
Other Research Interests

PIM
- Keeping, managing and accessing personal data

Collaboration Tools
- Video, real-time apps, meetings, collaboration personas

CMC and Social Media
- IM, ‘social email’, social network extraction from email, largescale analysis of social applications

The Lifelogging Vision (Bel and Gemmell, 2009)

What if we could save records of:
- Every bit of information we touch?
- Every event we experience?
- Our reactions to those events?

What it might look like...
The Lifelogging Vision

Never miss a thing
A complete and accurate digital prosthesis
Contrast to fallible Organic Memory (OM)

Ebbinghaus forgetting curve

Technical feasibility?

In 70 years of life exposed to:
~ 6 Gbytes of text
Video recording our lives: ~1500 Terabytes (~1.5 x 10^{15} bytes)
Storage isn’t a problem

Psychologically appealing....

Affective benefits
Lifelogging could support reminiscence
Reminiscing promotes happiness and health (Lyubomirsky et al. 2005)
Efficiency benefits
Records of all our personal information
Studies of deletion - people are loath to discard anything
Why is it hard to delete?
Basic psychology: people oriented to losses not gains (Kahneman and Tversky 79)
- Inability to sell losing stock
Always think of a context where information might be useful

Lifelogging: technically possible and psychologically appealing
BUT
- When might we use memory prostheses?
- How might they work in practice?

Studies of Lifelogging showing problems with the Lifelogging Vision
New Design Principles
New Systems built according to these Design Principles
Future Challenges

Lots of lifelogging systems - Memex, Reqall, Eyetap, Stuff I’ve Seen….
BUT
- Do they actually help memory?
- How would we use them?
- When would we use them?
Does SenseCam help us remember past events?

How does it help?
- More events, more details, reconstruct or authentically recall?

Does UI affect recall?
Affective reactions, habit detection at recall

SenseCam study (Kalnikaite et al., 10)

18 participants wore SenseCam and GPS for 2 weeks
5 weeks later, test recall
Questions

Recall: What did you do, where did you go and who did you meet on (e.g. Monday morning Dec. 16th?)

Reconstruction rating
• Remember = 'see in my mind’s eye'
• Know = 'I must have done x'
• Guess = 'unsure but maybe I did x'

Emotions, habits

Recall?

# of events
Event = driving kids to school, going out to lunch, supermarket shopping, having a meeting, visiting the gym
Details of events: place, people, topics – had lunch with Jack and Jill
2 independent coders check reliability
Replicates Sellen et al., 07

"I found [SenseCam] pictures really useful for those small micro events that happened over those days...

"[Snaps] usually made me remember. [SnapTracks and Tracks] made me figure out something must have happened in a particular way e.g. I must have gone home by taxi."

"[Organic Memory] was useless - I could have no emotional attachment to those memories... but the tools, especially Snaps were very good at reviving accurate memories..."
Recall poorer than expected - rich information doesn’t guarantee recall. Lifelogs are not an automatic trigger for authentic recall.

- Often reconstructive (Schacter, 1996)
- Different types of lifelogs have different effects

Implicit assumption that Lifelogs are privileged compared with OM
Lifelog is complete and accurate
But will people prefer to use Lifelogs?
OM is often more efficient, especially if Lifelog indexing is poor

Research Questions

When do people use Lifelogs as opposed to their own memory?
What determines these choices?
- Quality of their own memory?
- Properties of the Lifelog interface? Indexing?

Compare 4 Devices

1. Organic Memory (OM)
2. Pen & Paper (PP)
3. Dictaphone (DP)
4. ChittyChatty (CC)
Temporally Tagged Annotations:

Clicking on a tag (e.g. ‘explanation of Nielsen’s usability heuristics’) will replay what was being said when the note was made or picture taken.

Chitty Chatty: How It Works

Recording
Combination of handwritten notes and speech recording
Temporal co-indexing of notes and speech

Retrieval

Device Characteristics

<table>
<thead>
<tr>
<th>Device / Characteristics</th>
<th>Accuracy</th>
<th>Efficiency</th>
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</thead>
<tbody>
<tr>
<td>Organic Memory (OM)</td>
<td>X</td>
<td>✓</td>
</tr>
<tr>
<td>Pen &amp; Paper (PM)</td>
<td>X</td>
<td>✓</td>
</tr>
<tr>
<td>Dictaphone (DP)</td>
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</tr>
<tr>
<td>Chitty Chatty (CC)</td>
<td>✓</td>
<td>✓</td>
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</table>

Experimental Design

- 3 stories presented once, 25 people
- Tested in 3 sessions (after 1,7,30 days)
- Answer questions about stories
- Same device/same story but different questions
Questions

- Test factual memory for conversation
- Before people answered the memory probe we asked a *metamemory* question
- *How confident are you that you can answer this question from memory?*

Synergy not Substitution

- Don’t always use Lifelogs
- Only used when you perceive your own memory is weak

Usage Depends on the Device Properties: verbatim records aren’t always preferred

Accuracy & Efficiency
Summary of Empirical Studies
- Creating a rich archive doesn’t guarantee perfect recall
  - Retrieval benefits less than expected
  - May involve reconstruction
- Archive usage depends on
  - Ability to remember unaided using OM
  - Lifelog UI properties – efficiency, accuracy
- Importance of *effective retrieval indices* and *UI*

