

## **Investigating the Impact of Survival Relevance on Information Recall**

Het T. Gor

College of DuPage: Psychology

Dr. Kenneth Gray

### ***Abstract***

This study will discuss the findings of a psychological study derived from the Journal of Experimental Psychology at Purdue University which was investigating the evolutionary cause of memory – specifically survival. Given that, this study made use of a questionnaire survey that investigated the memory retention of 110 participants. Using a between-subject design each participant was assigned one of three conditions. In the rating condition (condition one) participants were asked to rate on a 10-point scale how likely the given list of words would be helpful in a survival scenario. The survival writing condition (cond. two) asked participants to write a short sentence about how the given words would help in a survival scenario. Lastly, the self-reference condition (C3) asked participants to write a short sentence about how they personally relate to the given list. The same 30-word list was used for all conditions. The findings in the original study point to survival having a significant advantage in memory retention; however, this study also considers effort and its relation to memory retention as well as the importance of survival processing on the evolution of memory.

### ***Introduction***

What is the purpose of memory? That is a very complicated question that can be answered in a multitude of ways. One can argue a Metaphysical origin, another may argue from a Darwinian perspective. One may even argue about some combination of the two. To pinpoint the precise answer to such a question in one of mammoth magnitude and one of the many questions this study will attempt to answer. Modern psychological knowledge would tell us there are many functions and roles that memory plays in our everyday experiences, but it fails to provide a basis for memory. This study will outline a potential reason for the purpose of memory from an evolutionary perspective. The chief purpose of memory from an evolutionary perspective is one of survival. It argues that memory processing and systems evolved to better help us survive in

the primordial environment by helping us remember fitness related information. The previous study outlined the importance of survival relevance on memory retention through four different experiments (Nairne et. al.). This study will extend upon that research by trying to investigate the degree to which survival relevance is important as well as the role of effort.

### ***Original Experiment and Results***

The original experiment by Purdue University was composed of 4 incidental experiments. Each experiment was testing survival processing along with another memory strategy. Experiment 4 was the one that was concerned with the differences between survival and self-reference processing. This experiment was composed of two conditions. Condition one asked the participants to rate on a scale of 1-5 how a given list of words was to help them in a survival situation. The situation they decided was a “vast grassland” area. The list of words was selected from, “A pool of 128 words from Clark and Paivio (2004) norms.” Then they separated the words into different groups depending on imagery, frequency, familiarity, etc. Then these words were presented to participants in both conditions. Condition two was a self-reference group in which the participants were asked to rate on a scale of 1-5 if the given words describe them. The researchers decided to compare survival processing to self-reference processing because of the wide praise of self-reference processing among academics. The self-reference was essentially used as a metric that assesses the potential power of survival processing. Afterward, the participants completed a 2-minute number task which was used to distract the participants. After the distraction, the participants were asked to recognize the original list of words again.

### ***Results***

The results of that experiment were quite intriguing, which is what led me to conduct my own study. The study concluded no statistically significant results, but it did however have some trends. The trends pointed to survival processing being slightly more powerful. However, this was not a significant enough difference to conclude that self-reference is less effective than survival processing. Also, as covered in the previous paragraph, self-references are often thought to be some of the strongest mnemonic strategies. Thus, the ideation that memory evolved because of the need for memorizing survival-relevant information is a theory with some backbone to it.

### ***The Experiment***

As covered in the abstract section, this experiment is composed of three conditions. All three conditions were a derivation of the original experiment.

### ***The Conditions***

The rating condition (C1) was very similar to the original experiment as the participants were asked to rate on a scale from 1-10 how likely the given word(s) are to help then in the survival condition. The change from a 5-point to a 10-point scale was made to ensure that the participants

had more room to conclude a more precise measurement as a secondary purpose of this experiment was to measure how effort also impacts memory retention. The survival writing condition (C2) was also a survival condition in which the participants were asked to *write* a short sentence about how the given list would help them in the same survival situation. This was done to measure if writing on top of survival processing had a change substantial enough to result in a statistically significant result as writing is also known to be a powerful mnemonic device. The survival situation remained the same, a “vast grassland”. The self-reference condition (C3) asked the participants to write a small sentence about how they personally relate to the given words. This was done to keep C2 and C3 on an equal playing field by making them both write but also measuring the difference between self-reference and survival processing. All the conditions had a limit of 8 seconds per word. After 8 seconds had passed the survey would move on to the next word.

