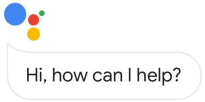

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Engineering

In all lexical *Siri*ousness: On the cognitive impact of engaging voice assistants

•••

ISEN631: Cognitive Systems Engineering
Human-computer Interactors

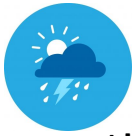
Outline

1. Introduction: Background, scope, and system components
2. Methods: Self-observation, surveys, and inferences
3. Task Analysis: A hierarchical perspective
4. Results
   - *4.1 Data Analysis*
   - *4.2 Challenges*
5. Solutions
   - *5.1 Interference and Proximity GA interpretation challenge*
   - *5.2 Google Assistant Activation*
   - *5.3 Inconsistent Language Response*
6. References

1. Introduction

Googly: You talkin’ to me?

1. Introduction



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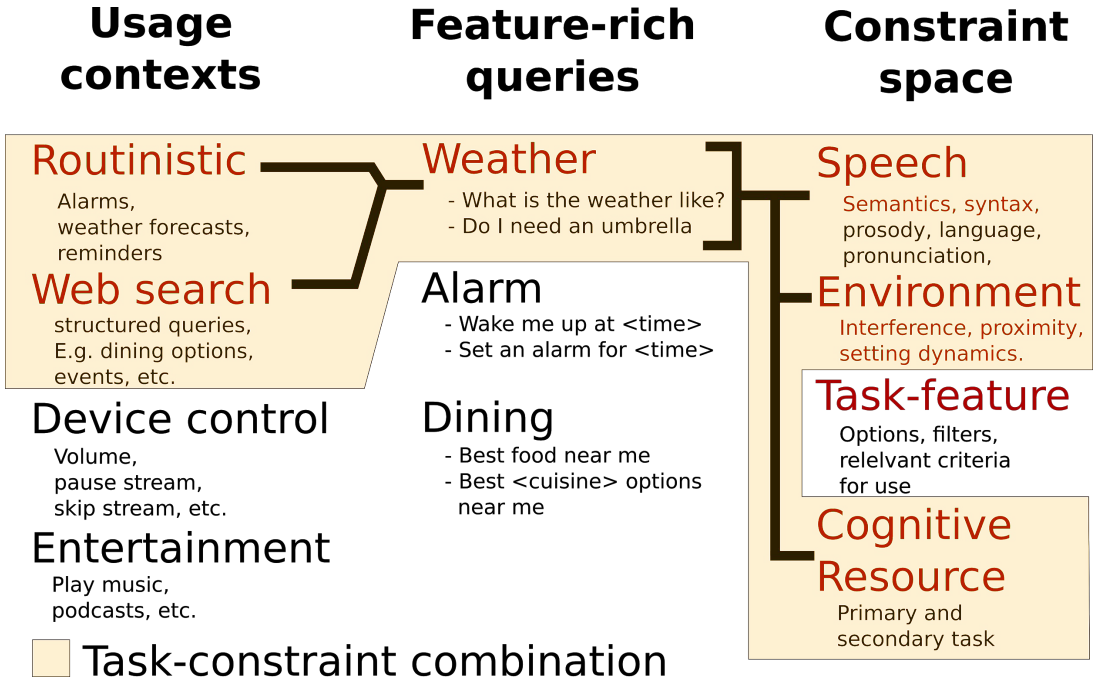
- Goal: Obtain correct weather information using voice input



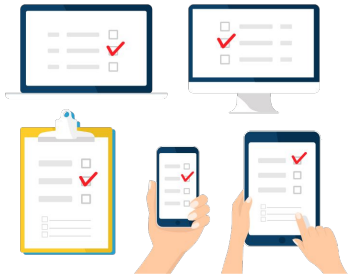
2. Methods

Generic Query: Obtain the weather forecast

Simple	Interference	Setting	Language	Cognitive
Alter keywords, be creative	Auditory distractions, environment variables	Proximity, dynamics of interaction	Alter keywords, be creative	Alter engagement, time pressure

