SenseCam & memory rehabilitation

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What is SenseCam?

• A new concept for digital cameras
  – Wearable, wide-angle lens
  – Automatic capture
  – Range of sensors

• New media type
  – Between digital stills & video recordings

• Applications
  – Cueing recall for the wearer
  – Sharing experiences with others
A SenseCam movie
Easy to use software...
How can SenseCam help memory?

- External memory aids are an effective aid to memory rehabilitation (Kapur et al. 2000)

  Two issues with this:

  1) Almost all treat prospective memory

  2) Memory aids are best used by people with intact memory (Wilson, 2002)
How can SenseCam help memory?

SenseCam overcomes these problems:

1. It records events as they happen
2. Use requires little cognitive effort
   - Passively records experiences
   - No conscious thought
   - Allows full participation in the event
   - Simple to upload and view images (VCR interface)

• Subsequent viewing of image sequences
  - Cue recall & so consolidate storage of memories
Why Rehabilitate Autobiographical Memory?

• Remembering is an act of communication
  – Retelling past experiences is integral to social interaction
  – Reminiscing creates interpersonal bonds

• Autobiographical knowledge ‘constrains what the self is, has been and can be…’ (Conway, 2005).
SenseCam Clinical Trials: Study Design

– **Experimental condition**
  SenseCam used to record memorable days

– **Control condition**
  Written diary used to record memorable days

– **Baseline**
  No memory aid to help recall memorable days

– Information reviewed approx. every 2 days for 2 weeks
– Memory evaluated before each review

*In this way we assess whether a patient’s memory of an event improves with successive viewings of the event*
Clinical studies: case study 1

Mrs B

(Berry et al, in press)

- Cambridge Memory Clinic
- 63 year old, well educated woman
- Limbic encephalitis 2002
- Severe episodic memory impairment
  - No recall of an event within 3 to 5 days
Memory of an event over time

- **Baseline**
- **Written diary**
- **SenseCam**

Level of Recall vs. Time elapsed since event (days):

- 1 day
- 3 days
- 5 days
- 1 week
- 2 weeks
- 3 weeks
- 10 weeks
Results: feedback from patient and spouse

- Seeing images brings memories ‘flooding back’

- More relaxed socially and less anxious

- Sharing experiences again was a ‘sheer pleasure’

- ‘It has enormous potential as a memory aid and has been a great success for us personally’
Clinical studies: case study 2

Mrs F – Alzheimer’s disease

- Cambridge Memory Clinic
- 67 year old woman, living alone
- Alzheimer’s disease diagnosed in 2000
- Now in ‘moderate’ stage of disease
- Marked memory impairment
Results

Memory of an event over time

Level of Recall

Time elapsed since event

Baseline
Written diary
SenseCam
Clinical studies: case study 3

Mr RD – Alzheimer’s disease

• Cambridge Memory Clinic
• 75 year old man, living with his wife
• Diagnosed with MCI in 2005 & AD in 2006
• Now has marked memory impairment
• Relatively intact other cognitive functioning
Results: Mrs F, Alzheimer’s disease

Memory of an event over time

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Time elapsed since event
Results: feedback from patients & spouse

- ‘(It) is definitely helpful... normally I would just forget these things’

- ‘I have more confidence’

- ‘SenseCam is a Godsend... everyone should have one!’

- ‘When we didn’t have the camera she wouldn’t be able to recall much... We get enjoyment out of it’

- ‘I’m grateful because I remember what I have done’

- ‘Even if we didn’t have you to worry about, we’d still use it’
Why is SC better than written diary?

• Evidence that autobiographical memory is rich with visual imagery (Brewer, 1988; Greenberg & Rubin, 2003)

• SenseCam images may be similar to images in autobiographical memory (Martin Conway, 2006)

• Certain SC images may powerfully cue recall:
  – SC movies capture *personally meaningful events* which appear to cue recall for thoughts & feelings at the time the image was taken
  – Croucher, Calder & Barnard (2006) call these ‘impact’ images
  – These are not necessarily accessible to another person
Personally meaningful images
Personally meaningful images
Personally meaningful images
Personally meaningful images
Ongoing funded SenseCam research

– Dr Fergus Gracey and Prof. Andrew Bateman
  • SC & physiological monitoring as a tool to aid executive functioning after brain injury

– Dr Phil Barnard & Dr Linda Clare
  • SC facilitated recollection in patients with dementia

– Prof. Adam Zeman
  • SC as a memory support in Transient Epileptic Amnesia

– Prof. Martin Conway & Prof. Roberto Cabeza
  • Behavioural and neuroimaging studies of effects of SC on human memory
Conclusions

- SenseCam powerfully stimulates the recall and consolidation of memories that would have otherwise have been forgotten.

- Patients have a subjective feeling of remembering. They recall events, thoughts and feelings not in the images.

- In some patients, this improves confidence & reduces anxiety.

- The clinical and experimental applications of SenseCam are continuing to be explored by us and our collaborators.