Human-Computer Interaction IS4300

I4 – Swing!

Due Now

- Implement a Java applet to provide online ordering for your favorite restaurant. The interface need not be functional, but the controls should be laid out on the page in such a way that it could actually work if completely implemented.
- Minimum requirements. Your interface need not implement the entire menu, but must contain at least the following:
  - Two JLabels, one with an icon.
  - Two JButtons, one with an icon.
  - One JButtonGroup with at least 3 JRadioButton options (with toggling functional).
  - Two JCheckBoxes.
  - One JComboBox with at least two items.
  - One JTextField
  - One JPanel with a titled border enclosing at least one other component.
  - One tool tip on one component.
  - One Menu with at least two options.

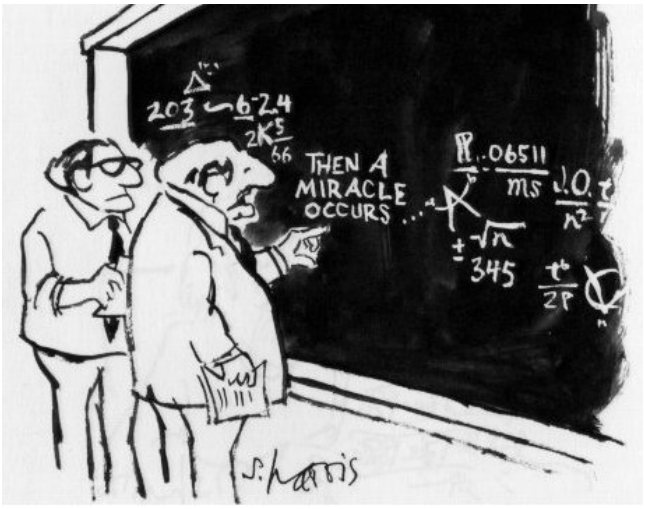
Projects
due Wednesday

P3

- Convert task scenarios and hierarchical task analyses into a conceptual design.
- Metaphors.
  - Make a list of possible interaction metaphors for your interface (per the examples in class). For each of your task scenarios list at least two options for interaction metaphors and pros and cons of each.
- Activity Scenarios
  - Transform each of your problem scenarios into an activity design scenario.
- What to Post
  - three detailed activity scenarios and a list of the metaphors you considered. If you have updated your task models during this exercise please provide them as well.

4

Design

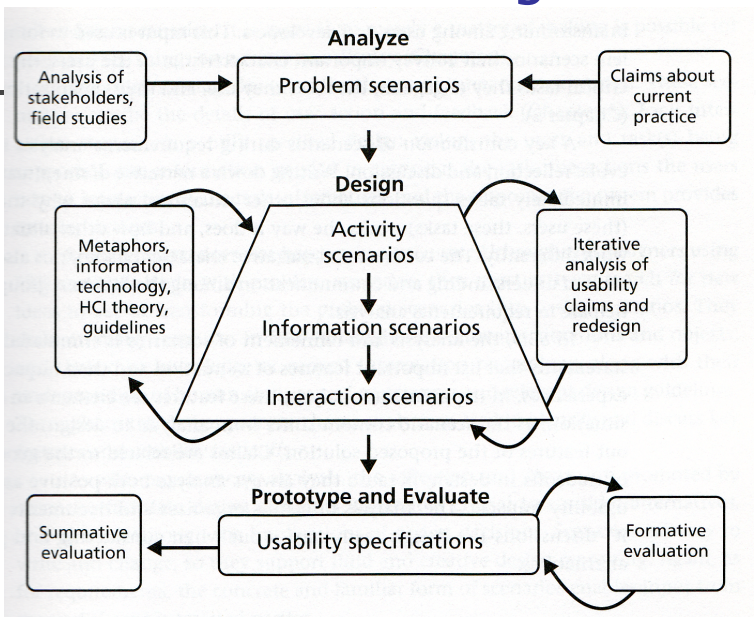


Design: The Plan

- Monday
  - Activity Scenarios
  - Interface Metaphors
- Today
  - Information Scenarios
  - Interaction Scenarios
  - Design Methodology Research
  - (Swing Events)
- Next Weds
  - UI Design & Design Guidelines

6

Scenario-Based Design

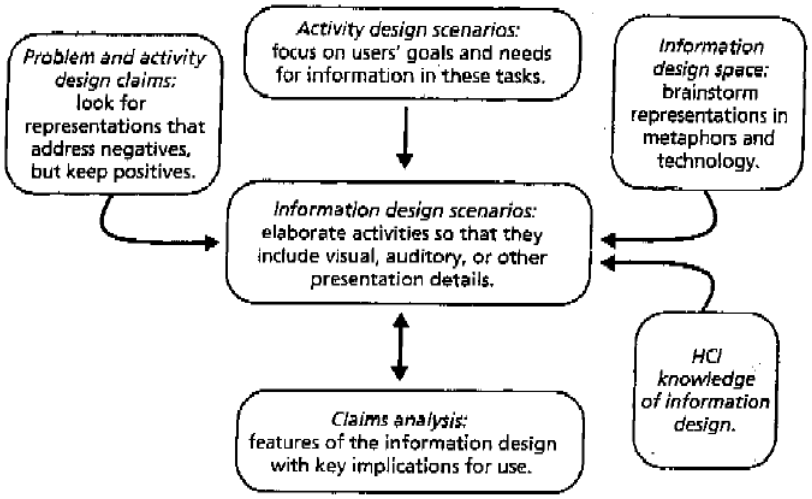


Concepts in R&C Ch4

- Norman
  - Gulf of {evaluation|execution}
- Gestalt Perception
  - Proximity, etc
- Affordances
- Participatory design
- (Internal) Consistency
- (Visual) Metaphors
  - an exhibit looks like a … multimedia notebook