Constraint conditions

Think Aloud Protocol



Survey and Data Collection

Profile of Mood States

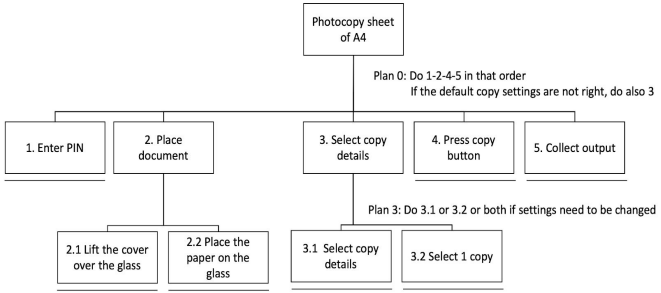
2. Methods

Generic Query: Obtain the weather forecast

Simple	Interference	Setting	Language	Cognitive
Alter keywords, be creative	Auditory distractions, environment variables	Proximity, dynamics of interaction	Alter keywords, be creative	Alter engagement, time pressure

Constraint conditions

Heuristic Evaluation



HTA

3. Task Analysis

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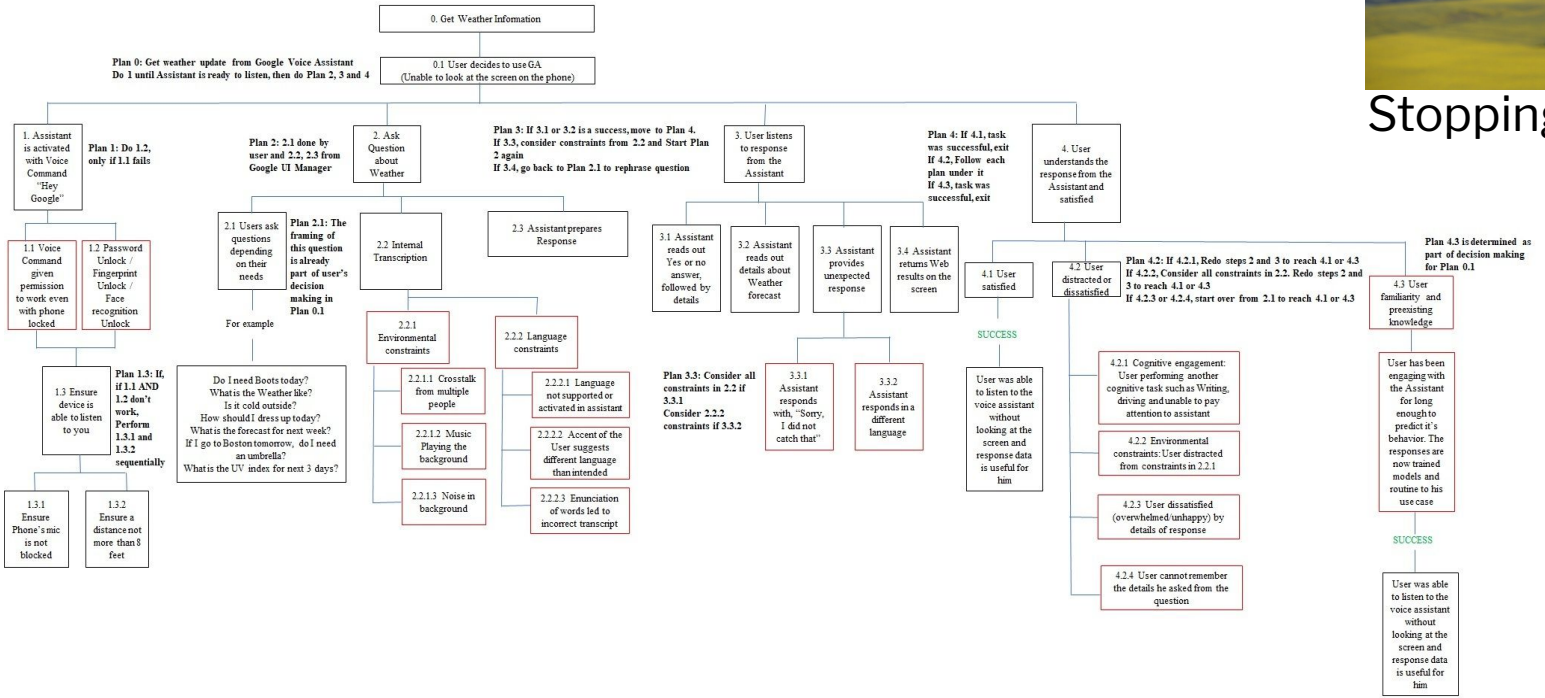
- Hierarchical Task Analysis



