



Using SenseCam, a wearable camera, to alleviate autobiographical memory loss

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With thanks to:

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 - Steve Hodges (Project Manager & Hardware Developer)
 - Lyndsay Williams (Inventor)
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Summary of talk

- What is SenseCam?
- How might SenseCam aid autobiographical memory?
- Early studies: Can SenseCam help memory impaired patients remember the past?
- Summing up

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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



SenseCam movies



Easy to use software...

Frame 424/803, Timestamp 01/11/2006 15:57:19

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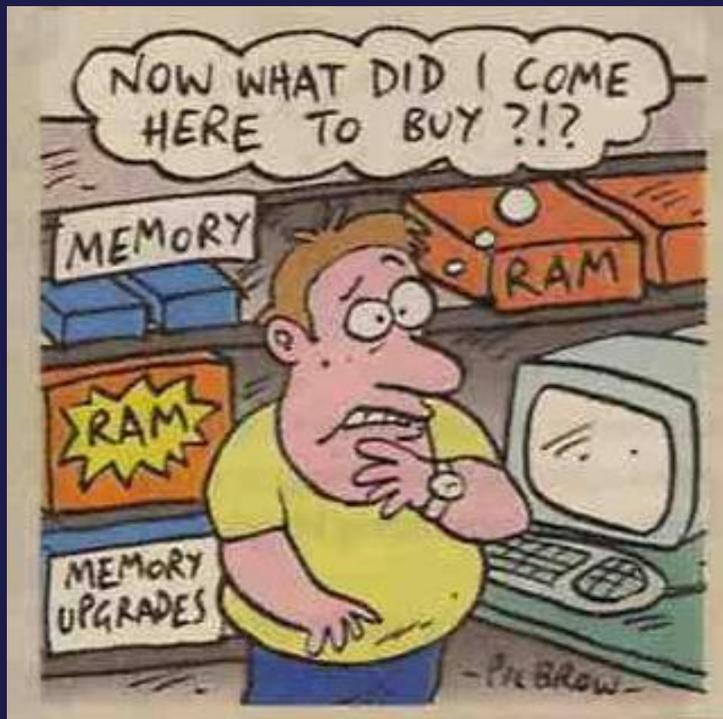
Fast Back Back Pause Forward Fast Forward

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Can SenseCam aid autobiographical memory?

- External memory aids are an effective aid to memory rehabilitation (Kapur, Glisky & Wilson, 2000)



Can SenseCam aid autobiographical memory?

- Memory aids are best used by people with intact memory... (Wilson, 2002)
- SenseCam passively records experiences
 - Without conscious thought
 - Allows full participation in the event
 - Plays back quickly in simple-to-use, easy-to-view 'movie'
- Subsequent viewing of image sequences
 - Cues recall & so consolidates storage of memories

Why rehabilitate autobiographical memory?

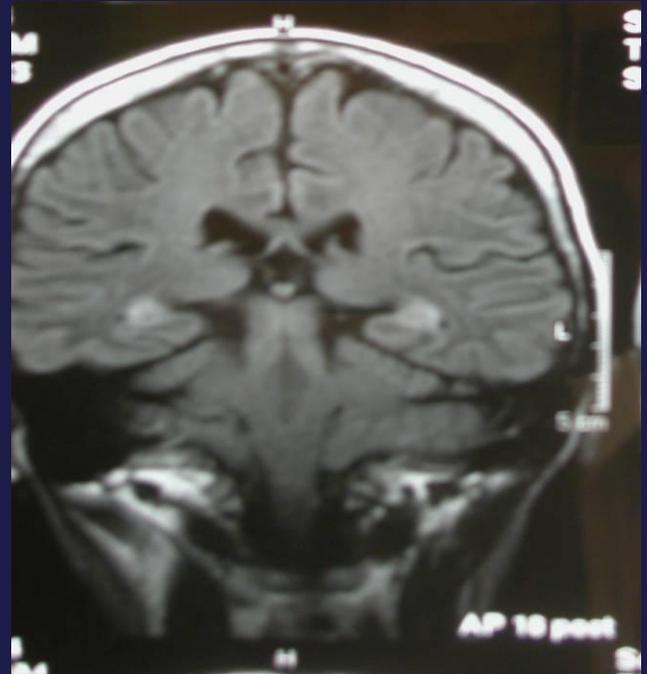
- Remembering is an act of communication
 - Retelling past experiences integral to social interaction
 - Reminiscing creates interpersonal bonds
- Autobiographical knowledge ‘...constrains what the self is, has been and can be...’ (Conway, 2005).

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Clinical history: 'Mrs B'

- Cambridge Memory Clinic, Addenbrooke's Hospital
- Diagnosed with limbic encephalitis in 2002
- MRI scan March 2005
- Now has severe memory impairment (delayed story recall = 0)



