The Survival-Processing Effect Based on The Richness-of-Encoding Hypothesis

Vlad Buzducea[i]
Department of Psychology, Education and Child studies,
Erasmus School of Social and Behavioral Sciences,
Erasmus University Rotterdam, Netherlands

Abstract

Introduction: *The article is a questionnaire-based experiment that aimed to reproduce the original study of Nairne et al. (2007). As per the original experiment, people were presented with one scenario, either surviving on a foreign land or moving to another country. Afterwards they were presented with a list of words which they had to grade based on their easiness of usage. In the end, the participants were presented with a list of simple equations, which functioned as a distracting task. After completing it, they were asked to write down all the words they could remember.*

Objectives: *The purpose of this paper was to test whether the human memory was involuntarily enhanced when presented with a scenario in which survival is crucial.*

Methods: *The experiment followed a between-subject design. Participants were equally distributed into two groups, one presented with the moving-out scenario and one with the survival scenario.*

Results: *The results were not in concordance with the findings of the original study. The participants had a higher recall rating and easiness of usage rating in the moving out scenario.*

Conclusions: *The results proved that human memory is not affected by scenarios that the individual is in.*

Keywords: human memory, survival effect, richness-of-encoding, scenarios

*

* *

[i] Corresponding author: Vlad Buzducea, Department of Psychology, Education and Child studies, Erasmus School of Social and Behavioral Sciences, Erasmus University Rotterdam, Netherlands, email: vbuzducea@yahoo.com.

I. Introduction

The thesis that human memory evolved, subject to the constraints of natural selection, is noncontroversial (Nairne, Cogdill & Lehman, 2017). Just as the organs of the body were sculpted over generations to solve specific problems (such as pumping or filtering blood), human memory almost certainly evolved because it helped solve adaptive problems, ones that were highly relevant in ancestral environments (Klein et al., 2002; Nairne & Pandeirada, 2008). An instrument that would retain the location of predators or prey, characteristics of possible mates and any other information that would be vital for survival, would have been essential for the viability of our species. As such, it has been hypothesized that memory is subjective in processing survival related information. An experiment was done by Nairne et al. (2007) to test this theory.

Subjects were divided into groups. The first group was asked to imagine being stranded on the grassland of a foreign land, without any basic survival materials, and for the next couple of months they would have to find water, food, shelter and to protect themselves from predators. The second group was given a control scenario, such as moving to a new country. Then, they were shown a list of unrelated words, and were asked to rate the ease of use for each word, in the respective scenario. At the end of the experiment, they were given a surprise free-recall test, whose results showed that the survival group had processed the words better than the control group. This led to support the hypothesis that memory is subjective to processing information beneficial for survival. There have been multiple replications of the experiment, with different control scenarios, but all results showed support for the original theory.

However, the proximal mechanism that enables a better retention for survival-related information is still subjected to discussion. There have been multiple theories that attribute this mechanism to different processes, such as interactive imagery, but the focus of this article will be the richness-of-encoding hypothesis proposed by Kroneisen and Erdfelder (2011). The relevance-rating task would activate many concepts in the semantic network model of the participant, but the complexity of the survival scenario would create a rich encoding context, favorable for the recalling of the listed words. Findings by Kroneisen, Erdfelder and Buchner (2013) support this theory.

Given the ongoing discussion about the processes that enable the survival-processing effect, we will try to answer the following research questions: What is the effect of encoding context on recall performance? What is the effect of encoding context on perceived ease with which participants can imagine interacting with an item?

The measurement method we are going to use is a survey, followed by a surprise recall test of the words. Considering the multitude of experiments (Nairne et al., 2007; Kroneisen, Erdfelder & Buchner, 2013; Kazanas & Altarriba, 2015) that found a better recall score for the survival group, we hypothesize that encoding context has a positive effect on recall performance and on the ease with which participants could use the specific items.

II. Method

A between-subject design was used to investigate the research question. The independent variable is the scenario, survival or moving out, to which the subject was distributed, while the dependent variables are the recall score of the participant and the perceived ease of using the items presented.