8

Information Design

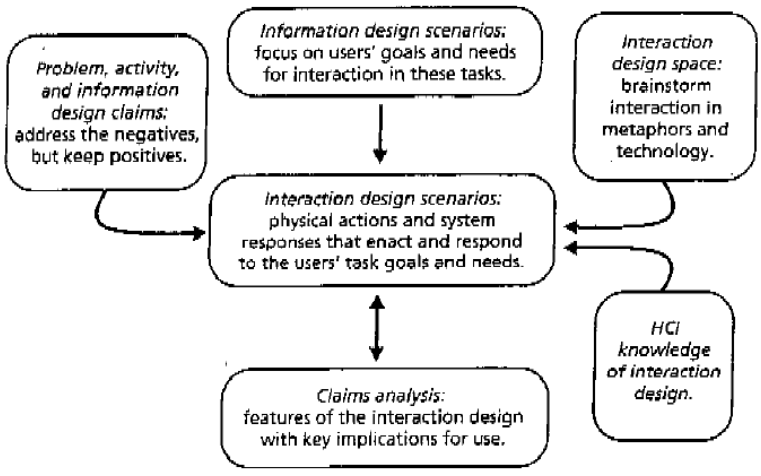


9

Example Activity Design Scenario	Transformed into Information Design Scenario
3) Alicia and Delia go to the science fair.	*3) Alicia and Delia go to the science fair.*
Background on Alicia, Delia, and their motivations, . . .	The email includes a string that Delia recognizes as a URL in MOOsburg.
When Delia shows Alicia an email invitation to a virtual science fair (VSF), the two of them decide to follow the link right then and there. They are curious about how this will be different from a regular fair.	At the VSF they recognize the standard MOOsburg layout—panorama view of the fair, brief list of objects to work with, chat tool, and interactive map.
When they arrive at the VSF, they are able to get an overview of what and who is there and the current activites taking place. They can see that some exhibits are still "under construction," so they figure that one difference may be that this fair is ongoing. A welcome note confirms this, indicating that all virtual exhibits will be complete by next Thursday, when the judging will take place.	Alicia recognizes the map as a high-school floor plan. She shows Delia where she worked in the office as a peer counselor. They see a green dot in the gym, blue dots in other rooms. Alicia infers they are "in" the gym; she plans to check out the rest later.
They decide to look around anyway since they have time, and Delia suggests that they visit the exhibit that already has several people viewing it, thinking it must be	The main view is crowded. At the back is a large Welcome sign, with thanks to organizers, and other announcements.
	Exhibits are arrayed around the room, each with a student name attached. Some are covered with a black and yellow banner; Delia suggests that these must be "under construction."

10

Interaction Design



11

Interaction Scenario

Mr. King can see that Sally is already there when he arrives: The Current Visitors list shows her name. When he arrives, his name is added and flashes briefly in red, so Sally notices him arrive and greets him with a chat message. He quickly notes that she has already added several new items—a title page (which is displayed by default in the main view) and a slide show. He selects her name in the Visitors list, and then uses Control+I to see what she is viewing. The miniature window titled Slide Show flashes in red, so he figures she must be working on her slides. Leaving her name selected in the list, he uses Control+F to synchronize his view with hers. His main viewing area updates to display the message, "Slide show being modified." PowerPoint then opens to the side, positioned at the slide she is working on. Mr. King's view of the slides is now controlled by Sally; when she moves to a new slide, so does he. He watches and makes suggestions as she refines the slides, using the text chat.

Sally tells Mr. King that several elements in the template are still empty, but that she has developed most of her material and is about to upload it. Because he is still synchronized with her, he is able to watch this process. She selects a template icon, then selects Get File from the Construction menu. A familiar file-browsing dialog box appears, and he watches as she selects the files from her PC and then presses the Upload button. After each upload, the miniaturized window updates and flashes in red briefly.

12

Exercise

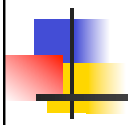
- Make HTA for ordering a set of frames on the optician website
  - Appropriate interaction metaphor?
- Do an interaction design
  - At each step of the task…
  - What does the user need to see?
    - Before taking an action (visibility)
    - After taking the action (feedback)
  - What kind of control (input) is appropriate?
    - Affordances, Minimize memory load, Minimize errors, etc

13

Group Exercise

- Project teams
- Pick one of your tasks…
- Do an interaction design
  - At each step of the task…
  - What does the user need to see?
    - Before taking an action (visibility)
    - After taking the action (feedback)
  - What kind of control (input) is appropriate?
    - Affordances, Minimize memory load, Minimize errors, etc

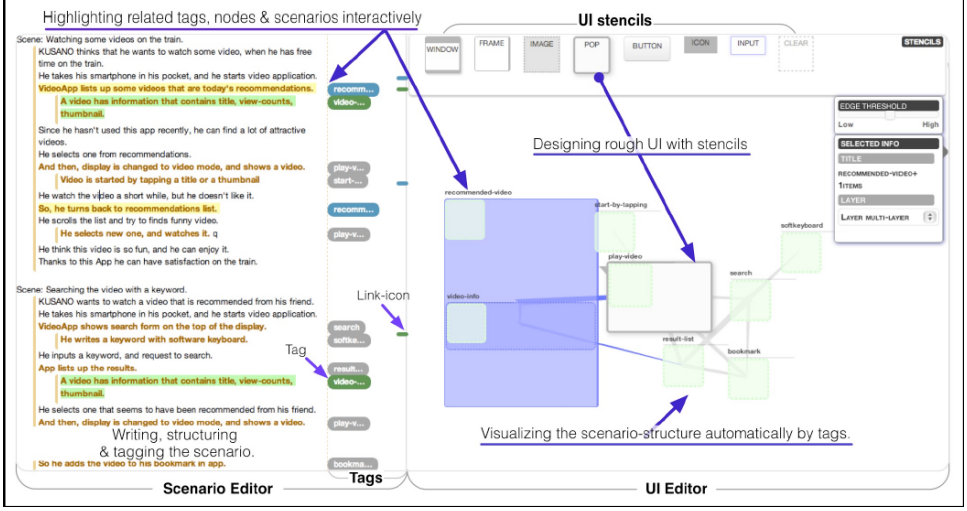
14



Conceptual Design Research Papers

15

Scenario-Based Interactive UI Design Kusano, et al



Design-Driven Narrative: Using Stories to Prototype and Build Immersive Design Worlds Spaulding, et al

Figure 2. Image of the *City Channel* prototype in a public space.

