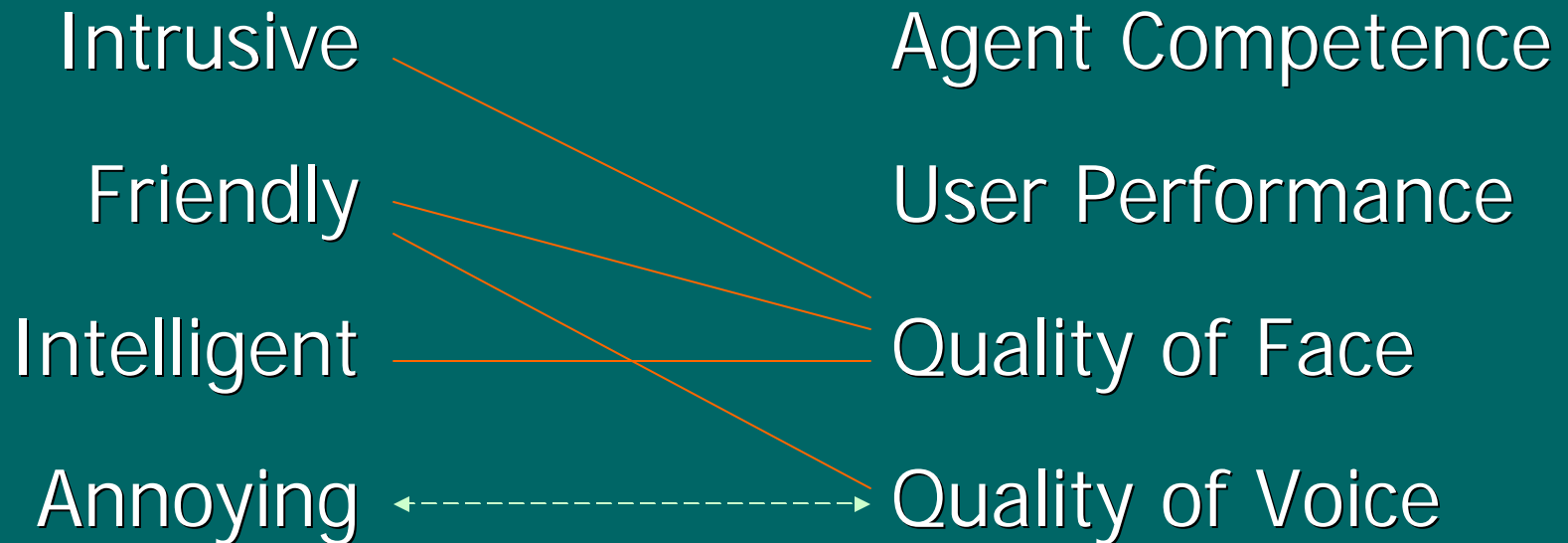
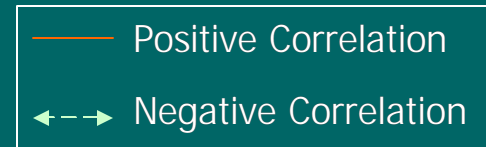
# Findings: Perceived Utility Varies with Types of Errors the Agent Made

- Repeated errors greatly impair user's perception of agent usefulness
  - Implication: more work should be done to detect and avoid repeated errors or to embed social intelligence in the agent to deal with such situation
- User's expectation and perception of the usefulness of proactive help are relatively low
  - Implication: proactive suggestions are more readily accepted if they can be immediately applied and are easy to understand



# Results: Impression of the Agent

Whether the participants found the agent to be ...