Participants

A total of 105 participants were used for this study. However, only 52 test trials were finished. As such, the data is based on the remaining 52 participants (27 male). The experiment was done on people above or at the age of 18. Age ranged from 18 to 67 (Mean = 27.34; SD age = 11.82). The recruitment of the subjects was done by sending a message to friends and family members, which included information about the experiment and a link for the survey.

The experiment could be done on laptop, computer or smartphone. Out of 52, 30 participants had completed compulsory education, while 21 had completed a higher education. However, given the fact that this survey was distributed by students to our friends, it is safe to assume that most of the lower education level participants are still studying. Only six participants had English as their native language, while the others reported different levels of English comprehension.

Material

We used two conditions for the participants. One was the surviving scenario, while the other was the moving out scenario. We had described the survival scenario as being stranded on a grassland of a foreign territory, without basic materials for survival. We had also mentioned that they had to procure water and food, and protect themselves from predators. For the moving

out scenario, we had described it as moving out to a foreign country.

We also used a list of words. The list of words was: *frog; shoes; stone; string; basement; bottle; chair; cigar; corn; cotton; dawn; dollar; dust; engine; flag; flood; fur; gold; library; nail; orchestra; oxygen; paper; peach; pencil; picture; poster; refrigerator; rock; spray; square; steam; ticket; toast; truck; window*. It contained 36 words, out of which the first four were used as trials. As such, they were not taken into account as correct answers if the participants recalled them. We had also used a list of simple equations.

Procedure

Participants were randomly assigned to one of the two scenarios and they were asked to imagine being in that specific scenario. Then, they were told that they would see words on the screen. The participants were asked to rate the ease with which they would use the objects in their respective scenarios. The ratings were from one to five, five being the easiest, while one being the hardest After they had finished the list of words, they were given a list of equations, and were asked to solve them. This functioned as a distracting task, as afterwards the subjects would be exposed to a surprise recalling test.

III. Results

It was predicted that the encoding context has a positive effect on recall performance and on the ease with which participants could use the specific items. As the experiment was a between-subject design, an independent sample t-test was conducted, using the software SPSS (25th version). We had compared the mean and standard deviation of correctly recalled words for the survival scenario (Mean = 9.26; SD = 3.991) with those of the moving out scenario (Mean = 9.14; SD = 3.439) as it can be seen in figure 1.

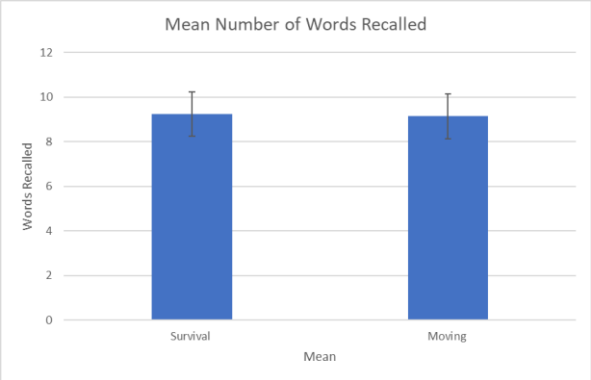

Figure 1

We had concluded that the surviving scenario had a slight better recall. However, that proved to be statistically insignificant, t = 0.111; p = 0.912. Consequently, our first hypothesis was rejected at alpha level = .05.

When comparing the means of relevance-rating (Mean survival = 3.412; SD survival = 0.859) and (Mean control = 3.546; SD control = 0.754), we saw that the control group had perceived the use of the objects with more ease than the survival group. However, this proved to also be statistically insignificant, t = -0.577; p = 0.566. Consequently, our second hypothesis was rejected at alpha level = 0.05.

IV. Discussion

We aimed to prove that the encoding context has a positive effect on recall performance and on the ease with which participants could use the specific items. According to the results, our hypothesis has been rejected, as they are not statistically significant. Those results are different from the majority of the experiments done on the survival-process effect (Nairne et al., 2007).