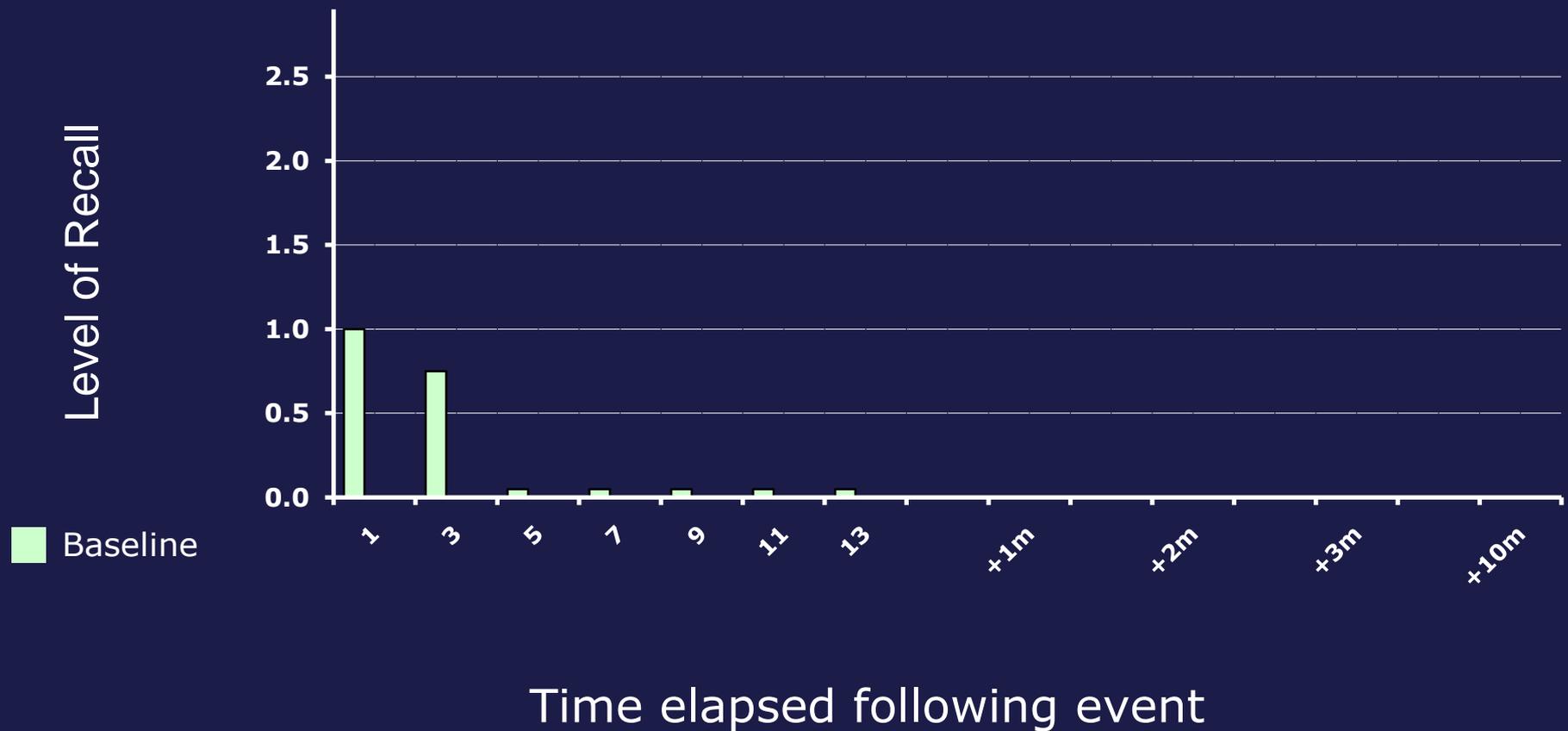
SenseCam Clinical Trials: Study Protocol

- Experimental condition (N = 9)
SenseCam used to record memorable days
- Control condition (N = 3)
Written diary used to record memorable days
- Baseline condition (N = 2)
No memory aid to help recall memorable days
- Information reviewed every 2 days for 2 weeks
- Memory evaluated before each review

In this way we could assess whether Mrs B's memory of an event improved with successive viewings of the event

