

**Primary memory is priming memory  
seen through the working memory  
viewpoint**

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Abstract:

There are two streams of thought about memory, that don't seem to jibe with each other, One thought stream works with implicit and explicit memory and one thought stream works with Working Memory. The problem is that the theories are not visible each within the other. In this article I attempt to combine the two threads of thought by pointing out a simple but overlooked identity between priming memory and primary memory, explaining why they look so different when looked at from their own particular threads of interpretation, and showing how the difference is really one of the interface between priming memory and working memory, not an incompatibility in design as first seems obvious.

Keywords:

Priming Memory, Primary Memory, Working Memory, Memory Interface

There are two different streams of thought in memory theory, one has to do with implicit and explicit memory, priming memory, working memory and episodal memory, and the other has to do with Primary Memory, Working Memory and Secondary Memory. They are talking about the same memory systems but in incompatible ways. Part of the problem is that each way of thinking about memory starts at a different point in the system and it's assumptions are predicated on the viewpoint from that place.

The explicit, implicit, priming, working memory and episodal memory stream is based on neuroscience looking at the structures of neurons and how they combine to form the brain. The Primary Memory, Working Memory, and Secondary Memory stream is based on psychology and what can be told from tests. While there might be good reason from an academic viewpoint not to combine the streams, I am coming from outside the academic tradition and hope to show that the two streams are easily combined with a simple identity.

Priming Memory IS Primary Memory.

To back that up, lets look at what we know about both priming and primary memory and see why they have always seemed so incompatible. The first objection has to be that there is a serious size difference between priming memory and primary memory. Ever since Millers magic number, theorists have been struggling with the apparent size limitation to primary memory. Where only  $7 \pm 2$  items can be stored at one time. More recent work has suggested that the limits are even lower allowing only 3 or 4 items to be stored at a time. This however is looking at it from a Working Memory perspective, only 3 or 4 items can be stored in Working Memory but this does not mean that the limit is imposed on the memory the items come from, just on their interface to Working Memory [Oberauer K. 2002]. This then is the difficulty, is primary memory the buffer into which they are loaded, or the vast sea of memory that makes up priming memory.

My choice is that primary memory is the priming memory of course but that leaves room for a second type of memory the actual buffer between priming memory and Working Memory, and that is the problem it seems to break parsimony to require more than one type of memory before working memory.

50 It really doesn't break parsimony as badly as it seems, because the other choice is to have two separate but incompatible theories which is a greater threat to parsimony than one combined one with an extra buffer. The fact is that we know that the buffer must exist, but that calling it primary memory is in line with computer processes which we haven't yet quite given up on as explanations for how memory works.  
55 Actually even that oversimplifies computers which have for a significant period of time had registers that are temporary stores, a sort of limited buffer for the primary memory.

60 The problem is the limited size of the storage buffer since Miller [Miller G 1955] we have known that the working memory has a very limited size, but if primary memory is not as limited in size then why the limit on the buffer? The answer lies in something else Miller discovered, the concept of chunking. According to Dr. Edelman [Edelman G 1990] priming memory is retrieved in functional clusters, but somehow by the time it gets to the working memory it has been converted to chunks [Gobet F et. al. 2001], where the number of items that can be stored depends on how the data is  
65 organized not just on the size of storage required to store it. Chunks are counter intuitive according to information theory, but Miller suggested that we need the concept to capture the nature of storage in the short term or working memory.

70 Evidence suggests that what limits the memory size is interference between storage elements [Berman M., Jonides J., Lewis R., 2009][Brown J., 1958], and that this is limited to about the size of storage that can be rehearsed in about 3 seconds or less. The similarity between elements in memory takes away from the limit, and differences add to it. We can actually count the milliseconds that it takes to resolve  
75 similar elements, and tell the difference in milliseconds when a new type of data is stored and retrieved [ Unsworth N., Engle R., 2007].

80 If we look at primary memory from the Working Memory perspective, all we see is the amount of memory that makes it through the interface into the actual working memory. This is necessarily limited by the serial dependency caused by the conversion between Functional Clusters and Chunks. However there is no real limitation to the size of the memory that the working memories came from. Priming memory is a suitable model for that.

85 *Conclusions:*

Primary Memory is Priming Memory, looked at from the Working Memory Perspective, and through the viewpoint of the Working Memory Interface.

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