IT 351: Human Computer Interaction
Lab 7 – Short Term Memory

P Akshara - 181IT132

Assignment 1

Iconic memory:
Also known as visual sensory memory, iconic memory involves a very brief image. This type of sensory memory typically lasts for about one-quarter to one-half of a second.

Echoic memory:
Also known as auditory sensory memory, echoic memory involves a very brief memory of sound a bit like an echo. This type of sensory memory can last for up to three to four second.

Haptic memory:
Also known as tactile memory, haptic involves the very brief memory of a touch. This type of sensory memory lasts for approximately two seconds.

Experiment to prove iconic memory :
This experiment can be used to demonstrate the existence of visual sensory memory. We show a series of letters to a few participants. These letters are made visible only for a fraction of a second. Some of the participants were able to recognize some of the letters, but many participants were able to identify more than four to five letters. The reason why participants were able to recognize very few letters was because this type of memory is fleeting.
We further provide clues to help prompt memories of the letters. Letters were presented in rows, and the participants were asked to recall only the top, middle or bottom rows. The participants were able to remember the prompted letters relatively easily, suggesting it is the limitations of this type of visual memory that prevents us from recalling all of the letters.

Experiment to prove echoic memory :
This experiment can be used to demonstrate the existence of echoic sensory memory. The experiment is conducted by making use of auditory stimuli in participants who are not paying attention. It is seen that participants can recall the words for upto 3-4 seconds even though they haven't been paying attention to the auditory stimuli. It is generally simulated by letting the participants listen to a series of numbers, which the participant then proceeds to recall. It is observed that echoic memory is stored for longer periods than iconic memory.

Experiment to prove haptic memory :
This experiment can be used to demonstrate the existence of haptic sensory memory. Experiment was conducted to study the immediate recall for brief tactile stimuli applied to the 24 interjoint regions of fingers. It was observed that a participant had a 2 second retainment span.

It is also observed that memory for stimuli applied to the skin is resilient for approximately ten seconds after removal of the stimulus, even when the individual is engaged in tasks that inhibit verbal rehearsal.

Assignment 2

Problem Statement:
To show/read the contents of the matrix given below and find out the average percentage and number of:
  a. Characters recognized
  b. Location of characters recognized

X	B	S	T
D	H	M	G
R	L	W	C

Theory:
Short-term memory is the capability of holding information in mind in a readily available state for a short period of time. The duration of short-term memory is in the order of seconds. It holds only about 7 chunks of information, and these fade from the brain in about 20 seconds.

The first part of this experiment follows the serial position effect. The serial position effect has two parts, according to Atkinson and Shiffrin (1968). These two parts are known as the primacy effect and the recency effect.

The second part focuses on the effect of tonality on short term memory. According to the most prominent working memory model proposed by Baddeley and Hitch in 1974, temporary storage of verbal information is based on subvocal articulatory rehearsal in a phonological loop which is supposed to operate independently from the mechanisms used for storage of visual and spatial information. In line with this account, it has been found that short-term memory is superior for phonologically distinct verbal items than for phonologically similar items even when the items are presented visually and that the maintenance of verbal information is disrupted by articulatory movements and task-irrelevant speech. These observations suggest that verbal information is maintained in short-term memory through phonological rehearsal i.e., using a phonological code, with irrelevant articulatory movements and speech sounds gaining obligatory access to the phonological store.

More specifically, the phonological similarity effect suggests that the poorer recall of items with similar phonological codes is due to the absence of discriminatory features, whereas the irrelevant speech effect indicates direct access of speech sounds to the phonological store, leading to interference with the to-be-remembered items. The working memory model further predicts that articulatory suppression attenuates the irrelevant speech effect if the to-be-remembered items are presented visually, whereas articulatory suppression should not affect the irrelevant speech effect when both irrelevant and relevant items are auditory.

Screenshots:

You have 2 seconds to memorise!

X	B	S	T
D	H	M	G
R	L	W	C

Recall the alphabets shown previously

X	B	S	F
G	H	N	K
Y	I	U	C

Click on Submit button to get your score!