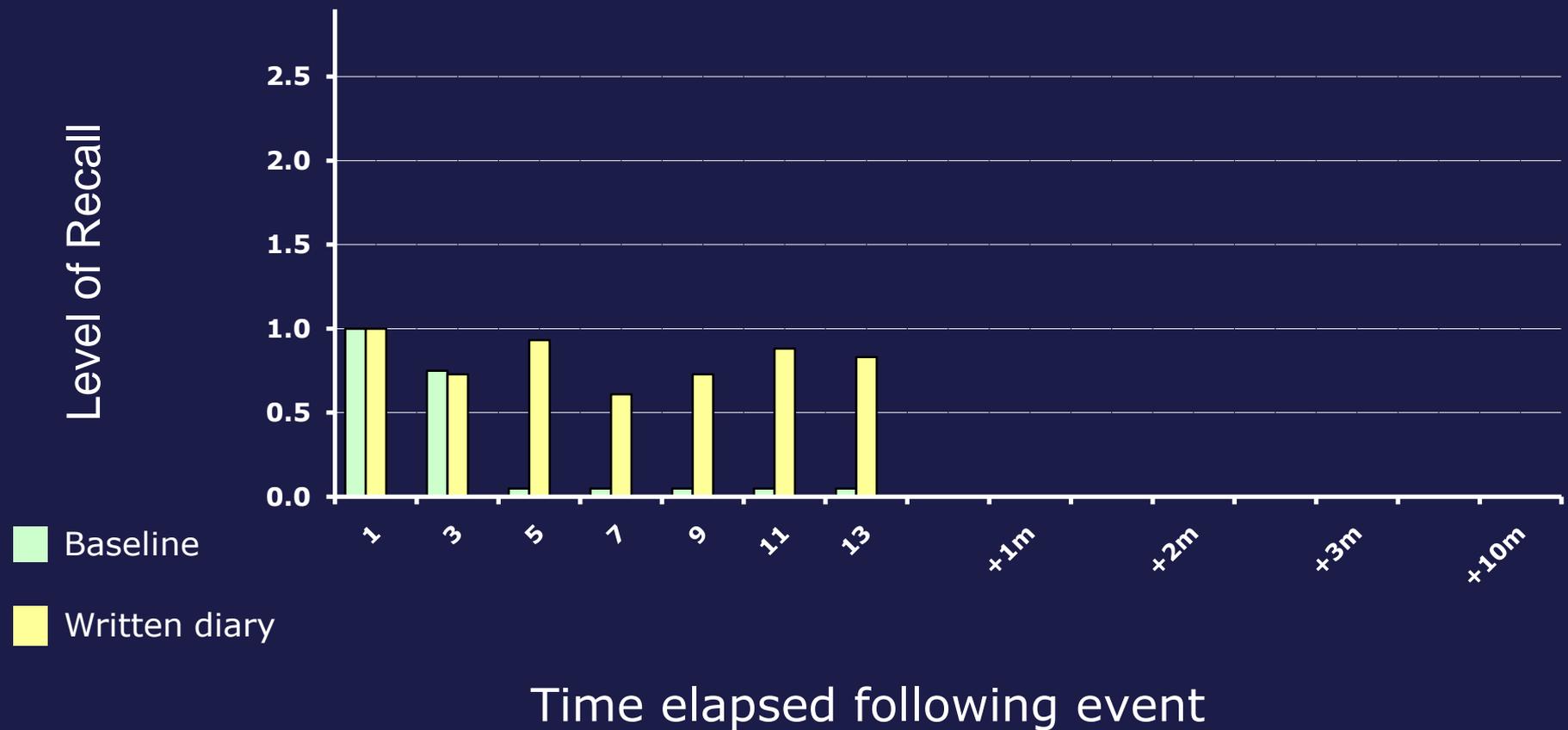
Results

Memory of an event over time



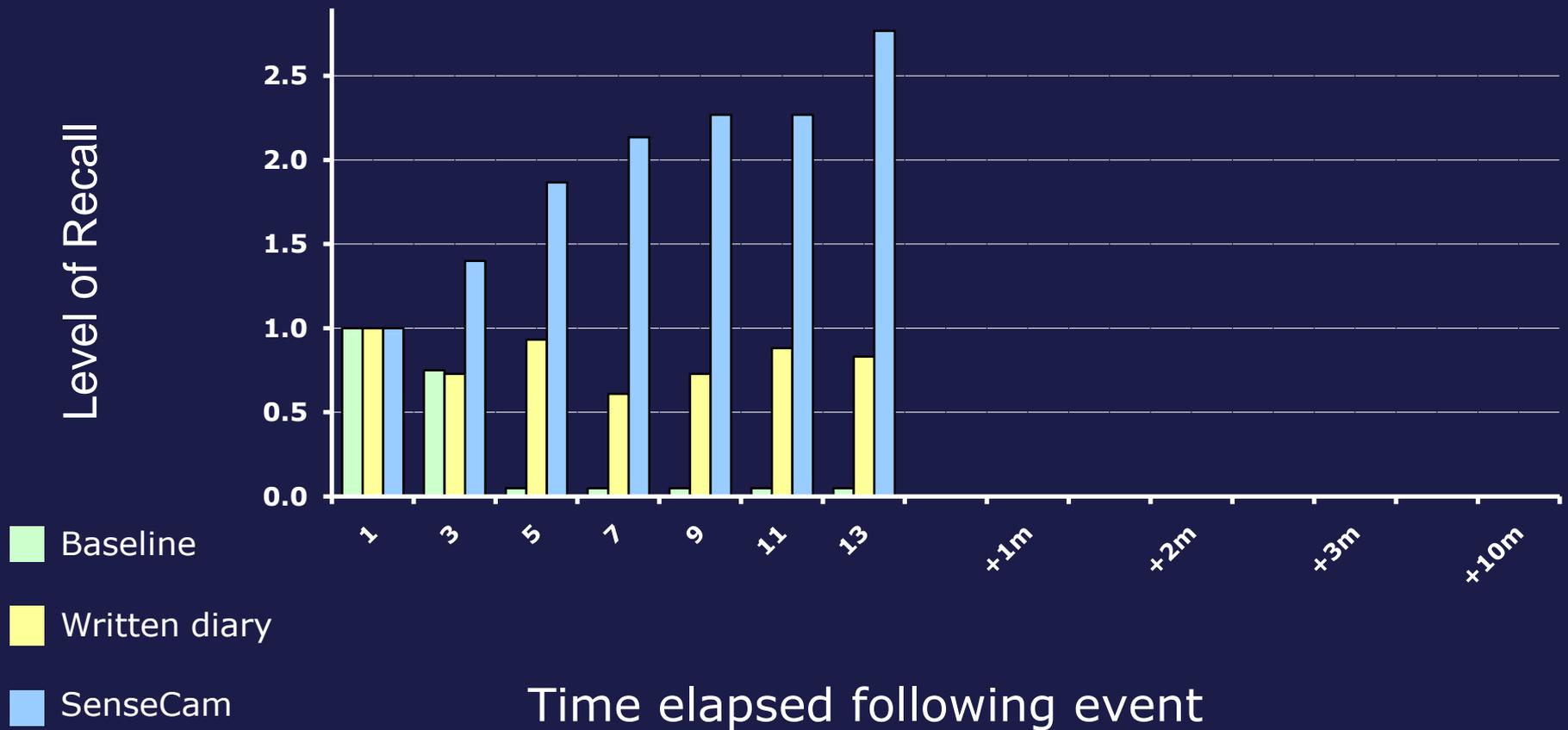
Results

Memory of an event over time



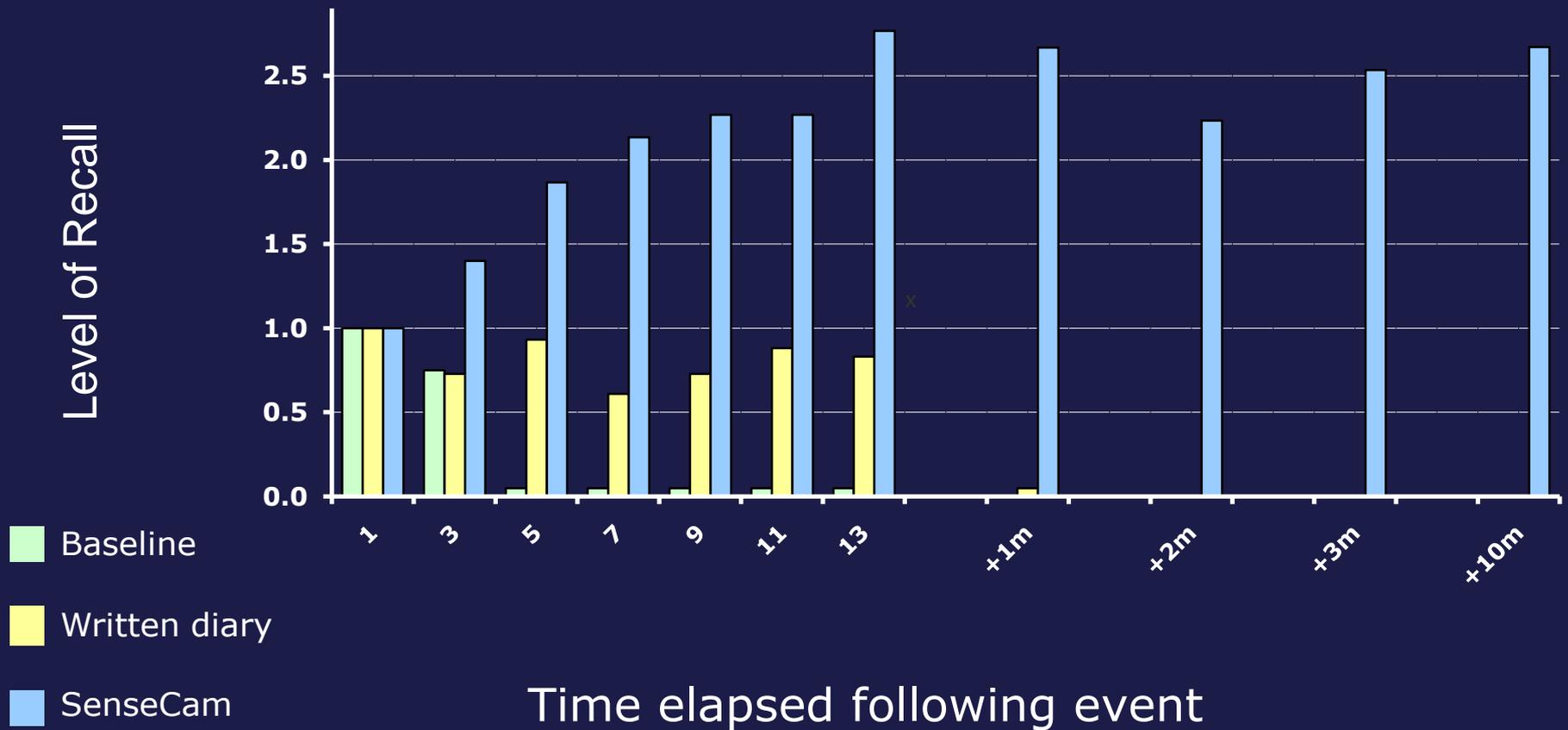
Results

Memory of an event over time



Results

Memory of an event over time