BAD CONCEPT

REJECT

"I'd never use this. Ever. Even in a different setting." (P6)

CO-CREATE THE DESIGN

"The design would be much more useful if I could customize how the city talks to me.." (P3)

BAD STORY

"I would use this when visiting my friend in NYC who is always too busy to hang." (P4)

CO-CREATE THE WORLD TO IDENTIFY DESIGN PRINCIPLES

GOOD STORY

"I would definitely use the City Channel, whether I was new or had lived in a city for years.." (P1)

CONSUME

GOOD CONCEPT

18

Design probes

- direct observation
  - sometimes hard
    - in the home
    - psychiatric patients, …
- probe packs
  - items to prompt responses
    - e.g. camera, postcard, diary
  - given to people to open in their own environment they record what is meaningful *to them*
- used to …
  - inform interviews, prompt ideas, enculture designers

Making Design Probes Work

Wallace, et al

Figure 1. *Self Tree* probe deta
of individual elements and ex

Please use these objects to tell me about some of the people who make you who you are…

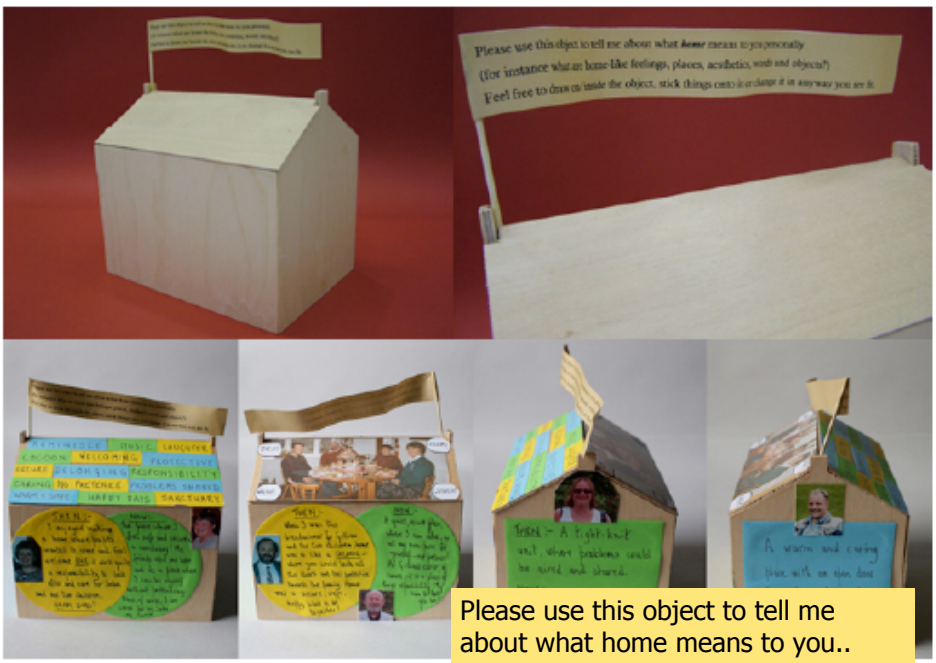


Figure 2. *Home* probe wi

Please use this object to tell me about what home means to you.. Feel free to draw on or inside.

Figure 3. *Pillow* probe an example of a completed response.

Use this to share a dream..

22

Figure 4. *Pot of Clay* probe with an example of a response.

Figure 5. *Bodymapping* probe with an example of a response.

23

Figure 6. *Top Trumps* probe with examples of responses.

Figure 7. *Preserves* probe with examples of responses.

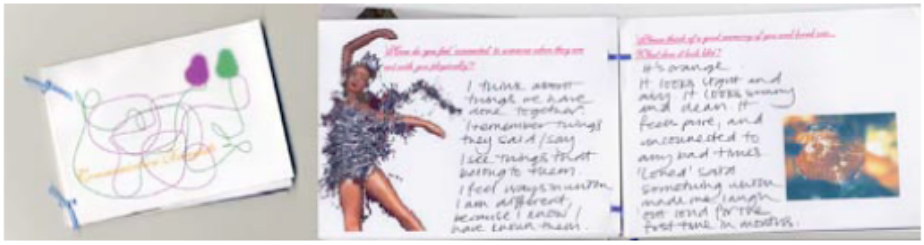


Figure 8. *Communication Fairytale* probe with example pages.

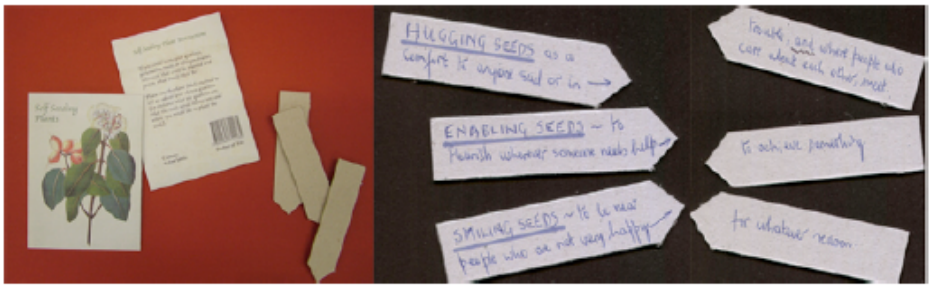


Figure 9. *Self Seeding* probe with examples of responses.

Probe-like Methods

- Diaries
  - E.g., Always Available
- Ecological Momentary Assessment
  - Random
  - Researcher-initiated
  - Context-initiated

26

Exercise

- Project teams
- Create a design probe that will inform the design of your project
  - What form does it take?
  - What are user instructions?
  - What do you hope to learn?

27

A Conversational Agent-based Clinical Trial Search Engine

HCIR 2013

Health Literacy

- Ability to find, read, understand, and act on written medical information
- Nationally 1/3 of adults have low health literacy
- Urban minority pops (e.g., BMC) is closer to 1/2
- Patients with low health literacy have worse control of chronic disease, worse health outcomes, more hospitalizations, more death

Motivation

- Nearly 90 million people in the US have difficulty understanding and acting upon health information.
- 34% of clinical trials recruited less than 75% of their planned sample

- Information-related barriers to clinical trial participation:
  - 85% of cancer patients were unaware that there were clinical trials they could participate.
  - Difficulties with clinical trial search process.

