CCC 2016
Cyber Social Learning Systems
Mary Czerwinski
Honest Signals (as important for learning systems as for humans)—trust, behavior change, etc.
Affective Computing

• Precision Psychology: using ML to target skills training
  • Using ML for understanding what parts of DBT work for which people/problems/contexts

• Conflict management

• Group decision making
  • Better policy->equal distribution of resources, underserved?

• Productivity and stress

• Creativity and Flow

"Well, Ms. Gided, if you really want to feel better, you will need to work very hard to change."

"Doctor, can’t you just hypnotize me and wake me up when it’s over?"
DBT: Dialectical Behavior Therapy

DBT is a modular and transdiagnostic treatment specifically designed for suicidal individuals presenting with multiple problem behaviors related to emotion dysregulation.

Linehan, 1993; Linehan 2014; Stoffers et al., 2012; Panson et al., 2013; Harned et al., 2008
DBT: The Scalability Problem

It works really well!

- **Gold standard for BPD and suicide** (Kliem et al., 2010; Stoffers et al., 2012; Ward-Ceileiski & Linehan, 2015).
- **DBT is highly effective for dual diagnosis** (See Dimeff & Linehan, 2008).
- **DBT also reduces:**
  - Depression (Harned et al., 2008).
  - Anger (Neiscai et al., 2015)
  - PTSD (Harned, Korslund, & Linehan, 2015).

However

- In 2010, 5.2 million American adults in need did not receive any psychological treatment (Institute of Medicine, 2012).
- 63% of suicide decedents not in contact with mental health care in the year prior to their death (Luoma et al., 2002).
- Waiting times for evidence-based treatments like DBT range from 8 weeks to 18 months—worse for low income (e.g. Van den Berg et al., 2006; Trusler, 2008).
- The few online attempts have failed
Example Research Method: Path to improve treatment access

• Translate the active components of face-to-face treatment into a mobile application

• Iterative research design—1st prototype w/ Human in the Loop:
  • Recruit clinical population (N = 10)
  • Continual assessment about what works and what doesn’t work and make changes accordingly; active human intervention; a work in progress

• 2nd iteration: machine learning:
  (1) Determine what works & what’s liked and for whom and where
  (2) Improve face-to-face treatment by understanding ecological skill use

• After learnings, map out to larger number of people
HeathSense: Creating a flow experience for work

Gloria Mark, Shamsi Iqbal, Mary Czerwinski, Paul Johns
Biometrics are cheap and widespread
HealthSense: Improving and empowering the workplace experience

Goal: to capture as comprehensively as possible the workplace experience: through sensors, biosensors, probes, computer logging
Focus, productivity and stress

Attention focus follows rhythmic patterns in the workday
Computer usage characterized by short segments of focus
Email duration detrimental to productivity, stress and mood
Feeling in control is essential to productivity

Mark, Iqbal, Czerwinski, Johns, CHI’14
What predicts computer attention duration?

Factor: ‘Lack of control’ explains 19% of variance

Lack of control comprised of:
  - High Neuroticism
  - Impulsivity: lack of perseverance
  - Stress

Mark, Iqbal, Czerwinski, Johns, CHI’16
Workplace mood

Factors:
Shorter Sleep**
Concentration difficulty*
Email duration**
Workplace productivity***
Non-sedentary activity

Controlled for:
Job Demands
Job Decision Latitude*
Age**
Gender

adj. $R^2 = .48$

Mark, Iqbal, Czerwinski, Johns, Digital Health ‘16
Can biometrics tell us how difficult it is to comprehend source code? (ICSE 2014)

• Devs compare pairs of almost identical programs with small changes designed to induce comprehension difficulty.
• We used eye tracking, electrodermal activity (EDA), and EEG to predict developer self-reports of comprehension difficulty.
• Machine learning classifiers get 85% precision, 70% recall when trained on each task.
Delve Analytics

Your time
Your stats are based on your email and calendar. Learn more

Meeting hours  Email hours  Focus hours  After hours
47 hours       16.1 hours    11.5 hours    26.1 hours

Edit goal     Edit goal     Edit goal     Edit goal

Stay in touch
New CSLS Topics

• Not a deterministic system—theoretical at a hybrid level
  • Expect the unexpected and continuously learn (both human and system)/unlearn
  • Have to have provenance
  • Continuous experimentation
  • Influence of the crowd/interventions
  • Difference between complicated and complex (e.g., blueprint or not)

• New methods for studying—watch brain signals, etc.
  • Remember to study human psychology (e.g., motivation)
  • Simulation is very important

• New notions of “users”
  • Professionals (all levels), consumers
  • Different levels of skin in the game; motivation is huge; incentives
CCC CSLS 2016

• Thanks for listening!