Results: feedback from patient and spouse

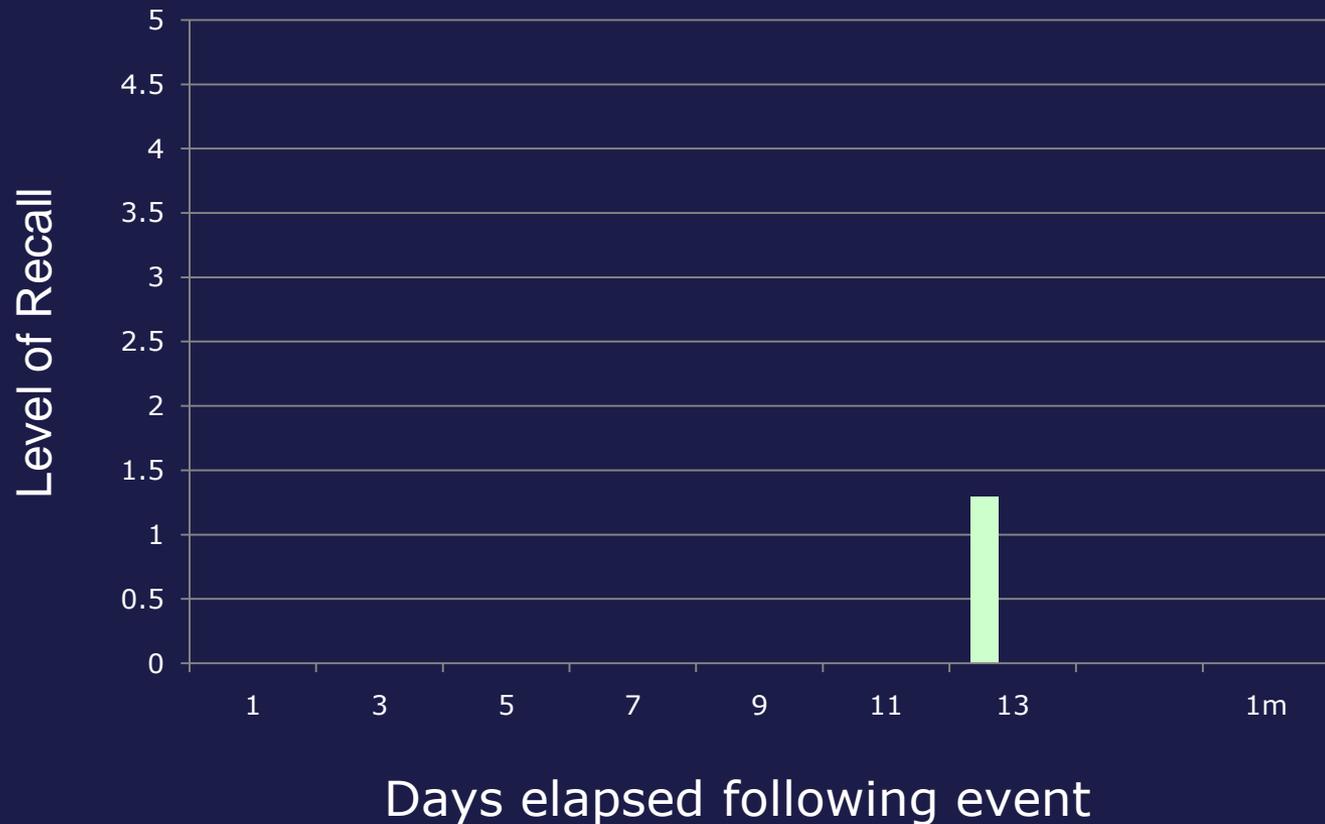
- Seeing images brings memories '*flooding back*'
- More relaxed socially and less anxious
- Sharing experiences again was a '*sheer pleasure*'
- '*It has enormous potential as a memory aid and has been a great success for us personally*'

