

SOUND AND THE PRIMING OF LONG-TERM EPISODIC MEMORY

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Why do families take so many photographs of their offspring? Why do we photograph our individual adventures to foreign locations? We do so to remember our individual histories, proof we have existed and even had the opportunity to exist in front of buildings, statues, and even people (preferably famous).

Photographs prime our long-term episodic memory. They give the little men inside our head the right tools to find where they have stored the paperwork, at least according to Thomas Edison. To date cognitive neuroscientists have still not found the little factory workers, but they have a better clue to how memories are made.

To understand memory, we must look at the three stages of its formation. The first stage is the sensory memory stage that encompasses visual (*iconic*) and auditory (*echoic*) memory. Wave your hand in front of your face and notice the streak it seems to make, this is your iconic memory at work. The life of an iconic memory can only be measured in milliseconds, but echoic memory taps out at around four seconds. If you had someone read a list of animals out loud to you, when they stop you can usually recall the last three or four on the list; this is echoic memory.

Echoic memory also does the impressive task of locating the direction of a sound. It does this by calculating time lapse between the registrations of sound between ears. Obviously the little memory men have computers.

The next stage in memory formation is the *short-term* memory stage. This stage lasts twenty to thirty seconds and is used to temporarily remember phone numbers or find some space on our own "hard drive" for new *long-term* memories. Two systems are used the short-term memory stage: *phonological loops* and visuo-spatial sketchpads. Phonological loops hold onto spoken sound by "repeating" the relevant information before it fades. This system is key in the understanding a new language, so it is more important for children to have. Visuo-spatial sketchpads are for visual information. Visualize a tiger; close your eyes and the image you see is thanks to you visuo-spatial sketchpad.

Basically, short-term memory works to compress relevant information for storage in your memory's final stage long-term memory. Long-term memory works more like a web than the public library. If I ask you where you were last Tuesday, instead of the retrieval of last Tuesday's file, you remember different things about the day. Perhaps you were extremely tired at work Wednesday because you were up late. Why were you up late? You were helping your friend move to a house across town. Then you can start remembering specific things about the night, the food your friend bought for your help, the color of their new carpet, etc.

Long-term memory has two major knowledge categories, *implicit* and *explicit* knowledge. Riding a bike would be considered implicit knowledge, remembering the brand of your bike is explicit knowledge. Explicit knowledge further breaks down into two categories, *semantic* and *episodic* knowledge. Semantic knowledge involves facts, while episodic knowledge holds day-to-day experiences.

As we grow older, the photographs our parents take remind remind of a time when they really liked us. The priming, which is much like exercising a muscle, gets the gears moving again and brings back those old memories.

This is where I find a problem in our system of episodic memory retrieval. Currently the majority of priming performed on memory today takes the form of visual stimulus. What moves you more, a song that reminds you of a person or a picture of the person? I would believe that the majority of the time the song does the better trick. There are musical artists that I cannot listen to without feeling like I am in high school, but I can look at pictures of myself during that period with no such reaction.

I believe sound acts as a better primer of long-term episodic memory than pictures can. Video cameras do have audio tracks to accompany the picture, but I find these deficient. Cameras, video and still, have always been known to be highly subjective and most photographs in family albums are staged in one way or another. Purely auditory recordings of specific times provide, in my opinion, greater richness in episodic memory recall.

My knowledge of cognitive neuroscience is, to put it mildly, lacking. Therefore if my request for research into the increased success rate of auditory priming was met with volumes of research already performed, I would not be surprised. But the request is still there for now.

I took my hypothesis on a road trip in late fall 2007. Every night I recorded about twelve minutes of ambient audio in whatever environment I was currently residing. It is now approaching a year after my experiment and the results can still be easily observed. For example, while I listen to the parking lot recording in Tucson, Arizona, I can still feel the air, see the black cat slide under a wall, and recall specific spatial locations of cars.

Memory is a tricky thing and highly corruptible, but the depth of sensory recollection I experience while listening to the ambient recordings prove, at least in my case, that sound is the ultimate primer of long-term episodic memory.