Stopping Rule

4. Results

4.1 Data Analysis

N = 20

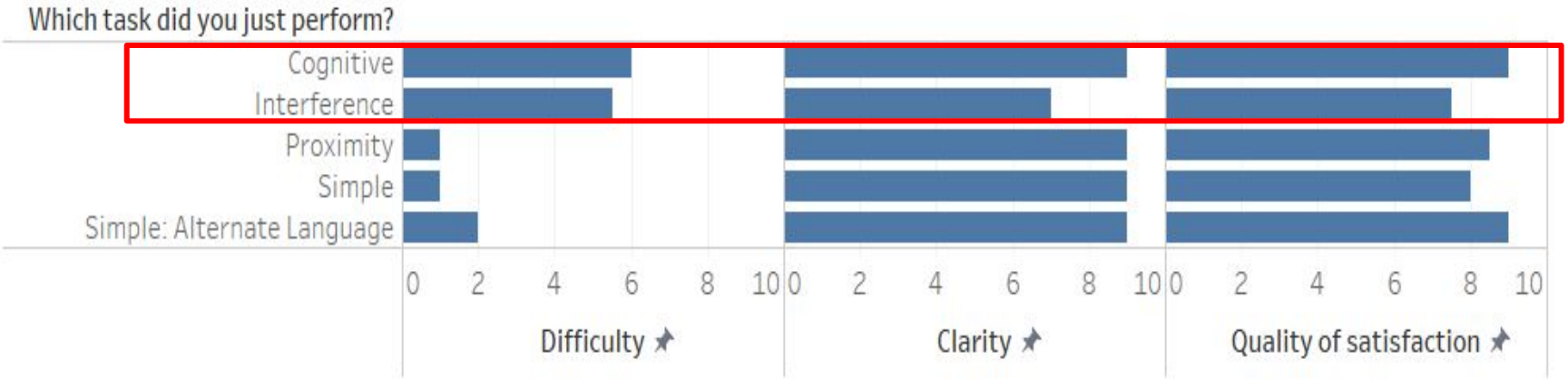
- 15 people familiar with Google Assistant
- 5 never used the Google Assistant, acquainted w/tech