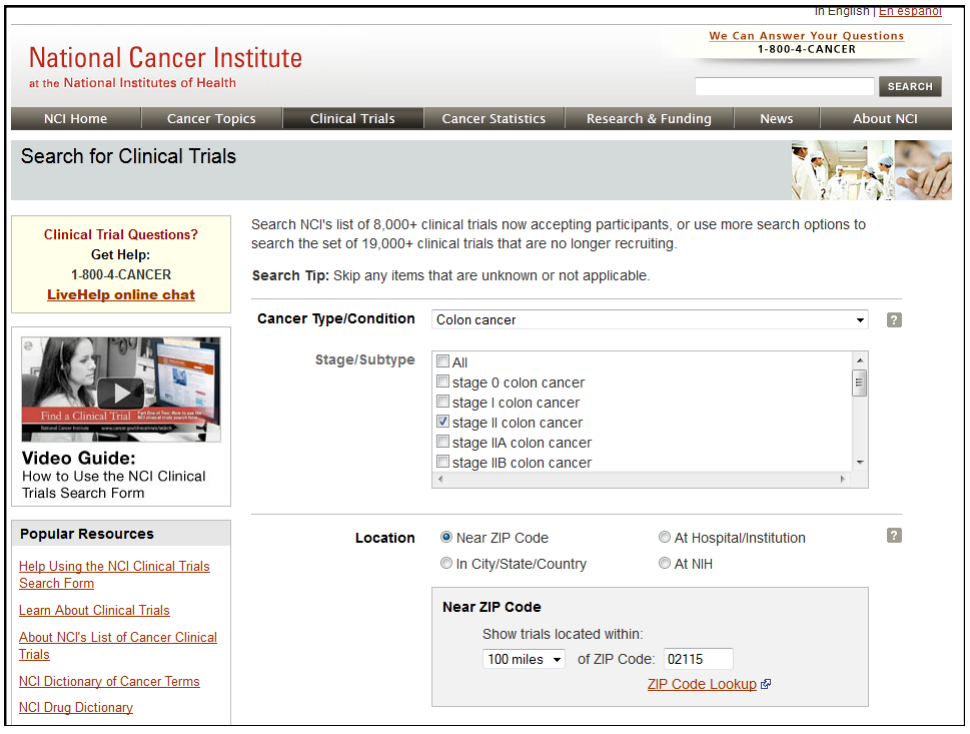
Health Literacy and Usability of Clinical Trial Search Engines

Timothy Bickmore, PhD
Maryam Aziz
Barbara Barry, PhD
College of Computer and Information Science Northeastern University

Michael Paasche-Orlow, MD,MPH
General Internal Medicine
Boston University School of Medicine
Boston Medical Center

Objective: Increase Participation in Clinical Trials

- Several web-based search engines available.
  - National Cancer Institute
  - ClinicalTrials.gov
  - Etc
- Are these usable by individuals with inadequate health literacy?



Usability Across the Health Literacy Spectrum

- We conducted a usability study of the National Cancer Institute (NCI) clinical trial search engine with individuals who had varying health literacy levels.
- Measures
  - Health Literacy via Rapid Estimate of Adult Literacy in Medicine (REALM), split using a REALM score of 9th grade and above.
  - Search engine skill was assessed using a single self-report scale measure.
    1="I've never used one." to 4="I'm an expert."
  - Satisfaction, 7-point scale
  - Ease of use, 7-point scale

Protocol

- **Part 1: Usability**
  - Participants given 3 standardized tasks of increasing complexity to perform using the NCI search engine.
  - For each task, participants were asked to find at least one trial that satisfied stated criteria.
    e.g., "Amy is a 66 year old appendix carcinoma cancer patient. She would like to participate in a clinical trial that is related to her condition. Location of the trial does not matter."
  - Measures: completion, time to complete
- **Part 2: Clinical Trial Preferences**
  - To understand decision making processes, participants were shown three pairs of trial descriptions from the NCI site.
  - For each pair a participant was asked to choose which of the two trials they would prefer and why.
  - Measures: Qualitatively evaluation

Participants

- N=23, recruited from an online recruiting site and an urban, older adult apartment complex
- 23-76 years old (mean 50.3)
- 65% female
- 17 adequate health literacy; 6 inadequate

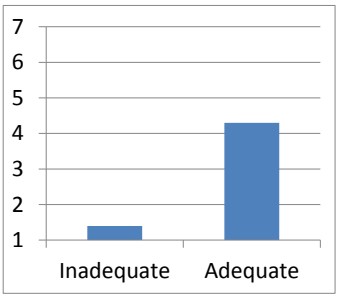
- Participants with low health literacy scored significantly lower on self-reported search engine skill (Mann-Whitney $p<.05$).

Usability Results

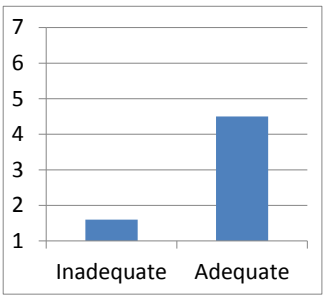
- Participants with adequate health literacy completed 1.25 search tasks on average.
- Participants with low health literacy failed to complete any of the tasks.
- Difference is significant (Mann-Whitney $p<.05$).

Usability Results

Satisfaction



Ease of Use

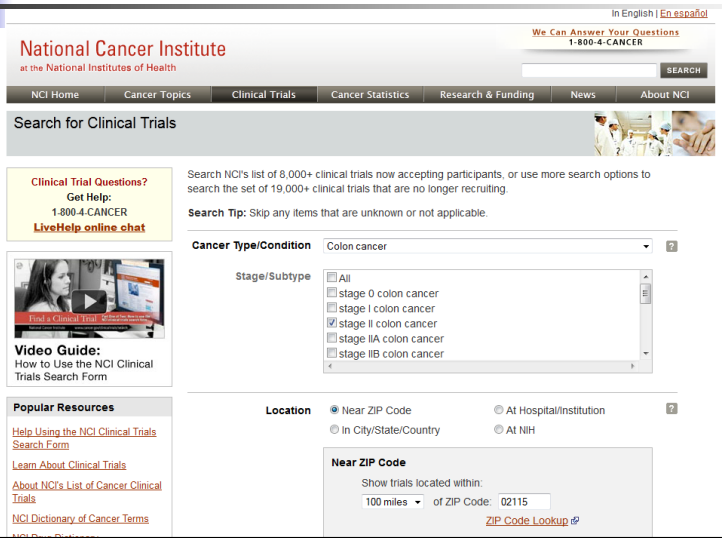


Both differences significant (Mann-Whitney $p<.05$).