New Design Principles
- Not just creating an archive to ‘capture everything’
- Problems of access and effective indexing

New Design Principles
- How can we design systems that allow lifelogs to be accessed effectively?
- Need methods to simplify, abstract and promote important information
- Cognitive science - theories of memory can help us determine what's important

Design Principles: Adaptive Selection
- Human memory is *selective*, but what *principles* for selection?
- *Adaptive* nature of memory (Anderson & Schooler91)
- Reflects the structure of the environment
- Remember events that are *useful* or *important* for us, e.g. Recent, Repeated
- Also adaptive for *emotions* – rosy view of our past (Mitchell et al., 1997)
Attention-based
Privilege certain types of events
- Preparatory attention: Events we pay careful attention to at the time they happen
- Note-taking
- Pictures – naïve theory of photography
- Post hoc attention: Events we repeatedly access after they happen

Preparatory actions
Notes: ChattyWeb
Pictures: PiccyWeb
Create indices
Index a lecture course
Many real-life situations where verbal information comes too fast, making memory a challenge
Pictures as retrieval indices

Photo annotations

‘Quiz’ results

Kalnikaite and Whittaker (2011)

Usage correlated with evaluations

Relation to course grades

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Standardized Coefficient</th>
<th>Sig.</th>
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<tr>
<td>(Constant)</td>
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<td>Last Years' Degree Score</td>
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<td># Sessions</td>
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<tr>
<td>Mins/Session</td>
<td>.833</td>
<td>.336</td>
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</table>
Problems with single user indices
- Deciding what's important, plus divided attention
- Not just what one person thinks will be interesting/useful
Combine indices across users for both storage and retrieval
- Storage: students can tag lecture
- Retrieval: most accessed indices will be foregrounded

Popular Pictures as Retrieval Indices
(Kahvakari and Whittaker, 08)

Popular Notes as Retrieval Indices
(San Pedro, Kahvakari & Whittaker 03)

Social Summaries of Youtube Videos
(San Pedro, Kahvakari & Whittaker 03)
Content-Based Event Selection

Internal event semantics
Memory for meeting conversations
(Tucker and Whittaker, 09)
Anderson-inspired analysis of transcript recordings
Importance profiling - analyse words in a speech document collection using Information Retrieval methods

Important words are frequent in a current sample but infrequent in general (tfidf) – show what the meeting was ‘about’

$\text{imp}_d = \log(\text{count}_d + 1) / \log(\text{length}_d) \times \log (N/N_t)$

Interactive selection, user controls the level of detail by which they view their past
(Tucker and Whittaker, 2009)
So far talked about adaptive memory from an informational perspective
- Identify events that are important/useful

New work
Emotional adaptation
Use lifelogs to promote reminiscence
Can we identify events that have positive emotional effects?
**Emotional adaptation**

Reminiscence generally promotes happiness and health  
Adaptive because we edit negative events from our past – ‘rosy view’

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**Reminiscing improves well-being and health**

“Those who spend more time reminiscing report greater positive affect than those who spend less...”

“Increasing the frequency of positive reminiscence can increase people’s level of happiness”

“Reviewing one’s life retrospectively promotes well-being among older adults”

Bryant, Smart & King, 2005, Lyubmenksky et al., 2005

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**Adaptive: Rosy view phenomenon**

“People’s recollection of an event is more positive than the actual experience.”

“Understanding the rosy view … may be important for understanding reactions to stress, coping mechanisms, prosocial behaviors and good mental health.”

Mitchell, Thompson, Peterson & Crank, 1997

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**New approach to reminiscence**

- Use lifelogging to track events and emotions  
- Explore the effects on happiness of using technology to present past personal events  
- We can use digital methods to manipulate what you remember  
- Re-present the positive  
- Process the negative
Micro-reminiscing is a way to...

Capture ordinary events each day
Incorporate lightweight reminiscing into our daily lives
Track our happiness over time
Increase our well-being?

Record activities with photos, text, audio, or video + 1-9 rating of happiness

Each day

11 am
3 pm
8 pm

8

7

9

8

7

9

9

1 month later

Time-based trigger

Alert arrives showing you earlier activity

You comment on it and rate happiness of the memory

Visualizations show patterns of activities, happiness
Negative becomes more positive: Despite initial anxiety, things often turn out well in the end.

Positive psychology: Remind ourselves about good past events.

**Examples from a two-year field trial**

**Effects of reminiscing on well-being**

Does micro-reminiscing affect overall happiness? How and why?

Do memories of ordinary events get “rosier” over time?

Does reviewing pleasant and unpleasant memories affect well being differently?

Does it help to selectively view memories based on happiness level?

**New Approach to ‘Digital Memory’**

Beyond Exhaustive Capture
- It’s not enough to store everything
- Various problems with digital archives
- Indexing
- Efficiency
- Adaptive approach addresses these

**Design Principles**

Need for *selection*

Informational
- User actions and attention
- preparatory/posthoc
- use social information

Affective
- Exploring effects of re-presenting positive and negative event types
Final observations

Synergy not substitution: Strategically target the weakness of human memory
Not ‘capturing experience’ but designing effective retrieval cues
Extend basic applications from factual recall to emotional reminiscing

Current Memory Projects

Family Memory
- Beyond photos

Very long term retrieval
- Sensecam
- Credit card records
- Photos

Questions?