

Assignment 1

Question 1 (25 points)

Find one follow up paper to Miller's work. Summarize the paper in 500 words and include the contributions, and how it argues with or extends Miller's work. Include the reference.

George A. Miller's paper, "The Magical Number Seven, plus or minus two : Some limits on our capacity for processing information" published in 1956 became one of the most acknowledged papers in psychology. Miller did not know that his research would be so known that he would be invited to address a few words to the Eastern Psychological Association. He even declined the invitation thinking that his small research could not be talked for an hour-long address. No one argued against the theory or there were very little follow-up research against his paper. In 2001, Nelson Cowen, wrote a paper – The Magical Number 4 in Short-Term Memory : A reconsideration of Mental Storage Capacity, which as clear by the title, did not fully support Miller's paper.

Cowen discusses how Miller's paper was blindly followed for almost 40 years and very little research was done on the memory's numerical limit to further prove or disprove his work. He discussed how he did not regard the paper entirely but rather believes that his paper impeded the progress of research on short-term memory or numerical limit of memory. After reading Cowen's theory and approach to the magical number of numerical limit of our memories, I concede with Cowen rather than Miller's theory.

Miller's paper talks about three main things – absolute judgement, chunks, and subitizing. According to Cowen the only "important specific contribution" to the article was the talk about chunks. The absolute judgement concluded that participants were able to use '7 plus or minus two' categories efficiently. However the tasks were rather similar simple stimuli like tones of different frequencies or pitches. The second topic was about 'chunks' according to which, it is easier to remember big words or letters or numbers if we categorize them into separate chunks based on a similar characteristic. This is an important point to note. One example that Cowen uses is 'FBICIAUSA'. This word is easier to remember if we separate them into FBI, CIA and USA, 3 acronyms that everyone is familiar with and hence can be remembered easily without

trouble. In his paper, Cowen puts emphasis on chunks and how the type of chunk alters short-term memory performance. The third task was subitizing that suggests that people can assess the number of objects without counting for a limit of 7 objects.

The reason that Miller's paper is not very effective or efficient is because it focuses on the number 7 solely, just because Miller was greeted with this number a lot. He mentions so even at the start of the book which was ignored a lot by people who followed his paper. Cowen mentions his email exchange with Miller, where Miller mentions, "*Herb Simon used to say 'George had the right idea, but the wrong number.' I think Herb favored 3. I never argue with Herb Simon. I was aware, even in 1954 when I was writing my invited address, that the running memory span was only about 4, and my introspections convinced me that the 7 that was standard on the intelligence tests at that time must have been a hooking together of a rehearsed initial segment with a final segment from what Nancy Waugh used to call the 'echo box.' But I was stuck with 7 because of the absolute judgment results (the first half of the article that people forget)*" (Cowen, 2015, George Miller's Magical Number of Immediate Memory in Retrospect: Observations on the Faltering Progression of Science). It is clear that indeed, the magical number is supposed to be 3 or 4 if we think in a broad aspect and consider all the possible stuff/tests to remember.