### *The List of Words*

A total of 30 words were presented. The list of words provided for each condition was the same, but the list was not the same list as the one used in the original experiment. The list of words for this experiment was selected from a different study by Marc Brysbaert and his team who categorized 37,000+ words on a concreteness scale. Concreteness is referred to as the likelihood of a word creating a spontaneous mental image. For example, a word such as “apple” is more concrete than words such as “would” because apple is almost automatic to imagine vs. would is nearly impossible. Therefore, a carefully curated list of 30 words with a concreteness of at least 4 was selected (See appendix).

### *Number Task and Analysis*

Another 2-minute number distraction task was given to the participants, so they were distracted from the original list of words. Then, just like the original experiment, the participants were asked to recall the list of words, but unlike the original experiment, the participants were not allowed to move on without spending at least 2 minutes recalling the list of words. The final analysis would compare the effort aspect and the results between the rating and survival writing conditions (C1 & C2). Then, compare the effect of survival vs. self-reference but compare the results between the survival writing and self-reference condition (C2 & C3). The last analysis that can be done is measuring the difference between the rating and self-reference condition (C1 & C3).

**Results**

## One-Way ANOVA (Welch's)

	F	df1	df2	p
Recall	5.76	2	66.5	0.005

## Group Descriptives

	Condition	N	Mean
Recall	1 (Rating) (C1)	38	13.2
	2 (Survival) (C2)	29	15.7
	3 (Self) (C3)	43	12.5

## Tukey Post-Hoc

		1 (C1)	2 (C2)	3 (C3)
1	Mean difference	-	-2.51	0.704
	p-value	-	0.035	0.715
2	Mean difference		-	3.219
	p-value		-	0.004
3	Mean difference			-
	p-value			-

### *Results*

An ANOVA test was used to extract the results of this experiment and the results show a statistically significant p-values of  $<0.05$ . When assessing the group variables of all three conditions C2 had the highest mean recall. Lastly, a Tukey post-hoc test was used to measure the difference between the three conditions. When comparing the p-values between the rating and survival writing condition (C1 & C2) there was a p-value of 0.035. The next column shows the p-values between the rating and self-reference conditions (C1 & C3) which is 0.715 which is not statistically significant. The last p-value in the column is the p-value between the survival writing and self-reference conditions (C2 & C3) which has a p-value of .004. Thus, it can be concluded that there is a notable difference that effort has on memory as there was a significant difference in memory retention between C1 and C2 which had a p-value of 0.035. It can also be concluded that there is no difference between rating for survival and writing for self-reference, the impact of which will be discussed in the discussion section. The last result that can be concluded is that there is a very significant difference between survival processing and self-reference processing as seen in the last p-value which was 0.004.

### *Discussion*

The discussion section will be divided into four different sections. This will include the rating vs. survival writing conditions, the survival writing vs. self-reference conditions, and the rating vs. self-reference conditions, and final thoughts.

#### *Rating vs. Survival Writing (C1 & C2)*

As seen in the result section, the p-value between the rating and survival writing (C1 & C2) conditions was 0.035 which is statistically significant, but what does this mean? Well, this points to effort having a role in memory retention. The operational definition of effort for this experiment was writing. If a participant is forced to write instead of merely rating like in C1 then it was hypothesized that they would be more likely to recall the information as they must put more effort to encode the information. This was shown in the mean score difference as participants in the survival writing condition, C2, got more words right on average. Also, the p-value speaks to the reliability of the experiment.

#### *Survival Writing vs. Self-reference. (C2 & C3)*

The results show that the p-value difference between these two conditions was 0.004 making is very statistically significant. This result is contrary to the results from the original experiment. Which concluded no obvious differences between self-reference and survival processing. However, this experiment argues that there may be a difference. The mean score from C2 and C3 clearly shows that participants in C2 were more likely to retain information potentially meaning that when one's survival hinges on the encoding of information then you are more likely to retain that information. The participants were instructed in C2 to link the words to their survival. Meanwhile, participants in C3 were asked to simply relate the words to themselves. The act of self-reference seems to be psychologically insignificant if one does not also believe that the