The differences could be explained due to multiple factors. First of all, as we have previously stated, the survey was given to our friends, most of which are international students. As such, the control scenario was already experienced by a big number of our participants. This could lead to them having a better perceived ease of use for the objects in the moving out scenario, and a better recall, as they may have needed or used some of the items presented when moving out. Secondly, the environment of the testing could not have been measured. The experiment was done online; as such participants were not supervised when they completed it. As such, there could have been many stimuli that could have distracted the subjects. Most participants recalled trial words, which could be further proof that participants may have been in a distracting environment.

It is also worth mentioning that acronyms for words were used by participants in the recall phase (refrigerator = fridge; oxygen = O2). They were taken into account as correctly recalled words, seeing as they are the same object, and their exclusion would not have significantly altered the results. It is interesting to mention too that some participants came up with their own words (such as electricity or water). The particular word “electricity” was used twice, by different participants, in the survival scenario. This could be linked to the importance the items mentioned above have in our daily survival.

V. Conclusions

As such, according to our results, the context of encoding does not alter recall performance or the ease with which participants could use the specific items. This also argues that the richness-of-encoding hypothesis is wrong. Given the insignificant difference in the means recalled words, we could also assume, based on our results, that the survival-processing phenomenon is false. However, there are multiple studies that attest otherwise.

There could have also been limitations to our experiment, which could have flawed the results. First of all, most of our participants are not native English speakers, so remembering a list of English words could have been a difficult task for them. Secondly, the environment of the test was not controlled. As we have pointed our earlier, participants could have been distracted by other stimuli. Last but not least, the experiment fails to take into account individual differences. Some of the participants have an international student background, while others have survival-related background, such as surviving camp. This information is known, as the survey was mainly distributed to friends and other close people.

A point of improvement for the experiment could be to take into account individual differences. Participants could be asked more questions about themselves (such as: if they are an international student or if they have survival training) and, according to their answers, be distributed to one of the groups. However, the balance between the two conditions should still be the primary goal of distribution of participants.

A second point of improvement could be the introduction of attention stimulating tasks. Participants should be presented with different tasks, between words, to make sure they are paying attention to the experiment. The tasks must not be complex or take a long time to complete as participants could forget the words they saw. An example of a simple task could be to click the x with the mouse.

In conclusion, according to our results, our hypothesis that the encoding context has a positive effect on recall performance and on the ease with which participants could use the specific items have been rejected. Therefore, we also reject the richness-of-encoding hypothesis. This difference to the original experiment could have been caused by the background of our participants and their attention to the experiment.

References

Klein, S. B., Cosmides, L., Tooby, J., & Chance, S. (2002). Decisions and the evolution of memory: Multiple systems, multiple functions. *Psychological Review*, *109*(2), 306-329. https://doi.org/10.1037/0033-295x.109.2.306.

Kroneisen, M., & Erdfelder, E. (2011). On the plasticity of the survival processing effect. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *37*(6), 1553-1562. https://doi.org/10.1037/a0024493.

Kroneisen, M., Erdfelder, E., & Buchner, A. (2013). The proximate memory mechanism underlying the survival-processing effect: Richness of encoding or interactive imagery?. *Memory*, *21*(4), 494-502. https://doi.org/10.1080/09658211.2012.741603.

Kazanas, S. A., & Altarriba, J. (2015). The Survival Advantage: Underlying Mechanisms and Extant Limitations. *Evolutionary Psychology*, *13*(2), 147470491501300. https://doi.org/10.1177/147470491501300204.

Nairne, J. S., Cogdill, M., & Lehman, M. (2017). Adaptive memory: Temporal, semantic, and rating-based clustering following survival processing. *Journal of Memory and Language*, *93*, 304-314. https://doi.org/10.1016/j.jml.2016.10.009.

Nairne, J. S., & Pandeirada, J. N. (2008). Adaptive Memory. *Current Directions in Psychological Science*, *17*(4), 239-243. https://doi.org/10.1111/j.1467-8721.2008.00582.x.

Nairne, J. S., Thompson, S. R., & Pandeirada, J. N. S. (2007). Adaptive memory: Survival processing enhances retention. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *33*(2), 263-273. https://doi.org/10.1037/0278-7393.33.2.263.