Submit

Letters shown were: X, B, S, T, D, H, M, R, L, W, C

Letters you remembered correctly are: X, B, S, H, C

Positions you remembered correctly are: 1, 2, 3, 6, 12

Recall Percentage: 41.67%

Results:

Visual short term memory:

Sr. No	X	B	S	T	D	H	M	G	R	L	W	C
1	✓	✓	✓			✓			✓		✓	✓
2	✓		✓		✓			✓	✓			✓
3	✓			✓	✓		✓		✓			
4			✓	✓		✓	✓			✓		✓
5	✓	✓	✓	✓					✓	✓	✓	✓

Audio short term memory:

Sr. No	X	B	S	T	D	H	M	G	R	L	W	C
1	✓		✓		✓		✓		✓			✓
2	✓	✓			✓				✓		✓	✓
3	✓		✓	✓	✓			✓	✓		✓	
4	✓	✓		✓	✓	✓			✓			✓
5	✓				✓				✓	✓		

Inferences and Conclusion:

The below graph shows the aggregate recall in pictorial format. The blue bar is when the matrix was displayed for 10s and then observations were noted. The red bar is when the alphabets were spoken in different tones.
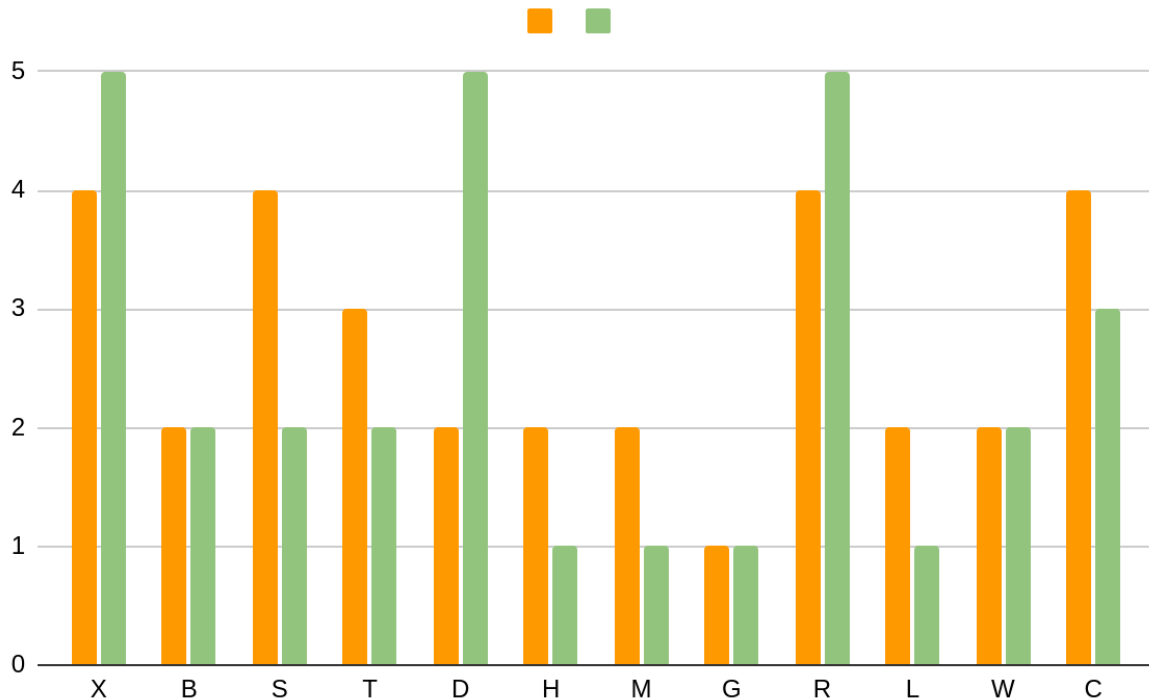
We observe that the initial and the ending alphabets were recognized more frequently in the case of visual experiment. This was in sync with the serial position effect.

When the alphabets were read out in different tones, the alphabets where there was a change in tonality were recognized better than when the alphabets were recited in the same tone. Thus we observe a peak at letters X, D and R.