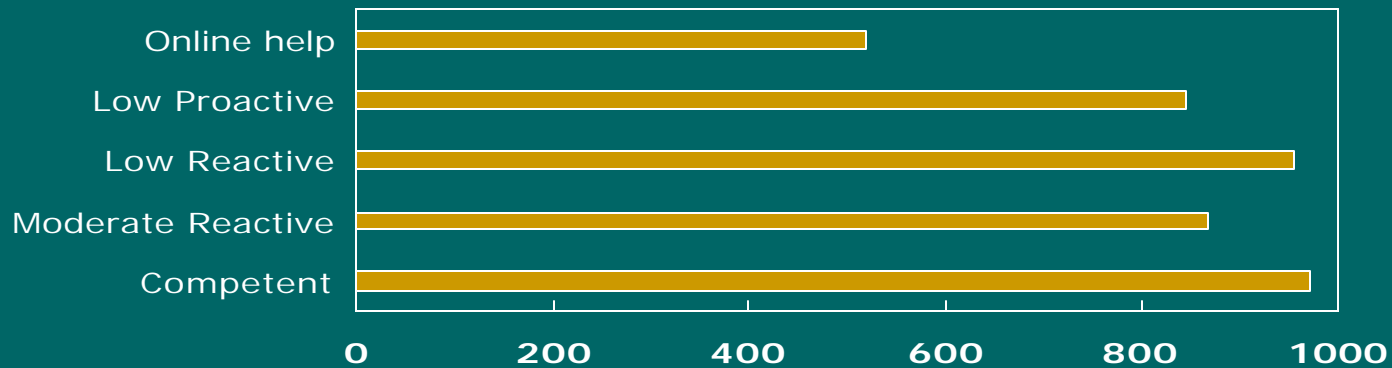
# Findings: User's Subjective View of an Agent has Little to Do with its Utility

- The appeal of an agent had more to do with features of its embodiment (face and voice) than with its competence or utility
  - Implication: great care must be devoted to design the representation of an agent
- The same agent system may arouse very different reactions from the users
  - Implication: "one size fits all" approach in designing agents simply might not provide enough flexibility

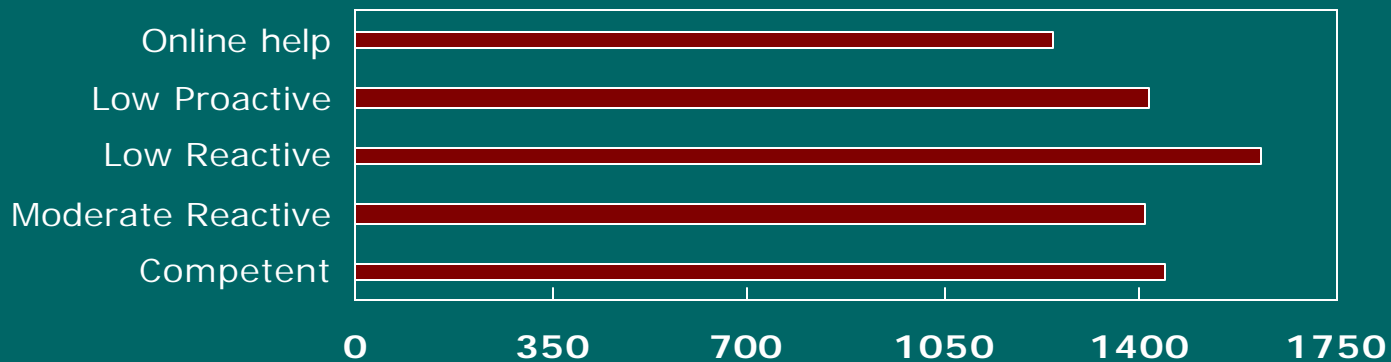


# Results: Performance of the User

Number of Keystrokes Issued



Completion Time in Seconds



# Findings: Preferred Assistance Styles Relate to Performance

- Allowing users to choose their preferred assistance style improved performance
  - Implication: it is crucial to provide alternative forms of help and match the way help is provided with user's preference
- Users' prior experience with interface agents biases their attitude and behavior
  - Implication: in some cases, it is important to build user's confidence by illustrating the utility of agents



# Related Work

- Analytical modeling
  - Horvitz: model of attention
  - Jameson: model of adaptation
  - Marsella: model of emotion
- Controlled experiments
  - Nass: computers as social actors
- System evaluation
  - André: PPP persona
  - Bickmore: relational agent
  - Pelachaud : reflexive agent



# Questions?

