

# SenseCam and Autobiographical Memory

Jason R. Finley, William F. Brewer, and Aaron S. Benjamin

University of Illinois at Urbana-Champaign



## Introduction

SenseCam: a new tool to study and augment human memory

## Device

Wearable, sensor-equipped, automatic digital camera:



### Features

- Fisheye lens
- Privacy mode
- Manual trigger
- Timer trigger

### Sensors:

- Tri-axis accelerometer
- Passive Infrared (body heat)
- Temperature
- White light intensity

Example images:



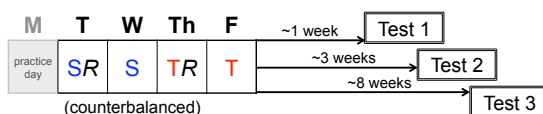
We thank Microsoft Research for the funding and equipment that made this research possible (Grant # 2007-066).

## Method

12 participants wore SenseCam for 5 days.

### Independent Variables (within-subjects)

- 1) **Trigger Condition:**
  - Sensor-triggered
  - Timer-triggered (mean interval: 10.6 sec [SD 1.3])
- 2) **Review Condition:**
  - End-of-Day Review
  - No Review of that day
- 3) **Retention Interval:**



S: sensor-triggered, T: timer-triggered, R: end-of-day review

### End-of-Day Image Review

Randomly selected subset of that day's images  
(mean 48.1% [SD 14.7%])  
Chronological order  
1 frame per second  
Mean duration: 17 min [SD 4]

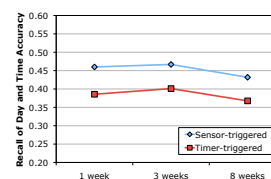
### Dependent Variables

**Picture-Cued Recall** (given picture, describe visual scene in next minute)  
**Order Judgment** (which of 2 pictures came first)  
**Recollection Judgment** (yes/no)  
**Recognition** (1-7 rating)  
**Recall of Time** (given picture, respond with day & time)  
**Time-Cued Recall** (given date & time, describe visual scene)  
**Full-Day Free Recall**

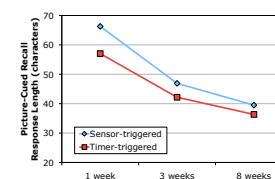
Mean number of images captured per day:  
Sensor-triggered days: 2,031 [SD 565]  
Timer-triggered days: 2,390 [SD 566]

## Results

### Sensor-triggered images were remembered better than timer-triggered images.

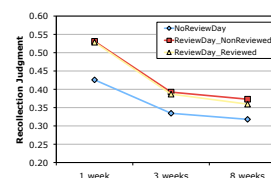


Recall of day and time was more accurate for sensor-triggered than timer-triggered images.

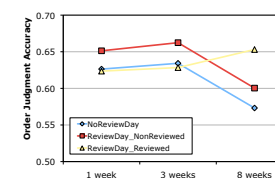


Picture-cued recall responses were longer for sensor-triggered than timer-triggered images.

### End-of-Day Review enhanced memory.



Review enhanced recollection judgment at all retention intervals, even for non-reviewed images from review days.



Review slowed decline in accuracy of order judgments.

## Conclusion

- Sensors can enable capturing of more memorable images.
- Reviewing images from one's day enhances autobiographical memory.
- Useful new lifelogging technology

## SenseCam and Autobiographical Memory

Jason R. Finley, William F. Brewer, and Aaron S. Benjamin

### Abstract:

Emerging “life-logging” technologies have tremendous potential to augment human autobiographical memory by recording and processing vast amounts of information from an individual's experiences. In this experiment participants wore a SenseCam—a wearable camera equipped with motion, light, and infrared sensors—as they went about their normal daily activities for five consecutive days. The cameras were set to capture images either at fixed intervals or as triggered by their sensors. On two nights participants watched an end-of-day review of a random subset of images captured that day. Participants returned for memory tests at intervals of 1, 3, and 8 weeks. On probed recall and recognition memory tests, end-of-day review enhanced performance relative to no review. In addition, images captured in sensor mode were better remembered than images captured in timer mode. These results demonstrate the promise of SenseCam as a tool to supplement human memory.

### Some Additional References:

Brewer, W. F. (1988). Memory for randomly sampled autobiographical events. In U. Neisser & E. Winograd (Ed.), *Remembering reconsidered: Ecological and traditional approaches to the study of memory* (pp. 21-90). Cambridge: Cambridge University Press.

Hodges, S., Williams, L., Berry, E., Izadi, S., Srinivasan, J., Butler, A., Smyth, G., Kapur, N., & Wood, K. (2006). SenseCam: a Retrospective Memory Aid. In P. Dourish & A. Friday (Eds.), *UbiComp 2006 Proceedings* (pp. 177-193). Springer-Verlag. [http://research.microsoft.com/~shodges/papers/SenseCam%20UbiComp%202006%20\(camera-ready\).PDF](http://research.microsoft.com/~shodges/papers/SenseCam%20UbiComp%202006%20(camera-ready).PDF)

Microsoft Research SenseCam. <http://research.microsoft.com/sensecam/>

*Address correspondence to Jason R. Finley, Department of Psychology, University of Illinois at Urbana-Champaign, 603 East Daniel Street, Champaign, IL 61820; email: jrfinley@illinois.edu*  
<http://www.jasonfinley.com>