SenseCam with patients with Alzheimer's disease

- Cambridge Memory Clinic, Addenbrooke's Hospital
- Patient 1: 75 year old, married man, 'Mr D'
- Diagnosed with MCI in 2005 & Alzheimer's Disease in 2006
- Now has marked memory impairment
- Relatively intact other cognitive functioning

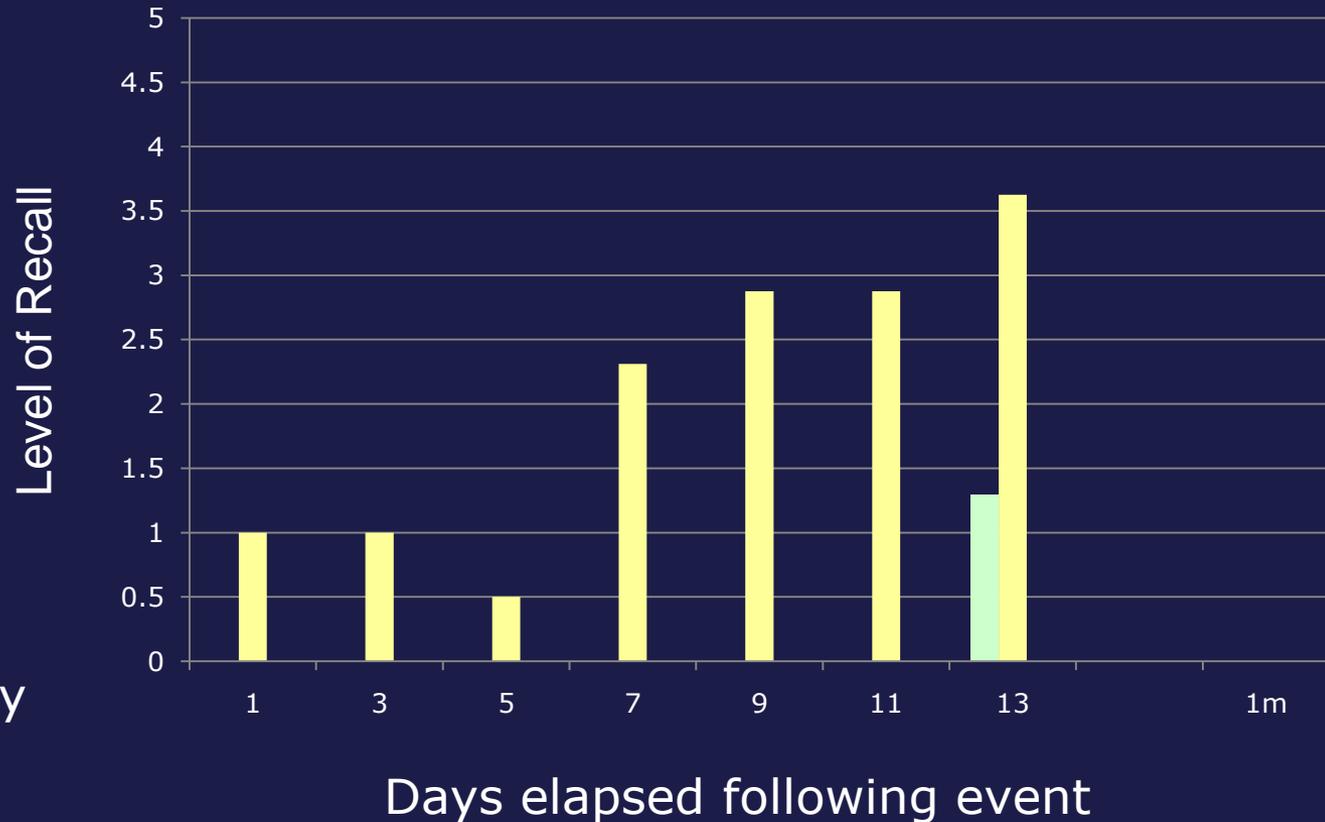
Results: Mr D, Alzheimer's disease

Memory of an event over time



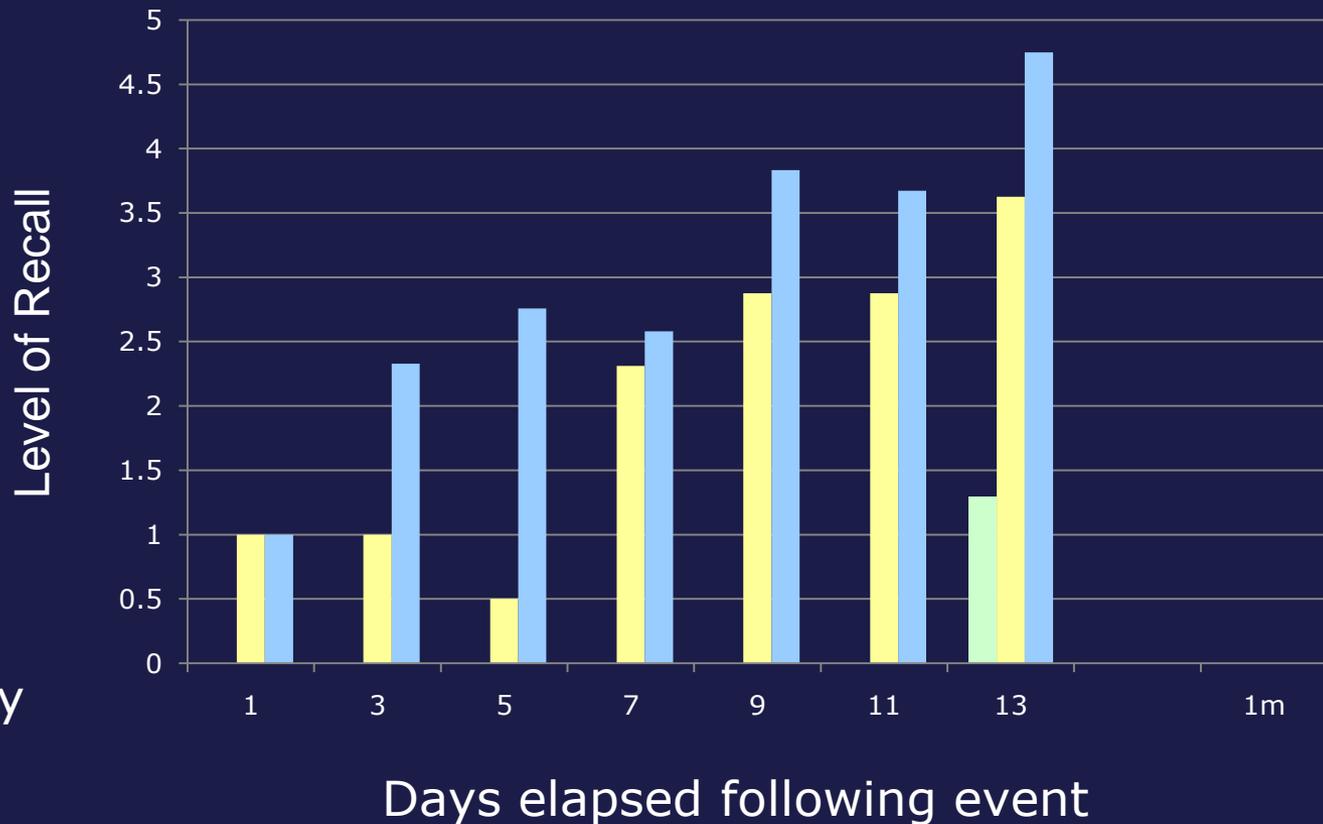
Results: Mr D, Alzheimer's disease

Memory of an event over time



