Design Problem: Directing Human Action
How might we guide physical actions?
How might we provide corrective feedback?

Design Brief: An Interactive Movie Booth
Tech: camera, mic, computer, green screen
Direct users through choreographed actions. Provide cues to action and feedback.

Your task: choose an interesting physical action. Pick an action you can actually sense!
Design for direction, feedback & correction.
Design Brief: An Interactive Movie Booth
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Your task: choose an interesting physical action. Pick an action you can actually sense!
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Spend 5 min brainstorming actions.
Spend 15 min prototyping direction & feedback.
Be prepared to perform your interactions!

Outline
- System Direction of Human Action
- Strategies for Directive Systems
  - Design
  - Direction & Feedback
  - Mediation

27 April 2004

SYSTEM DIRECTION OF HUMAN ACTION
Requires Direction & Feedback

Active Capture
one automated capture...
...drives multiple media uses.
Active Capture

http://vimeo.com/14174119

A Design Space for Direction

- **Direction Method**: Tell, Show, Make
- **Motivation**
  - Internal - “Act as if your whole body is on fire”
  - External - “Flail your limbs about wildly”
- **Triggers**: “Say Cheese!” “Action!!”
A Design Space for Direction

- **Direction Method**: Tell, Show, Make
- **Motivation, Triggers**
- **Feedback**
  - Implicit vs. Explicit
  - Positive ("great!") vs. Corrective ("I need you to...")
  - Post-Hoc vs. Real-Time

Outline

- System Direction of Human Action
- **Strategies for Directive Systems**
  - Context
  - Direction & Feedback
  - Mediation

STRATEGIES FOR DIRECTIVE SYSTEMS

**Designing Directive Systems?**

- Review of Existing Research & Practice
  - Speech Recognition, Multimodal Interfaces, Intelligent Tutors, Conversation Analysis
- **Mediation**: resolving ambiguity and error
  - Two Types: Repetition and Choice
- **Grounding** between participants
  - Shared context enabling communication

Contextual Interviews

- Contextual Interviews with 7 Practitioners
  - Interview experts in human direction
  - Conducted standard interviews and observation of practice, as appropriate
  - Film & Theatre Directors, Child Photographer
  - Golf Instructor, Aikido Sensei
  - 911 Phone Operator, Telephone Triage Nurse
Anticipation

Anticipate common errors before they happen. Actively seek out and address problems before they disrupt interaction.

Appropriate Impression

Adopt the appropriate tone and role for the context of the interaction.
Decomposition

- Break down complex actions into a series of simpler sub-actions.

Imaginative Engagement

- Immerse the subject in the experience by engaging their emotions or imagination.

External Aids

- Use physical props or other external aids to guide actions and provide feedback.

Confirmation

- Explicitly query the subject to ensure they are in the expected state.
Consequences

- Explain the consequences, both positive and negative, of particular actions.

Outline

- System Direction of Human Action
- Strategies for Directive Systems
  - Context
  - Direction & Feedback
  - Mediation (what to do when things go wrong)

Freshness

- Avoid repeating utterances, even when giving an instruction nearly identical to a previous one.

Progressive Assistance

- Provide “successively more informative error messages which consider the probable context of misunderstanding” [Yankelovich95].
Method Shifts

- In response to problems, vary forms of direction between **Tell**, **Show**, and **Make**.

Modality Shifts

- When a particular direction approach repeatedly fails, switch or augment the modalities of communication, e.g., use visual rather than auditory cues.

Level of Discourse

- Simplify vocabulary and language when people have difficulty understanding.

Backtracking

- When grounding is lost, backtrack to the last state of mutual understanding.

Sample Conversation:

```
50  CT:  do you want to try CPR?
51  C:  [1.0]
52  CT:  >h= yes- I= I don't know how to 'do
53  C:  [hhat
54  CT:  [uhhh]<Okay, I can give you instructions
55  C:  [for it, but we need to make sure he's not
56  CT:  breathing first, okay? lhh I want you to
57  CT:  ya- can you lay him flat on the floor?
58  C:  [1.2]
```

```
174  CT:  Okay, did his chest rise?
175  C:  [1.2]
176  C:  No!
177  CT:  [1.2]
178  CT:  It didn't rise. lhh Okay, do you have him
179  laying flat on the floor?
```
Graceful Failure

- When all else fails, provide natural exits from the interaction.

Direction Design Guidelines

Setting Context
- Anticipation
- Appropriate Impression

Direction & Feedback
- Decomposition
- Imaginative Engagement
- External Aids
- Confirmation
- Consequences

Error Correction
- Freshness
- Progressive Assistance
- Method Shifts
- Modality Shifts
- Level of Discourse
- Backtracking
- Graceful Failure

P4 User Testing

Formulate critical questions & hypotheses. Choose representative tasks to test. Conduct study with ≥ 8 representative users.

Produce a 5 part write-up:
- Introduction
- Methods
- Results
- Discussion
- Implications
Introduction
Describe your motivation and goals.
What questions do you hope to address with your study? What hypotheses will you test?

Methods
Who are your participants? How were they recruited? Provide basic demographic info.
Describe the system setup. Are you testing different design variants of your system?
Describe the environment(s) where the study occurs. Where are you performing the study?
What tasks or instructions do you provide?
What data (notes, logs, surveys) is collected?

Results
Describe and analyze your study data.
Examples of Quantitative Data
Counts of errors / breakdowns by task
Task success / failure rate
Performance time on task
Survey responses (e.g., Likert scale)
Examples of Qualitative Data
Critical incidents, usage observations
User quotes, notes from talk-aloud protocol

Discussion
Synthesize and interpret your results. Combine quantitative (stats, %) and qualitative (quotes, observations) data to assess your hypotheses.
Organize results into coherent themes. Examples: initial attention, “walk up and use” learning, gesture accuracy, error handling.
Are there any surprises? Aspects that performed better or worse than expected?
Document caveats. What are the limitations of your study or threats to validity?
Implications

Describe how you will apply your study results to your next design iteration.
What existing aspects will you remove? Why?
What aspects will you improve? How?
What new aspects will you introduce?
How will you prioritize these changes?

P4 User Test Write-Up

Due Fri 3/1 by 5pm
Introduction, Methods
You must have your methods description and participant recruitment completed!

Due Fri 3/8 by 5pm
Results, Discussion, Implications

Final Project Presentations

WHEN Monday, March 18, 6-9pm
WHERE Stanford d.school

Guests from across campus and industry will be invited to come experience your projects.

A panel of external judges will score each project and choose “best in show” projects.

You should arrive by 5:30pm to set up and test your presentation and demo.
**Final Project Deliverables**

**Presentation** - no more than 2.5 min (video OK)  
The goal is to give a motivating overview.

**Poster** - document your process. What need do you address? What were your primary design decisions? User study feedback?

**Demo** - provide a tour of your UI. Prepare a ~2 minute “demo script” to orient guests. Then, let them experience it themselves.

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**Presentation Examples (2011)**

**FaceStory**  
Elliot Babchick, Julie Fortuna, Clayton Mellina, Truc Nguyen, Nicole Torcolini

**Pixtory**  
Alexander Blessing, Andrew Chien, Eli Marschner, Michael Yu-Ta Lu

**Total Recall**  
Justine DiPrete, Stephen Carr, Cole Bennett, Daniel Capo