Using Smartphones to Measure (and Intervene in) Daily Life

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Background
Smartphones as Research Tools
Case 1: Subjective Wellbeing & Behaviour
Case 2: Smoking Cessation
Challenges, Opportunities, Questions
Background
Smartphones as Research Tools
“by 2025, when most of today’s psychology undergraduates will be in their mid-30s, more than 5 billion people on our planet will be using ultra-broadband, sensor-rich smartphones far beyond the abilities of today’s iPhones, Androids, and Blackberries.”

DIARY METHODS: Capturing Life as it is Lived

Niall Bolger, Angelina Davis, and Eshkol Rafaeli

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Key Words experience sampling method, longitudinal designs, electronic data
collection, self-report measures, multilevel models

Abstract In diary studies, people provide frequent reports on the events and experiences of their daily lives. These reports capture the particulars of experience in a way that is not possible using traditional designs. We review the types of research questions that diary methods are best equipped to answer, the main designs that can be used, current technology for obtaining diary reports, and appropriate data analysis strategies. Major recent developments include the use of electronic forms of data collection and multilevel models in data analysis. We identify several areas of research opportunities: 1. in technology, combining electronic diary reports with collateral measures such as ambulatory heart rate; 2. in measurement, switching from measures based on between-person differences to those based on within-person changes; and 3. in research questions, using diaries to (a) explain why people differ in variability rather...
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632 FOLLOWING 1,395 FOLLOWERS

Tweets Photos Favourites

Parra @denisparras
Our #sigir2015 Workshop proposal on Social Personalization & Search accepted, w/peterpaws @ctrattner @abellogin & @lbalby, updates soon!

What’s happening? 0 1 2 3 4 5 6 7 8 9 0 Q W E R T Y U I O P A S D F G H J K L Z X C V B N M Sym ENG(US) ENG(UK) ENG(SG) ENG(CN) ENG>').text

be used, current technology for obtaining diary reports, and appropriate data analysis strategies. Major recent developments include the use of electronic forms of data collection and multilevel models in data analysis. We identify several areas of research opportunities: 1. in technology, combining electronic diary reports with collateral measures such as ambulatory heart rate; 2. in measurement, switching from measures based on between-person differences to those based on within-person changes; and 3. in research questions, using diaries to (a) explain why people differ in variability rather
Accelerometer
GPS / Wi-Fi
Gyroscope
Bluetooth
Microphone
Humidity
Temperature
Phone / Text Logs
Device Logs
Social Media APIs
App Usage
Accelerometer | Physical Activity
GPS / Wi-Fi | Mobility
Gyroscope | Orientation
Bluetooth | Co-Location
Microphone | Ambient Audio
Humidity | Environment
Temperature | Environment
Phone / Text Logs | Socialising
Device Logs | Network
Social Media APIs | Socialising
App Usage | Information Needs
Case 1: Subjective Wellbeing & Behaviour

What is Emotion Sense?

Emotion Sense is a collection of Android libraries to quickly build applications that collect sensor, mobile phone usage, and survey response data from participants of human interaction or social psychology experiments.

The tools are fully configurable: social scientists can define what sensor data they would like to collect, a range of surveys with questions they would like to ask, and the conditions that should trigger each survey. Similarly, participants can set the application to meet their own personal preferences, by setting when they are available to answer surveys. The application is fully automated, and its configuration can be remotely updated, in order to adapt experiments as they are ongoing.

Recent Publications

K. Rachuri, C. Mascioli, M. Musolesi, P. J. Rentfrew.

Conscientiousness
You scored on the lower end of the average range for conscientiousness (lower than 50% of all people).
Conscientious people tend to be efficient, organized and thorough, and tend not to be careless, lazy or impulsive.

Emotional Stability
You scored quite high on emotional stability (higher than 75% of all people).
Emotionally stable people tend to be contented and self-confident, and tend not to be tense, irritable, shy or moody.

Extraversion
You scored on the upper end of the average range for extraversion (higher than 50% of all people).
“A sample of 222 undergraduates was screened for high happiness using multiple confirming assessment filters. We compared the upper 10% of consistently very happy people with average and very unhappy people. The very happy people were highly social, and had stronger romantic and other social relationships than less happy groups...”

