About me

- Background in CS
- Ph.D. in Human-Centered Computing from the Georgia Institute of Technology (advisor Beth Mynatt)
- Currently: Assistant Professor at the Department of Biomedical Informatics, Columbia University
### When and Where

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Overview

- Social translucence at work
- Collective Sensemaking within Online Health Communities
- Learner-centered crowdsourcing
- Observational learning for wellness management
Social Translucence at Work

- Rich tradition of observational studies of work practices
- Focus on communication and awareness
- Specifically for awareness – social translucence (Thomas Erickson and Wendy Kellogg)


Social Translucence at Work

- Social Translucence: awareness of practices and expectations among team-members can have significant impact on work
Social Translucence at Work

- Previous work: awareness
  - Fogargy et al (2005), Predicting human interruptibility with sensors

Social Translucence in Patient Care

- Patient care is increasingly delivered by interdisciplinary teams (physicians, nurses, physical therapists, pharmacists, etc.)
- Fluid and unrestricted communication is essential to teamwork
- Breaks in communication can lead to patient harm
Social Translucence in Patient Care

- Predominant way of communicating: verbal, face-to-face
- Increasingly: through Electronic Health Record (EHR)
  - Notes
- Handoff – a special type of note written to prepare transitions of care
  - Clinicians work in shifts (usually 12 hours)
  - Handoffs happen to prepare incoming clinicians and transfer responsibility for patient care

Previous findings: residents update handoff note throughout their shift, not only to prepare for handoff
- In part explained by awareness that others are reading those notes

Question: is there alignment in practices around handoff notes
- If residents update those notes throughout their shift to communicate with others, do those others actually read the notes
Social Translucence in Patient Care

- Examined usage logs of Handoff tool
  - Edits (how many times a note was updated during a shift, 7am to 7pm or 7pm to 7am): none (0), few (1-3), many (over 3)
  - Views (how many times a note was viewed during a shift): none (0), few (1-3), many (over 3)
- Classify based on match between views and updates:
  - Views = updates → Match
  - Views > Updates → More Views
  - Views < Updates → More Updates
- Usage logs for ALL handoff notes at NewYork-Presbyterian Hospital written/viewed in the month of October, 2013 (over 70,000 notes)
Social Translucence in Patient Care

Views by Hour

Time of Day

Social Translucence in Patient Care

Match
More views
More updates

Category 1
Social Translucence in Patient Care

- Over 40% of all notes were matched in views and updates
  - Some degree of social translucence
- Close to 25% of notes had more updates than views
  - Updating notes to prepare for transfer
  - Attempt at disseminating important patient updates that are not viewed by the team
- Possible solutions
  - RSS-style notifications about edits to the handoff note
  - ???

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Online Health Communities

- Qualitative studies
  - Information needs, emotional support,
- Computational analysis
  - Topic modeling, automated member profiles
- Visualizations of discussion threads
Online Health Communities

- Qualitative studies
  - Information needs, emotional support,

- Computational analysis
  - Topic modeling, automated member profiles

- Visualizations of discussion threads

I started on Afrezza last night...
Visualizing Discussion Threads

ForAvis:

Visualizing Discussion Threads

Themail
Visualizing Discussion Threads

- VizBlog

- ForumReader
Visualizing Discussion Threads

- ConViz

- DisViz (Drashko Nakikj)

Main goals (overview – details on demand)
- Overview (entire discussion in graphical form with focus on post length and reply structure, most frequent key words and users, timeline)
- Details (access posts by keywords or users)
DisViz

Evaluation study
- 10 participants recruited from online diabetes forum TuDiabetes
- Between-subjects design (5 control group/5 experimental group)
- Task: examine a discussion thread, answer questions about the discussion
- Questions:
  - Overview (what were the main topics discussed?)
  - Topic-specific (when were infusion sets first brought up?)
  - Opinion synthesis (what was the consensus on MDI?)
- Measures: accuracy of answers, time for answers
- Gold standard: research team, domain expert (PhD student in nursing)

Quantitative Results
- Increase in accuracy (from 38% to 64%, p=0.008)
- Decrease in time, non-significant (from 65 sec to 40 sec, p=0.15)

Qualitative Results
- Positive feedback on discussion overview, highlighting of key concepts and users, temporal representation
- Negative feedback on complex design and information overload and steep learning curve
Overview

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Learner-Centered Crowdsourcing

- Crowdsourcing is a popular way to accomplish small tasks
- Amazon Mechanical Turk – a popular crowdsourcing platform – has over 10,000 workers available at any given time
- Commonly need many workers to achieve accurate results
- Possibility of reducing the number of workers by improving their skills
- Learning new skills as an additional (or alternative motivator) for participating in crowdsourcing
Learner-Centered Crowdsourcing

- Improving workers' performance:
  - Self-assessment (examine one's own past performance)
  - Assessing the work of others
  - Expert-generated feedback