information in vital for their survival. One can also define survival as livelihood as we are no longer ravaged by nature like our historic counterparts, but we are faced with challenges in our lives that threaten our way of life. When such a problem arises then, through the results of this experiment, it can be deduced that we are more likely to retain information. Such an idea threatens the use of self-referential processing in academia. However, self-references are multi-dimensional. One such dimension lies in the perspective of the user of the self-reference. If the user considers the information as useless then the likelihood that the information will be properly encoded is low, however, if the user considers the information to be vital to their current and future way of life (their survival) then the probability of encoding increases. Therefore, for self-reference processing to be effective the user of the technique must believe that the information is important. When the importance is established then the self-reference processing effectively *becomes* survival processing. This is why it is held in high regard in the world of academia because self-reference processing can be a *form* of survival processing.

#### *Rating vs. Self-reference (C1 & C3)*

The results for this comparison showed a p-value of 0.715, which is not statistically significant. A potential explanation for this may allude to effort playing a key role in memory retention. Survival processing essentially gives a person a reason to consolidate information, it's the *why*. However, even if someone has a reason to consolidate information but they lack the effort to do so effectively (i.e., writing information instead of rating) then their motivation to encode the information is no different than being not motivated. This makes complete sense if you look at the purpose and results of motivation. If one is motivated to change their present circumstances, then they put in effort to move in that direction. In this experiment the motivation was to survive, but the participants in C1 lacked the same amounts of effort that the participants in group C2 had. This is why the participants in C1 were no better at memory retention than the self-reference group which, as covered before, was psychologically insignificant when it is not paired with survival. Therefore, when you do not put in the effort that is required to achieve your goals when there is motivation present, it is one and the same as being not motivated.

#### *Final Thoughts*

This experiment proved the importance memory has played in keeping our ancestors safe. The mechanisms that our ancestors used to encode and recall information about what plants were safe and what plants were poisonous are the same mechanisms we use today to encode and recall the important math equations we use during a test. The fundamental substructure has remained the same for hundreds of thousands of years. The most effective way to manipulate your brain to remember useful information is to convince yourself that your survival hinges on the retention of the information. This will provide you with ample motivation to retain information, and this coupled with effort will produce immensely fruitful results. Anything that is done in life a *why* must be married to the action otherwise it is meaningless.

### ***Future Research***

This study, like every study, had some flaws that can be improved upon. First, the pool of people from which the participants were selected was mostly any student/staff from the College of DuPage as well as people from the internet. This may have diluted the subject pool with people who are not familiar with the research process causing them not to take the survey seriously. Secondly, the way the survey was formulated may have made it difficult to come up with sentences in just 8 seconds which may lead to the participants, who are already not familiar with research, made them skip some of the words especially in the beginning while some other participants who are well accustomed with the research process were quicker to understand the experiment which may have created an asymmetry in the final results. Lastly, the list of words seemed more geared towards survival processing than self-reference which may have lead participants in the survival conditions to be more likely to retain the words compared to the self-reference group. For future research three things are recommended: a participant pool of mostly students, a different manipulation of time, and a different list of words that are more neutral.

### ***Bibliography***

Brysbaert, M., Warriner, A. B., & Kuperman, V. (2013, October 19). *Concreteness ratings for 40 thousand generally known English word lemmas - behavior research methods*. SpringerLink. <https://link.springer.com/article/10.3758/s13428-013-0403-5>

Nairne, J. S., Thompson, S. R., & Pandeirada, J. N. S. (2007, March). *Adaptive memory: Survival Processing Enhances Retention*. *Journal of experimental psychology. Learning, memory, and cognition*. <https://pubmed.ncbi.nlm.nih.gov/17352610/>

The jamovi project (2022). *jamovi*. (Version 2.3) [Computer Software]. Retrieved from <https://www.jamovi.org>.

R Core Team (2021). *R: A Language and environment for statistical computing*. (Version 4.1) [Computer software]. Retrieved from <https://cran.r-project.org>. (R packages retrieved from MRAN snapshot 2022-01-01).

*Appendix*

---

Axe	Cellphone	Robe	Vodka	Newspaper	Phonebook
Banana	Chopsticks	Arrow	Anvil	Plate	Spoon
Bandana	Flute	Gloves	Jump rope	Spear	Tank top
Baseball bat	Flashlight	Scarf	Kite	Duct tape	Knife
Credit card	Jar	Suitcase	Camera	Mask	Toothpick

---