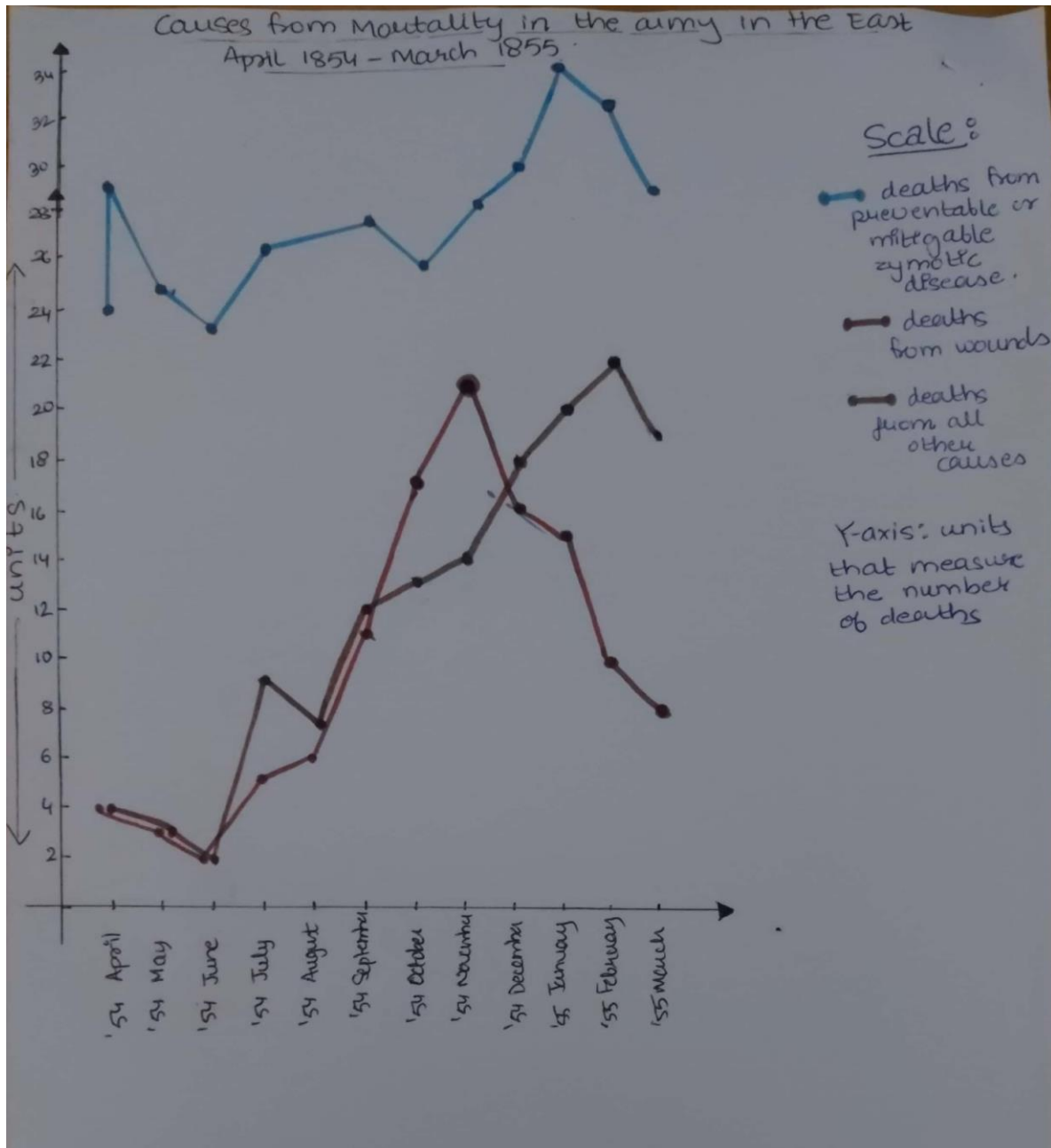
Miller's paper has been infamous in psychology department for too long and not questioned or have a follow-up research because scientists avoid arguing against a well-known paper or thesis in the fear of losing their career or be perceived as foolish. Miller did do an exceptional work in discovering that there indeed is a numerical limit to our short-term memory or immediate memory or working memory. However, his experiments were not on a broad base and his conclusion was rather on his instincts or repeated confrontation with the number 7. Cowen talks in his paper that our immediate memory limit is actually 3 or 4. The pure limit of the short-term memory differs if we consider it being expressed in chunks but lies within the range of 3 or 4 and not the 'magical number 7'. The best representation of memory and its limit is that the most prominent chunk is determined and the focus on that is what ultimately decides how much we are able to remember.

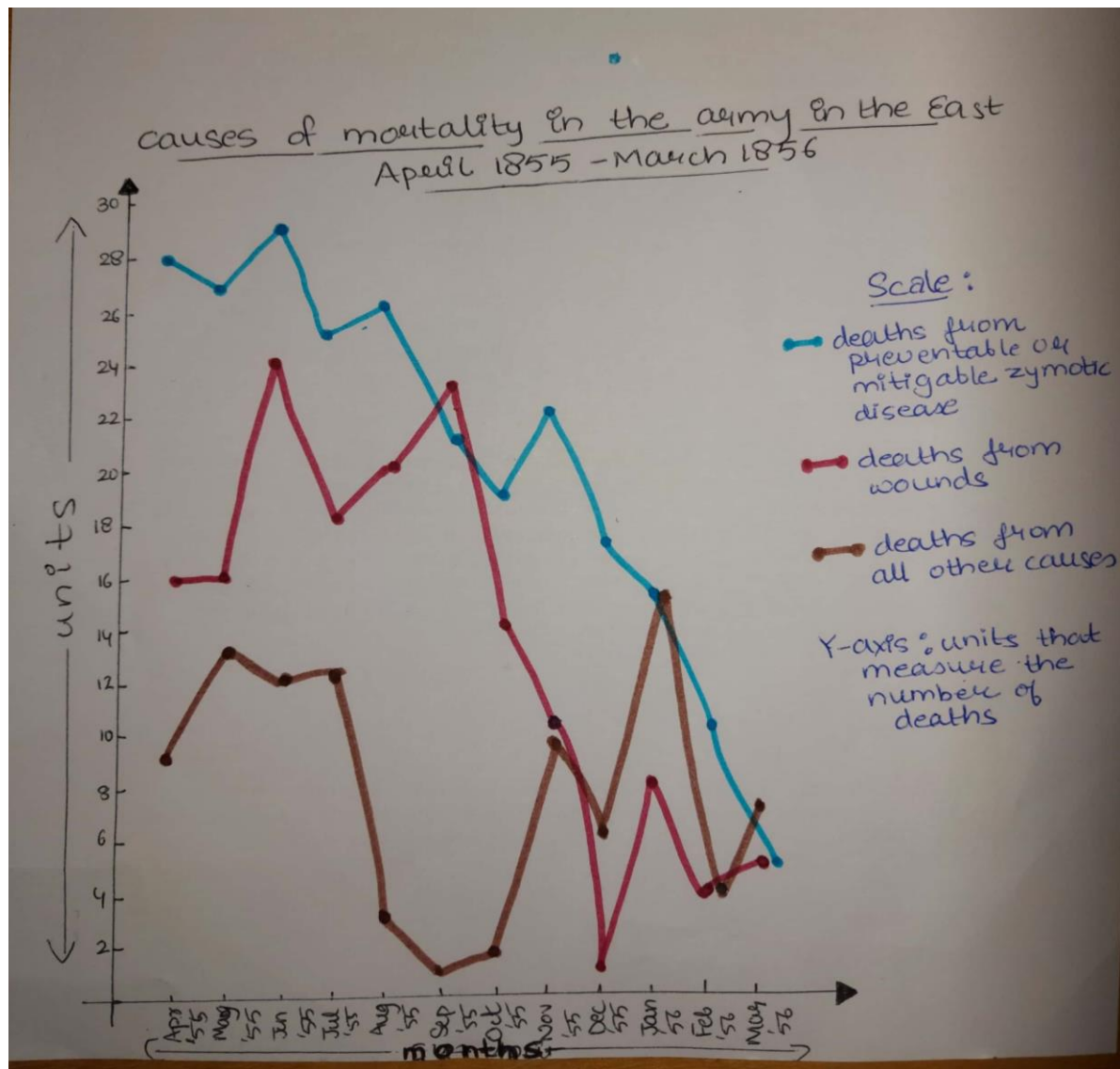
References :