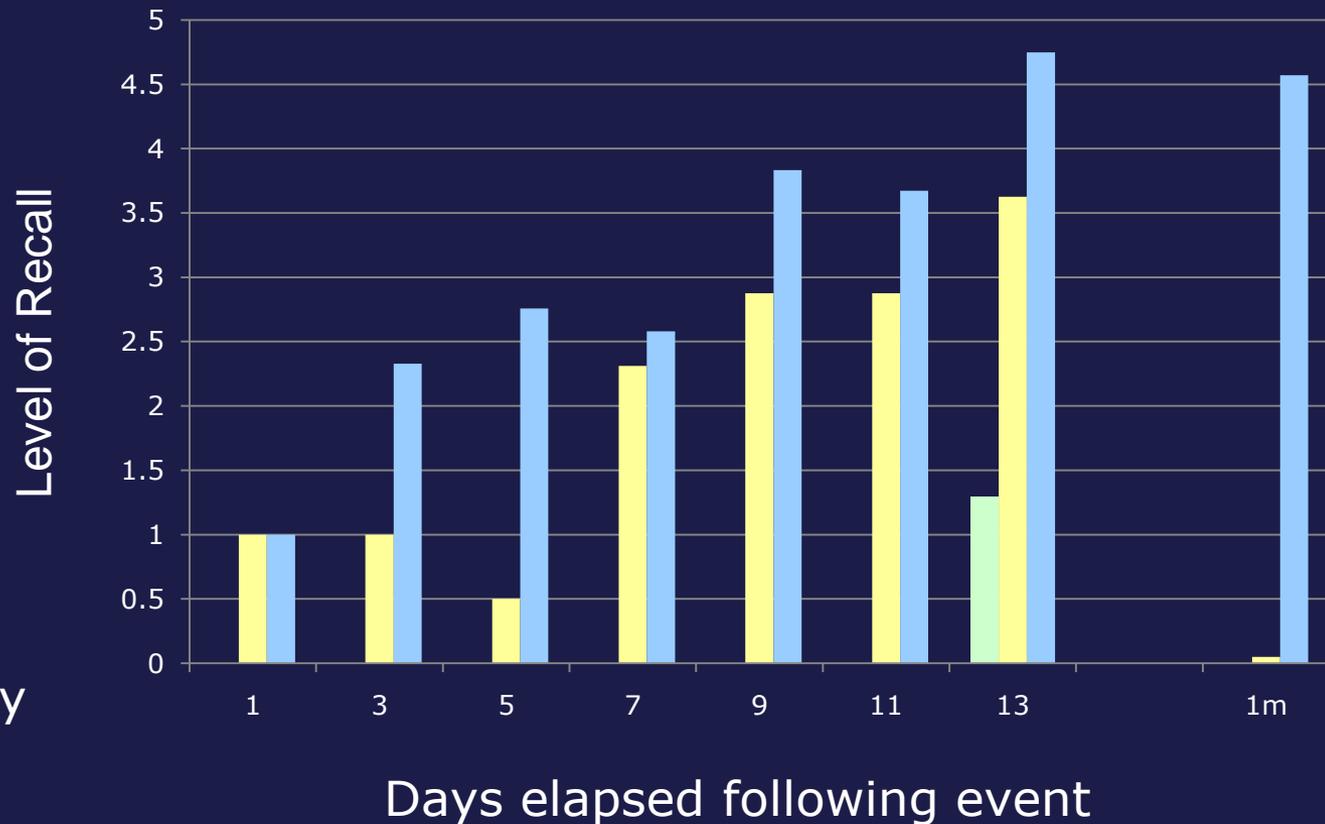
Results: Mr D, Alzheimer's disease

Memory of an event over time



Results: Mr D, Alzheimer's disease

Memory of an event over time



SenseCam with patients with Alzheimer's disease

- Cambridge Memory Clinic, Addenbrooke's Hospital
- Patient 2: 67 years old, 'Mrs F'
- First suspected memory problems in 1996
- Diagnosed with Alzheimer's Disease in 2000
- Now has 'moderate' Alzheimer's disease (59/100 on the Addenbrooke's Cognitive Examination)