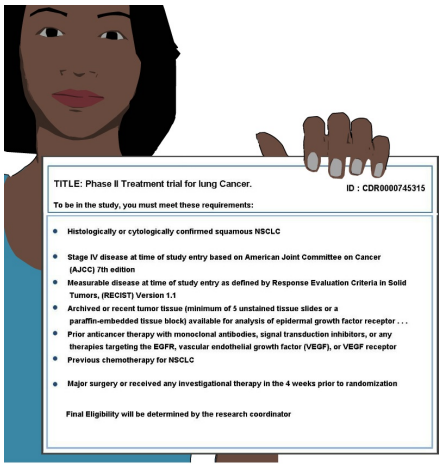
Clinical Trial Preferences Thematic Coding

Theme	Theme Description	Example from transcripts	#
Medication	A preference for or against taking pills / medications	No medication, I don't take, I don't even take aspirin; Medicine, medicine just makes it worse	31
Invasiveness	Degree of intrusion of devices or medications in the body	it sort of wears me out the thought of a direct delivery to the site of cancer with something like directly being delivered like interdermally it sounds like it's going through your skin into the cancer site; It's easier, non-invasive	30
Existing Condition Self	A current or past health condition of the participant	I have Chrons's disease; Because I am a diabetic	29
Procedure Familiarity	Participant has experienced one or more of the trail procedures before	I'm not familiar with the technology in this one; cause well every time you go to the doctor you give a urine sample anyway	26

How do we make this better for low health lit patients?



Design: Conversational Agent Interface



Yes. Who should I contact to participate?

No, I don't meet the requirement.

Show me more details of the study

Save this for later Viewing

No thanks! Show me something else.

Explain it to me.

Show me the trials I have looked at.

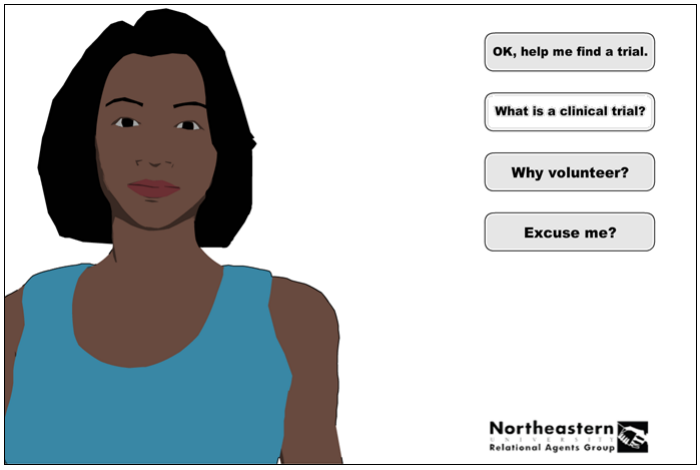
Could you repeat that please?

Northeastern Relational Agents Group

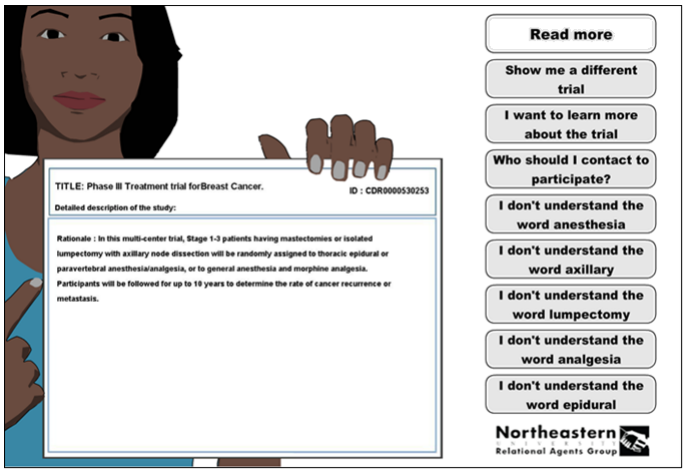
Design: Search Criteria

- To define the search criteria, we leveraged qualitative findings from our usability study.
- User criteria:
  1. age, sex, cancer type, geographic location, trial type and phase, medication use → available from protocol data.
  2. pain tolerance, invasiveness tolerance, time commitment → Inferred through text classification.
  3. Other comprised of heterogeneous collection of individual user beliefs or personal facts that could not be generalized into search criteria.
- Readily indexable search criteria are used to filter while inferred criteria are used to sort results.

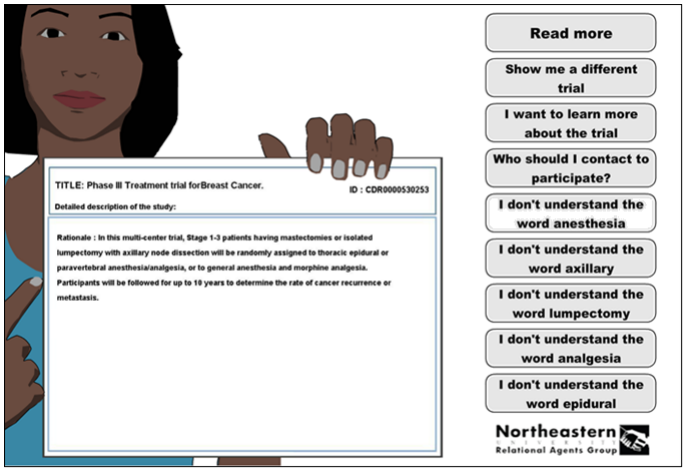
Search Interface Feature: Education modules



Search Interface Feature: Read-aloud

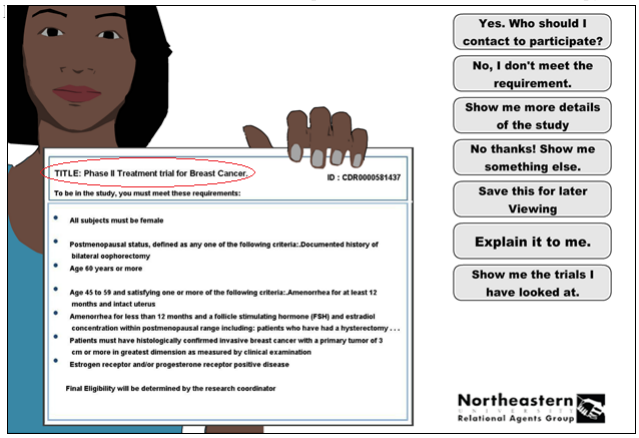


Search Interface Feature: Dictionary



Search Interface Feature: Simplified Title

Original title: "Phase IV Randomized Study of Doxorubicin Hydrochloride Liposome Versus Capecitabine as First-Line Chemotherapy in Women With Metastatic