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Statistical: mean, standard deviation, median, etc.
Time: auto-correlation, mean-crossing rate, etc.
Frequency: FFT, spectral energy, etc.
Peak: volume, intensity, skewness, etc.
Segment: e.g., velocity change rate
\[ r(24,201) = .37, \ p < .001 \quad d = .80 \]
\[ r(10,376) = .03, \ p < .001 \quad d = .07 \]

\[ r(2,969) = .10, \ p < .001 \quad d = .19 \]
Weekday Average

\[ F(2, 10,288) = 39.08, \ p < .001 \]

Happiness: \( M = .23 \)

Weekend Average

\[ F(2, 9,627) = 32.52, \ p < .001 \]

\( M = .57 \)
Case 2: Smoking Cessation

Naughton et al. (in prep). *The feasibility of a context aware smoking cessation app (Q Sense): A mixed methods study*. 2015.
“cue-induced cravings: intense, episodic cravings typically provoked by situational cues associated with drug use [...] smokers exposed to smoking-related cues demonstrate increased craving [...]”

Hello, Neal.

PREPARE & LEARN

20 days, 23:58:44 left.

My Profile    I'm Smoking

Ok, Neal! The first stage is “Prepare & Learn.”

2/4: Cravings and Urges.

How strong was the urge to smoke just before you lit up?

Very Strong - Slight - Extremely Strong

Submit

You have 40 reports in this area. Click below to explore your data.

- Stress Levels
- Mood Levels
- Craving Levels
- Smoking Situations

My Emotions

Time Of Day

Location
SMS Patterns
Accelerometer
Phone Screen
Microphone
Call Patterns
Personality
Sociability

Ongoing
Connected as a media devi...
Touch for other USB options.

Emotion Sense
How do you feel?

Survey Stats

Submit

Time Of Day

Positive
Negative

Stress Alert Excitement
Depression Sleepy Relaxation

Data: Last 30 days.

Colours
PREPARE & LEARN

5 days, 7:24:23 left.

You have 19 reports in this area.
PREPARE & LEARN

5 days, 7:24:23 left.

Stress Levels

Your ratings for how stressed you felt just before smoking. Based on your reports, stress seems to be part of why you smoke.

<table>
<thead>
<tr>
<th>Rating</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all</td>
<td>6.67%</td>
</tr>
<tr>
<td>Slightly</td>
<td>26.67%</td>
</tr>
<tr>
<td>Somewhat</td>
<td>60%</td>
</tr>
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Slightly 26.67%
Somewhat 60%
Very 6.67%
Extremely 0%

Stress, Depression, Urges, Situation, Social (Other Smokers).

MAKE LIFE EASIER
Quit tip - when you start your quit attempt make life easier by replacing your smoking routines e.g. try chewing gum or mints instead of smoking when socialising.
18 Dec 2014 16:30:28
Challenges, Opportunities, Questions
SensorManager
Android Sensor Manager Library
Updated 20 days ago

SensorDataManager
Android Library for exporting/managing data from the Sensor Manager Library
Updated 20 days ago

ProfileManager
Android library for storing user stats
Updated on 15 Jan

es-docs
Web documentation for our sensing libraries.
Updated on 27 Dec 2014

https://github.com/xsenselabs
http://easym.emotionsense.com/
**Time Of Day**
11,311

**Location**
5,212

**SMS Patterns**
3,902

**Accelerometer**
2,978

**Phone Screen**
2,401

**Microphone**
1,924

**Call Patterns**
1,514

**Personality**

**Sociability**

**Connectedness**

**Inbox**

**BODY CHANGES**
What research has found: After you stop smoking, your body will retain more caffeine after you drink tea, coffee etc. due to changes in your metabolism. So go easy on the caffeinated drinks at first, especially at night!

19 Jan 2015 15:44:40

**YOU REPORTED SMOKING**
You reported feeling "somewhat" stressed.

19 Jan 2015 15:43:33

**DID YOU KNOW?**
13.0% of your 78 reports are after 6:00pm.

19 Jan 2015 15:32:52
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