4. Results

4.1 Data Analysis

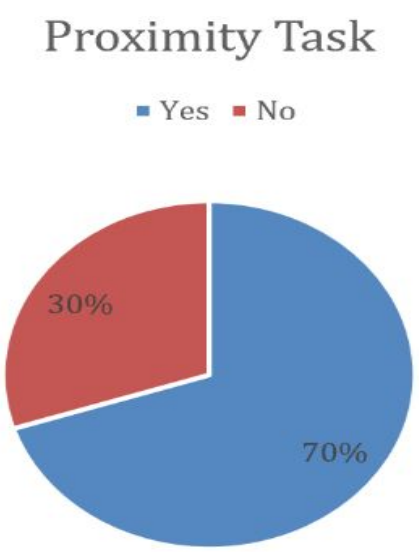
N = 20

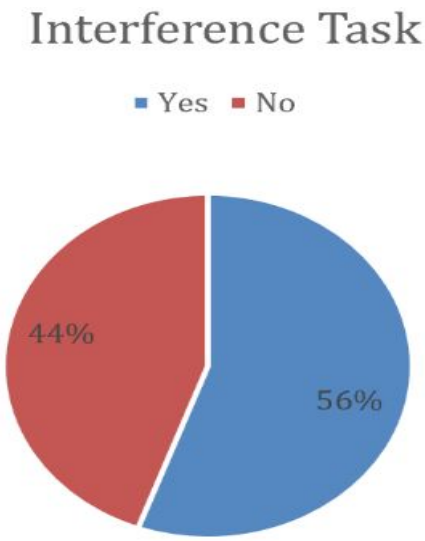
- 15 people familiar with Google Assistant
- 5 never used the Google Assistant, acquainted w/tech