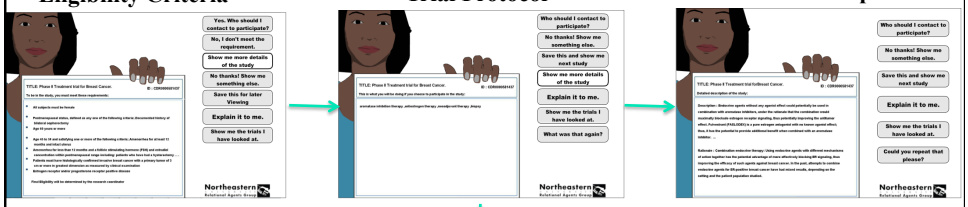


Search Interface Feature: Levels of information detail

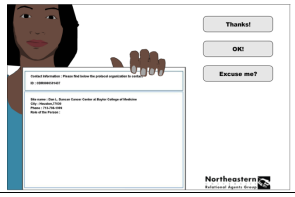
Eligibility Criteria

Trial Protocol

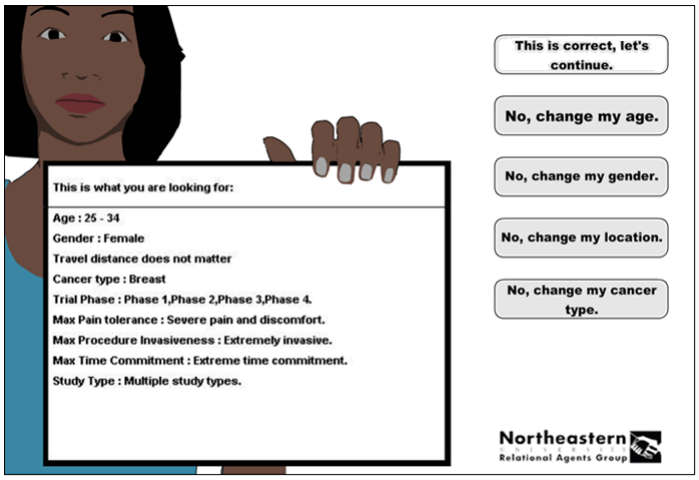
Detail Description



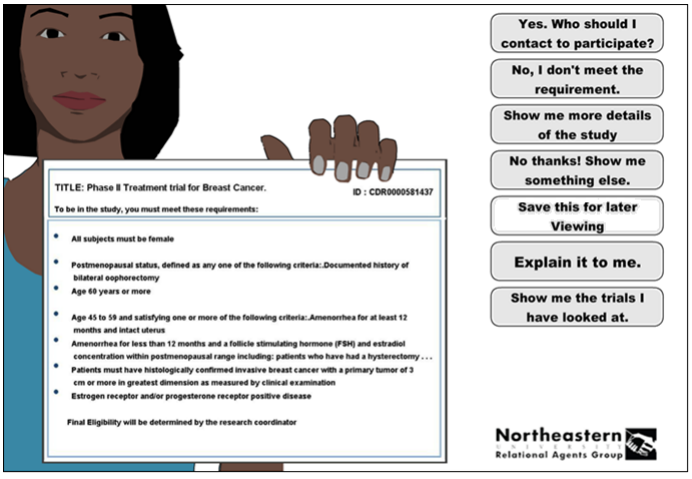
Contact Information



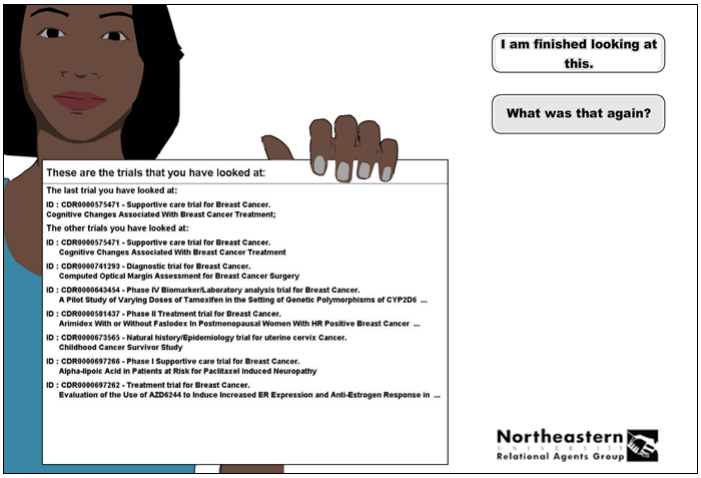
Search Interface Feature:
Search criteria confirmation & Refinement



Search Interface Feature:
Bookmarking

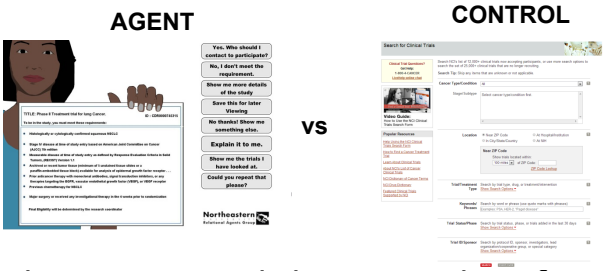


Search Interface Feature: Summary of views



Evaluation

- Between subject randomized trial



- The agent used the same data from the NCI database of clinical trials

Preliminary Evaluation

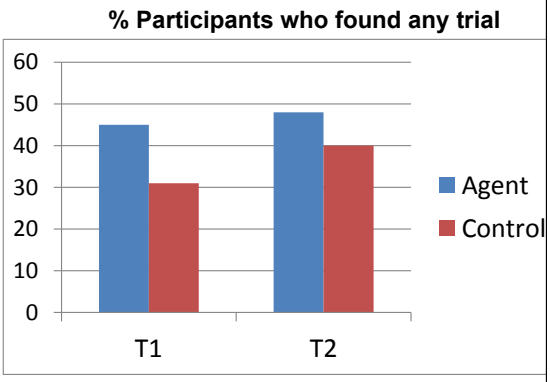
- Search Tasks:
  - T1: search for trials with user's own criteria
  - T2 (standardized task): search for trials with specified criteria
- Measure:
  - Self-report scale measures
  - Number of trial examined
  - Number of trial that met criteria
  - ID of trial found
  - Elapsed time