- Unexplored opportunity:
  - Use aggregated performance by others to generate feedback
  - Observational learning

Learner-Centered Crowdsourcing

- Collaboration with Krzysztof Gajos (Harvard University, PlateMate)

- Domain: nutritional assessment of meals

- Task: mapping meal ingredients to macronutrients
Learner-Centered Crowdsourcing

- Participants: workers on Amazon Mechanical Turk (n=240)
- Study design: between subjects (subjects assigned to one of 6 conditions)
- Procedures: baseline phase (5 images), training phase (10 images), post-training phase (5 images)
- Dataset: images of meals from wikimedia commons (20 images)
  - Dataset included 5 key ingredients (beans, avocado, nuts, corn, cheese)
  - Each ingredient was repeated 3 times (baseline image, training image, post-training image)
- Measures: improvement in accuracy from baseline to post-training

Dimensions in feedback conditions:
- Explicit – Implicit
  - Explicit: other Turkers are asked to assess whether an answer is accurate or not, and to correct it if it is not (and provide an explanation)
  - Implicit: simply showing a comparison between one's own answer and answers of others
- Aggregates – Distribution
Learner-Centered Crowdsourcing

- Feedback conditions:
  - No feedback – control group

- Expert-generated feedback
Learner-Centered Crowdsourcing

- Feedback conditions:
  - Explicit peer feedback – most popular solution

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Learner-Centered Crowdsourcing

- Feedback conditions:
  - Explicit peer-feedback distribution of opinions
Learner-Centered Crowdsourcing

- Feedback conditions:
  - Implicit peer feedback
  - Most popular solution

Other Turkers provided answers to the same question. Please take time to compare your answer to the answers of others. We don’t know which answer is correct and are showing you the most popular answers for each ingredient. Remember, the best answer should tell us food groups for each of the ingredients. If you still think your answer is correct, feel free to submit it as is. If you decide to change your answer, please explain why you think it was incorrect in your original solution.

Waffle Irons

- Feedback conditions:
  - Implicit peer feedback
  - Most popular solution

Learner-Centered Crowdsourcing

- Feedback conditions:
  - Implicit peer feedback
  - Distribution of opinions

Other Turkers provided answers to the same question. Please take time to compare your answer to the answers of others. We don’t know which answer is correct and are showing you the most popular answers for each ingredient. Remember, the best answer should tell us food groups for each of the ingredients. If you still think your answer is correct, feel free to submit it as is. If you decide to change your answer, please explain why you think it was incorrect in your original solution.
## Learner-Centered Crowdsourcing

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<th>Condition</th>
<th>Mean gain across ingredients</th>
<th>Mean gain for key ingredients</th>
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<tbody>
<tr>
<td>C1 (control)</td>
<td>-0.59 (-0.52, 0.6)</td>
<td>0.17 (0.1, 0.92)</td>
</tr>
<tr>
<td>C2 (expert)</td>
<td><strong>7.48 (5.69, &gt;0.01)</strong></td>
<td><strong>11.1 (6.27, &lt;0.01)</strong></td>
</tr>
<tr>
<td>C3 (peer/explicit/simple)</td>
<td>-0.18 (-0.16, 0.87)</td>
<td>1.19 (0.77, 0.44)</td>
</tr>
<tr>
<td>C4 (peer/explicit/detailed)</td>
<td>-0.4 (-0.34, 0.73)</td>
<td>-0.49 (-0.28, 0.78)</td>
</tr>
<tr>
<td>C5 (peer/implicit/simple)</td>
<td>1.56 (1.25, 0.21)</td>
<td>1.59 (0.7, 0.48)</td>
</tr>
<tr>
<td>C6 (peer/implicit/detailed)</td>
<td><strong>2.98 (2.48, 0.02)</strong></td>
<td>3.0 (1.9, 0.06)</td>
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### Conclusions

- Comparison with performance by others can help individuals improve their own performance

### Implications

- Volunteer-based crowdsourcing communities
- Individuals take pictures of their meals and generate an initial nutritional assessment (either nutritional breakdown, or comparison with goals)
- Images are submitted to a community of others who also provide their assessment
- Aggregated assessment by others is shown to the individual as feedback
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Ongoing work - Mealyzer

- A user takes a picture of their meal
Ongoing work - Mealyzer

- They themselves generate an initial nutritional assessment

Ongoing work - Mealyzer

- The picture is sent to other users who are asked to generate their own nutritional assessment of the submitted meal
- Gamification elements: promoting fast and accurate answers
Ongoing work - Mealyzer

- Mealyzer aggregates community generated answers and shows them to the users as feedback

Alternative:
Assess each meal on fit with goals
Ongoing work - Mealyzer

- Alternative: See examples of meals that meet goals and that do not meet goals that are generated by other users (observational learning)
Ongoing work - Mealyzer

- Looking for students interested in mobile design/development
- lena.mamykina@dbmi.columbia.edu