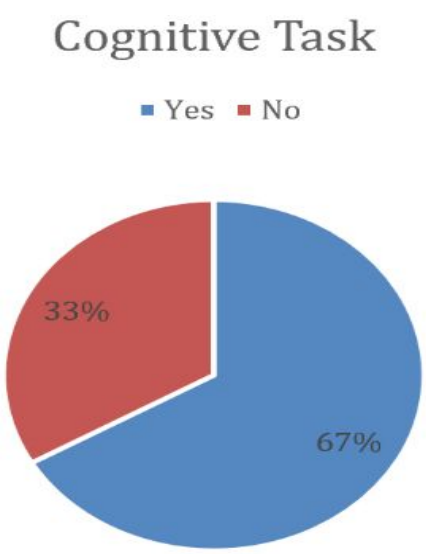


4. Results

4.1 Data Analysis

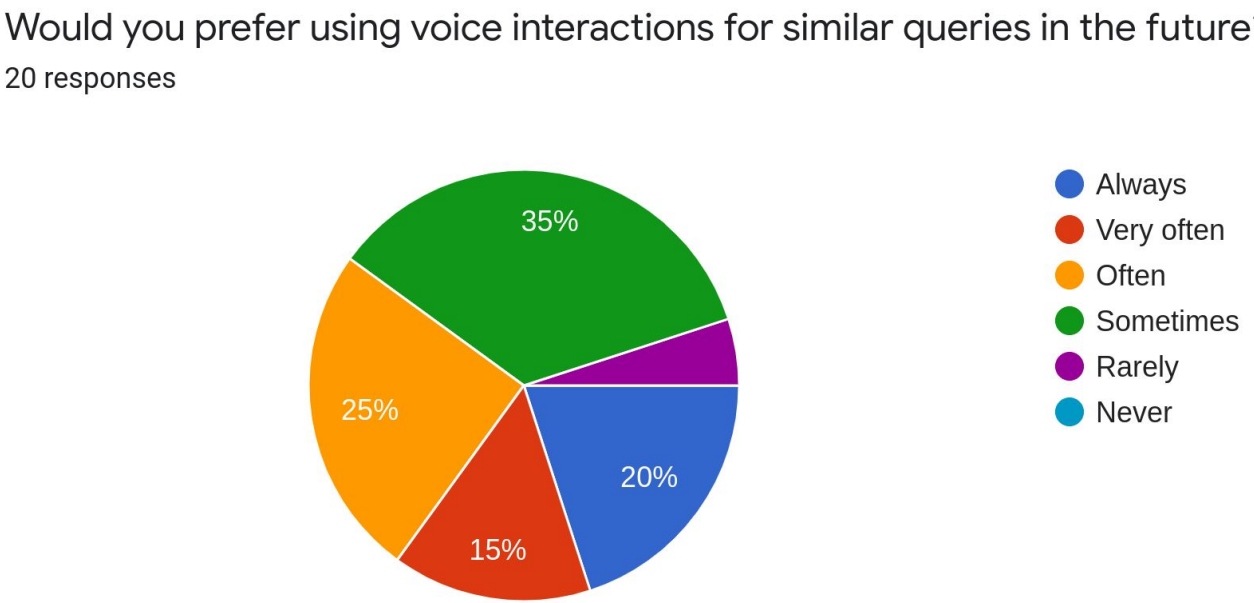






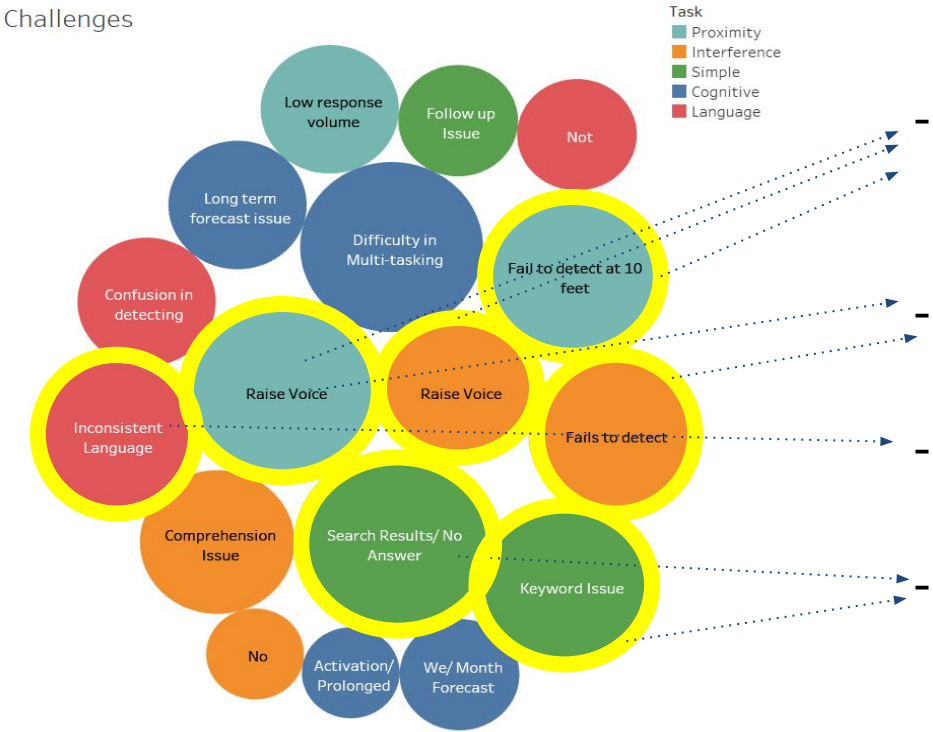
4. Results

4.1 Data Analysis



4. Results

4.2 Challenges



- **Interference** and **Proximity** challenges
- Google Assistant **Activation**
- **Language** inconsistencies
- Operator is **overwhelmed** with excessive results

5. Solutions

5.1 Interference and Proximity Challenges: **Technology-centric**

Stretch:

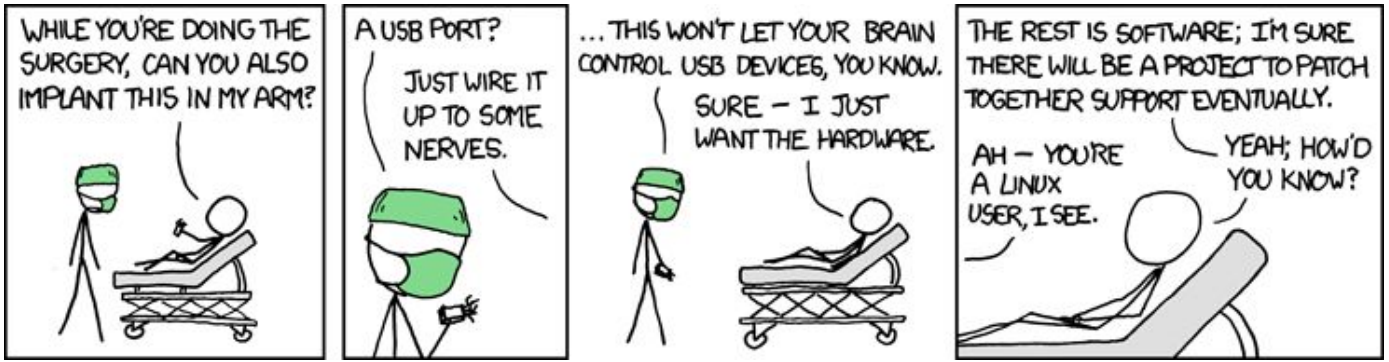
- Use of microphone enabled wearables
- Coupled smart home devices
- Enhanced voice capture and transmission
- **IOT**connections