Participants

- 87 participants:
  - 42 in the AGENT condition, 45 in CONTROL
  - 50 in person, 37 online
- Age:
  - Mean: 50.1 years (SD: 9.9)
- Gender:
  - 46% male
- **Health literacy:**
  - 26% low HL
- Computer Experience:
  - I've never used one: 8%
  - I've used one a few times: 24%
- Search Engine Experience:
  - I've never used one: 17%
  - I've used one a few times: 18%

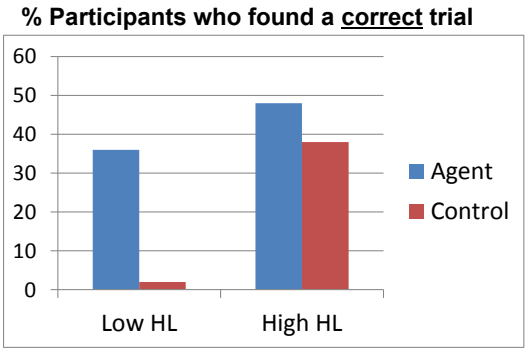
Results: Success Rate

- The AGENT is at least as effective as the web-based search engine
  - T1: 45% vs. 31% (ns.)
  - T2: 48% vs. 40% (ns.)
- T2: Low HL found significantly fewer trials (27% vs. 50%)



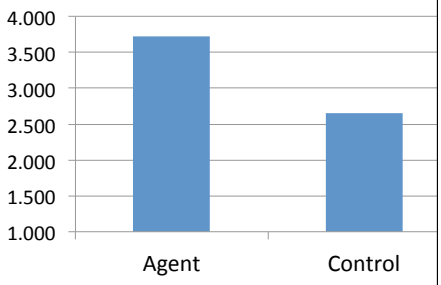
Results: T2 Success Rate

- Main effects for AGENT and Literacy



T1 Satisfaction with Search Result

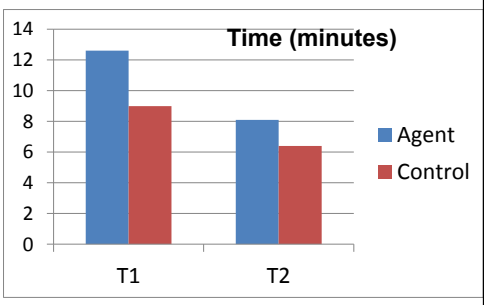
- Those in the AGENT group felt that the trials they found matched their criteria to a greater degree than those in the CONTROL group.
  - T1: 3.7 vs. 2.6, p<.01
  - No diff by literacy



To what degree did the trial match what you were looking for? (1=Not at all, 7=Exactly)

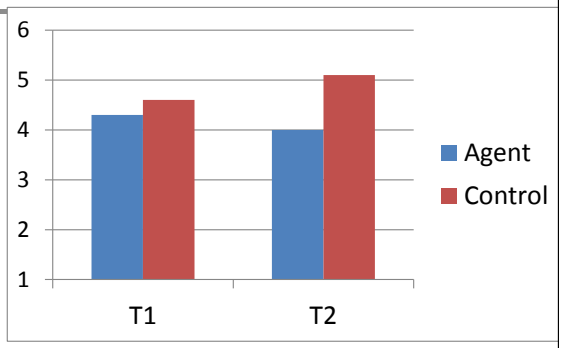
Results: Actual Search Time

- Those in the AGENT group spent significantly more time using the system, compared to the CONTROL group.



Results: Perceived Search Time

- T1: No significant difference in the **perceived** time spent using the system.
- T2: Agent perceived as taking significantly less time.

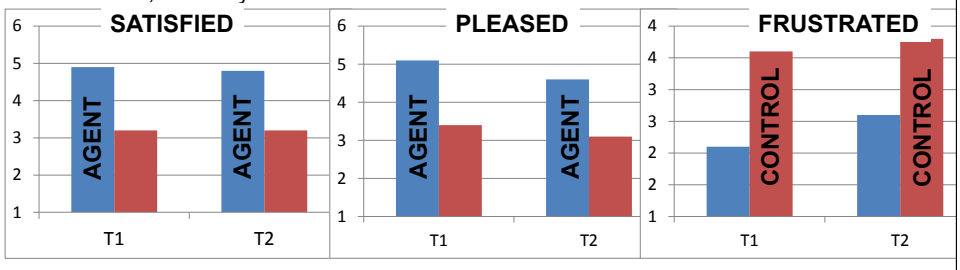


How much time do you feel it took to use the system?
(1 = Too little, 7 = Too much)

Results: T1 Satisfaction

- All participants in the AGENT group were significantly more satisfied with the experience compared to those in the CONTROL group. ($p < .001$, in T1)

1 = Not at all, 7 = Very much



How satisfied were you with the clinical trial search system?

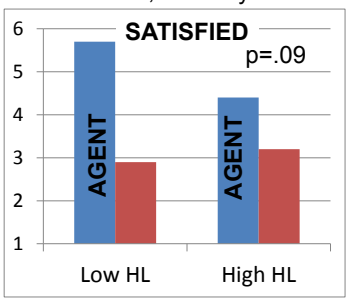
How pleased do you feel?

How frustrated do you feel?