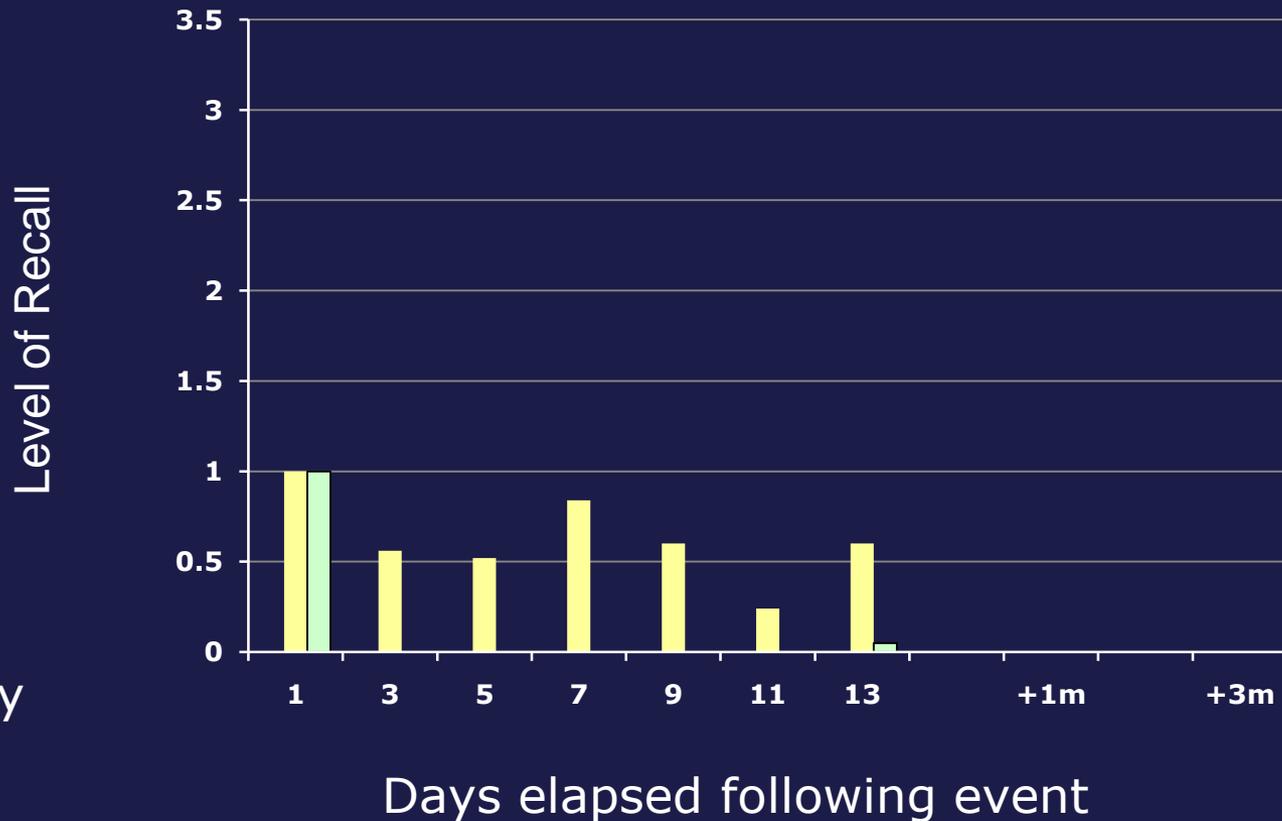
Results: Mrs F, Alzheimer's disease

Memory of an event over time



Results: Mrs F, Alzheimer's disease

Memory of an event over time



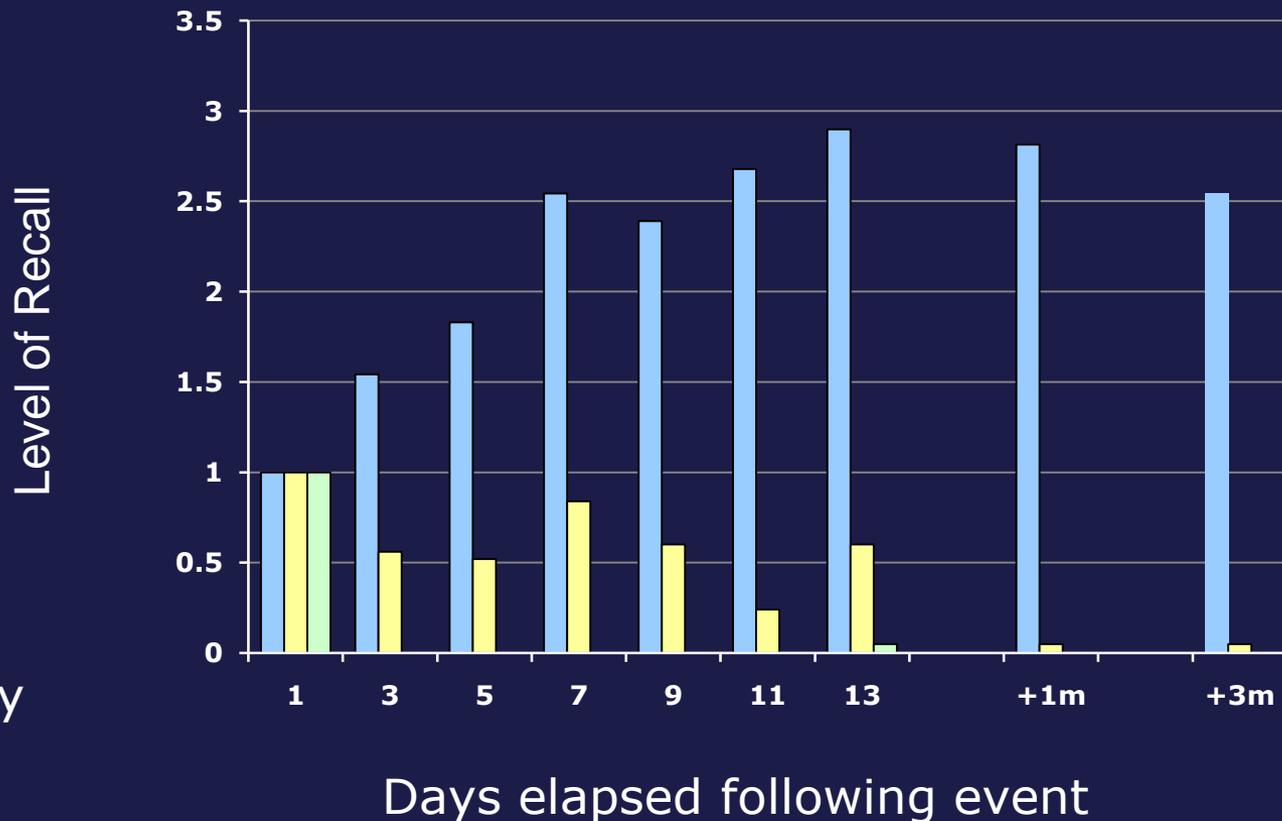
Results: Mrs F, Alzheimer's disease

Memory of an event over time



Results: Mrs F, Alzheimer's disease

Memory of an event over time



Feedback from patients with AD

- *SenseCam images provide good "prompt and then it comes rolling out and I can see it all again"*
- *"I am less anxious, because it helps to settle, or verify, what actually happened..."*
- *'I have more confidence'*
- *'SenseCam is a Godsend... everyone should have one!'*

Why is SenseCam significantly more successful than written diary?

- Evidence that autobiographical memory is rich with visual imagery (Brewer, 1988)
- SenseCam images may be similar to images in autobiographical memory (Martin Conway, 2006)
 - They are visual
 - They represent short-time slices of experience
 - They are temporally ordered
 - They are formed outside awareness