5. Solutions

5.1 Interference and Proximity Challenges: **Human-centric**

Sky-is-the-limit:

- Human augmentation strategies, Alter perceptive boundaries, Enhanced attention state
- *Stochastic resonance-driven wearables/ implants, neurostimulation, Brain Computer Interfaces*



Borrowed without permission from xkcd

5. Solutions

5.1 Interference and Proximity GA interpretation challenge

Reach:

- Task **procedural redesign**:
  Limit ambient noise,
  Reduce distance

- **Training** method:
  Train with your voice to
  enhance detection capability

5. Solutions

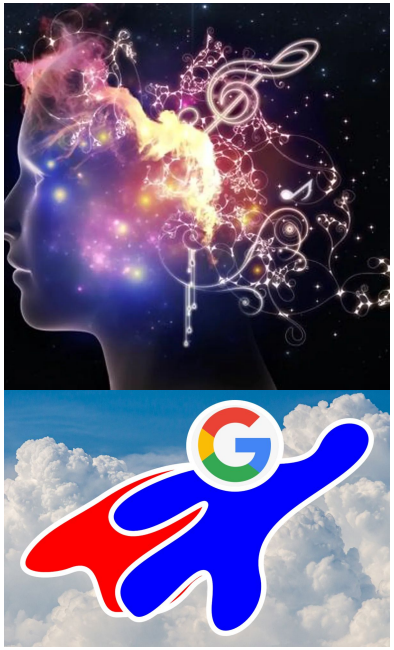
5.2 Google Assistant Activation

Reach:

- Redesigned **interface**(Technology-centric):
  Button based activation enabled with phone / smart devices (smartwatch/home devices)

- **Training** method(Human-centric) :
  Train phone with “Hey Google” to enhance user voice and Speech Structure recognition

Sky's the Limit: Neural signal based activation and automatic response



5. Solutions

5.3 Inconsistent Language Response

Reach:

- **Technology-centric**:
  Device/ setting-centric option of preferred language response
- Task **procedural redesign**:
  Selection of one language to avoid confusion in detection and response
- **Training** Method:
  Train user's device for better pronunciation and selection of key words

Stretch/Sky-is-the-limit:

- Improve NLP:
  Enable continued conversations to have more **fluid responses**.

6. References

- Holzinger, A. (2005). Usability engineering methods for software developers. *Communications of the Acm.* 48(1):pp71–74.
- Lewis C. (1982). Using the “think aloud” method in cognitive interface design. IBM Research Report RC9265 (#40713) IBM, Thomas J. Watson Research Center, NY
- Nielsen, J.(2005). Ten Usability Heuristics for User Interface Design, ISSN 1548-5552
- Novak, J.D. (1990), Concept mapping: A useful tool for science education. J. Res. Sci. Teach., 27: 937-949. doi:10.1002/tea.3660271003
- Rasmussen, J. (1983). Skills, rules, and knowledge; signals, signs, and symbols, and other distinctions in human performance models. in *IEEE Transactions on Systems, Man, and Cybernetics*, vol. SMC-13, no. 3, pp. 257-266

Project Proposal Phase -1 Report Phase -2 Report

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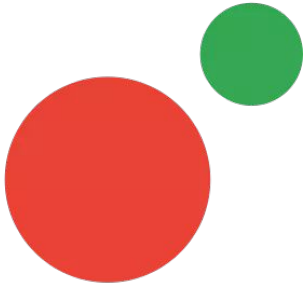

THANK YOU