- 1) George Miller's Magical Number of Immediate Memory in Retrospect: Observations on the Faltering Progression of Science by Nelson Cowan, University of Missouri :
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4486516/>
- 2) The Magical Number 4 in Short-Term Memory: A Reconsideration of Mental Storage Capacity, Nelson Cowen
https://www.researchgate.net/publication/11830840_The_Magical_Number_4_in_Short-Term_Memory_A_Reconsideration_of_Mental_Storage_Capacity

Question 2 (25 Points)

Find an alternative way to display Florence Nightingales Graph on Diagram of the Causes of Mortality in the Army in the East. Sketching your graph on paper is fine. Describe how your approach uses pre attentive features differently and use the discussion on pre attentive features in class to show disadvantages and advantages of your approach, and Florence Nightingale's approach.





As discussed, pre attentive processing is the one which occurs at high speed, unconsciously, and by detecting few visual attributes. That means, when conveying a message of data, we must use such visual perception to encode information in a way that it can be decoded by people without attentive processing. By doing this, the data is perceived with an agility and is understood and remains in our working memory for a little longer than it would if we ignored the visual attributes.

The graph I decided to use for depiction of the data of the deaths in the army in the east use pre attentive attributes. I have used a simple line graph with length attribute from the form category and hue attribute from the color category for pre attentive processing. Also, I used continuity and connection principle from the Gestalt Principles, for a better visual perception of the data for the

pre attentive processing. Now discussing advantages and disadvantages of the way I made the graph :

Advantages	Disadvantages
<p>1. I used the difference in <u>Hue</u> for better understanding of the difference in the causes of deaths. For example, red color for the death from wounds and brown line for deaths by all other causes</p>	<p>1 The use of line graphs does help in comparison between the different types of deaths, but to check the exact quantitative value for a particular cause of death at a particular month, it can not be done just by visual perception</p>
<p>2 By using <u>length</u> attribute, it can be perceived how drastic or little change was obtained in the number of deaths for a particular cause of death through the year</p>	<p>2. The line graphs when intersecting each other when the y-axis values coincide or are very close, it can prove to be difficult to find the exact point</p>
<p>3 The <u>continuity</u> makes all the points aligned together or in a continuation. This helps in perceiving how the data flows across the graph.</p>	
<p>4 The <u>connection</u> between the data values (number of deaths as depicted in a certain unit on the y-axis) tells us the number of deaths by a particular cause over the specified period of time(for example the first graph is for April 1854 to March 1855)</p>	
<p>5 The line graphs helps in comparing the number of deaths caused in a particular month by different causes. For example, for April 1855(second graph), we can see</p>	

the most number of deaths were from preventable or mitigable zymotic disease, followed by deaths from wounds and then the least number of deaths by all other causes	
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Now discussing the advantages and disadvantages of the Florence Nightingale's approach :

Advantages	Disadvantages
1. The graphs are soothing to the eye	1. It is difficult to perceive the trend in the number of deaths over the year for a particular cause
	2. It is difficult to perceive what cause of death led to more deaths at a particular time over the year
	3. Some colors overlap and for some segments, like the November 1854, there is just a simple line instead of a black color below that line. There is inconsistency which makes it harder for the person looking at the graph to understand the data
	4. Since, there is absolutely no mention of any scale of any kind, no one can know the particular quantitative value