 - They are taken from an egocentric viewpoint
- SenseCam captures personally meaningful events

SC captures personally meaningful images



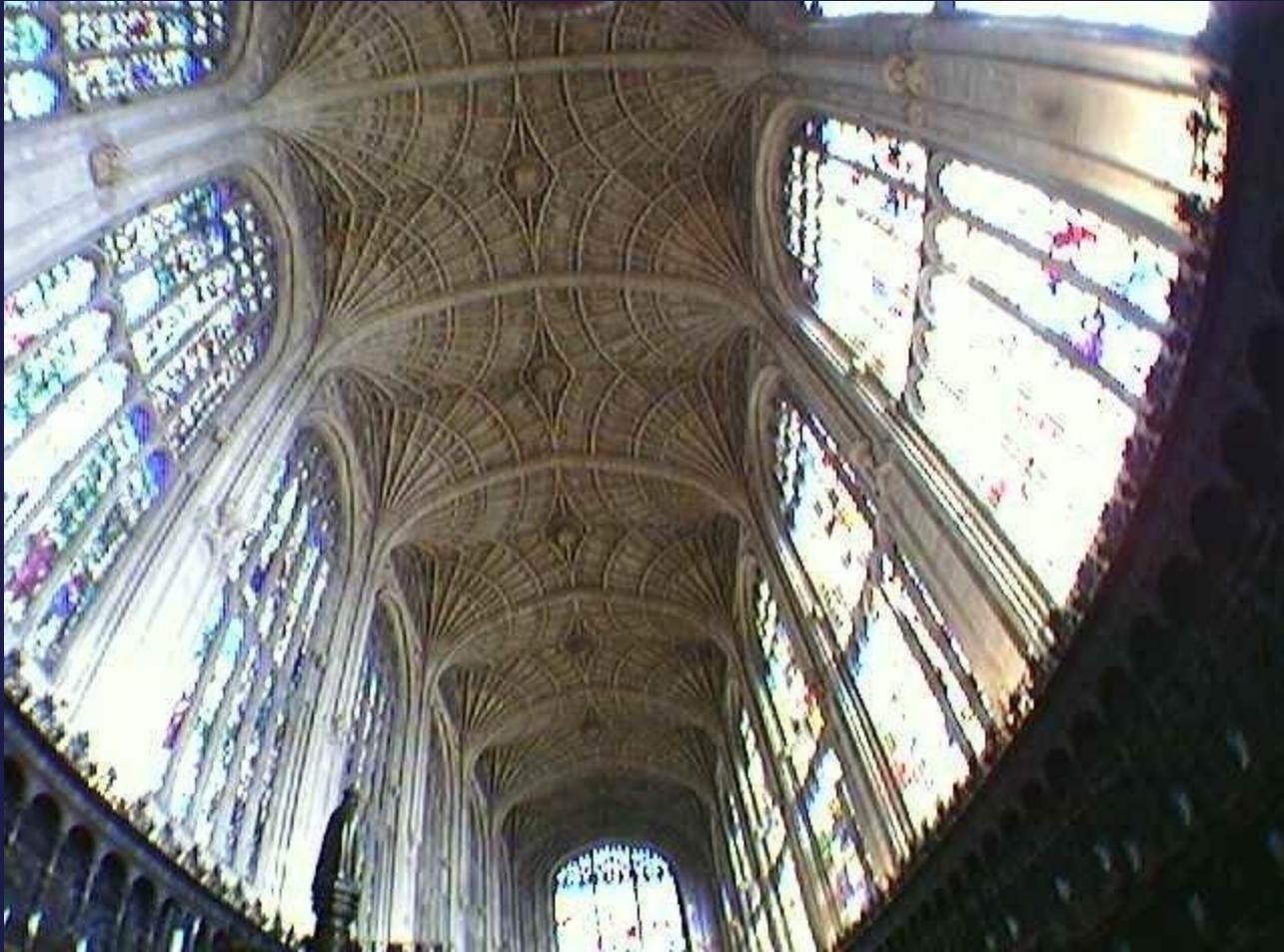
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- SenseCam may help people with memory impairment retrieve and consolidate past events, and this may improve confidence & reduce anxiety
- Undertaking functional imaging studies to explore the activation associated with viewing SenseCam images
- Collaborations planned with a number of academic partners
- Now is a good time for psychologists to collaborate with technologists to develop and explore the use of technology in cognitive and emotional rehabilitation

Questions?

- References

Berry et al. (In Press) The use of a wearable camera to aid autobiographical memory in a patient with limbic encephalitis: A preliminary study. *Neuropsychological Rehabilitation*.

Hodges et al. (2006). SenseCam: A retrospective memory aid. In P. Dutish & A. Friday (eds.) *UbiComp, LNCS 4206*, 77-193. Berlin, Heidelberg: Springer-Verlag.