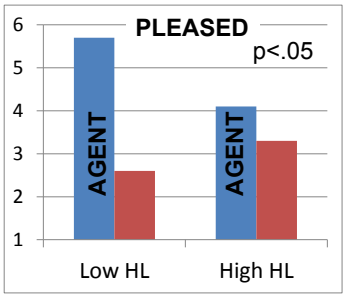
Results: T2 Satisfaction x Literacy

- Low Health Literacy Participants even more satisfied with Agent than High Literacy

1 = Not at all, 7 = Very much



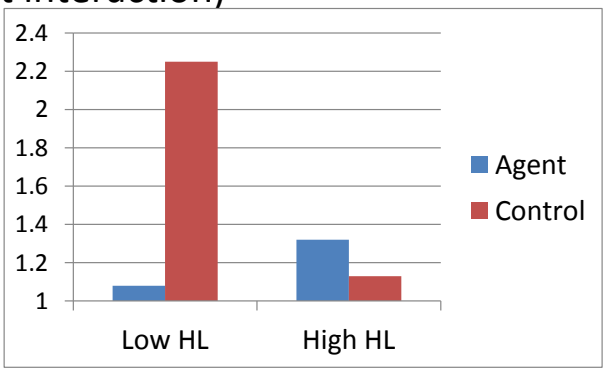
How satisfied were you with the clinical trial search system?



How pleased do you feel?

Results: T1 Pressure to Sign

- Low health literacy participants felt the most pressure to sign up for the trial with the Web (significant interaction)



How much pressure did you feel to sign up for the trial?

Conclusion

- The agent interface is at least as effective as the conventional interface in helping users find clinical trials.
- Users are significantly more satisfied with the agent interface compared to the standard,
  - despite the fact that it takes significantly longer to perform a standardized search task.

Swing Events & Graphics Primitives

JFrame

Class JFrame

java.lang.Object
  java.awt.Component
    java.awt.Container
      java.awt.Window
        java.awt.Frame
          javax.swing.JFrame

Useful stuff

- Graphics getGraphics() *called within Component*
  - Returns a 'Graphics' object
  - Device-independent interface to graphics
  - Basics (plus 'fillX' for most of these):
    - drawLine(x1,y1,x2,y2);
    - drawRect(x,y,w,h);
    - drawOval(x,y,w,h)
    - drawPolygon(int[] xpts,int[] ypts,numpts)
    - drawString("a string",x,y)
    - drawArc(x,y,w,h,startAngle,endAngle)
  - setColor(Color)
- Notes: 'java.awt' pkg, coordinate system

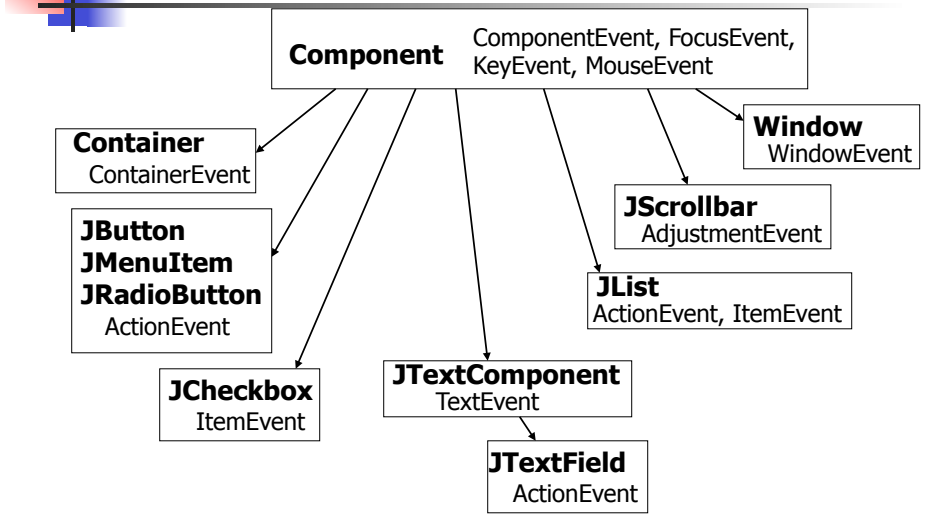
Colors
java.awt.Color

- Constructors
  - Color(int R,int G,ing B) //0..255 ea
  - Color(float R,float G,float B) //0..1
- Pre-defined as constants
  - black,blue,cyan,darkGray,gray,green, lightGray,magenta,orange,pink,red,white, yellow

Event Model

- Swing Events are a subclass of java.awt.AWTEvent (subclass of java.util.EventObject)
  - getSource() -> who produced it

Events by Component



Some Event Methods

ItemEvent	getStateChange() //SELECTED | DESELECTED
KeyEvent	getKeyChar(), getKeyCode()
MouseEvent	getX(), getY(), getClickCount()

Swing is Notification based

```
class MyActionHandler implements ActionListener {
  public void actionPerformed(ActionEvent event) {
      System.out.println("Somebody pushed me!");
   }
}

Button button1=new Button("Push Me");

button1.addActionListener(new MyActionHandler());
```

Event Types and Callback Signatures

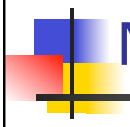
Event	**Listener Methods**
Action	actionPerformed(…)
Adjustment	adjustmentValueChanged(…)
Component	componentHidden(...), componentMoved(...), componentResized(...), componentShown(...)
Container	componentAdded(...), componentRemoved(...)
Focus	focusGained(...), focusLost(...)
Item	itemStateChanged(...)
Key	keyPressed(...), keyReleased(...), keyTyped(...)
Mouse	**MouseListener/MouseAdapter:** mouseClicked(...), mouseEntered(...), mouseExited(...), mousePressed(...), mouseReleased(...) **MouseMotionListener/MouseMotionAdapter:** mouseDragged(...), mouseMoved(...)
Text	textValueChanged(...)

Also useful

- JOptionPane
  - Easy creation of popup alerts

```
JOptionPane.showMessageDialog(
     null, "Hi there!");
```

78



NetBeans Example

I5

- Your mission in this exercise is to implement a very simple Java painting application. The app must support the following functions:
- Draw curves, specified by a mouse drag.
- Draw filled rectangles or ovals, specified by a mouse drag (don't worry about dynamically drawing the shape during the drag - just draw the final shape indicated).
- Shape selection (line, rectangle or oval) selected by a combo box OR menu.
- Color selection using radio buttons OR menu.
- Line thickness using a combo box OR menu.
- A CLEAR button.

81

To Do

- Read
  - Encyl of HCI, Chapter on Visual Representation
- Due next class (Weds!)
  - P3 – Conceptual design, Activity Scenarios
- Homework: Start
  - I5 – Swing Event handling – due on 10/19

82