Hard-to-find classics 4: Godden & Baddeley (1975)

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Dr. Julia Russell's Psychology Column

Reference

Godden DR & Baddeley AD (1975) Context-dependent memory in two natural environments: on land and underwater. British Journal of Psychology, 66(3): 325-31.

Introduction

Prior to Godden & Baddeley's study, there was little evidence for context-dependent effects. Research had mainly demonstrated an advantage to same-place learning and recall in investigations of interference. Another problem with the evidence existing at the time was that it came largely from studies which bore little resemblance to real life. For example, Dallett & Wilcox (1968) required each participant to stand with their head in an oddly shaped box which presented flashing lights of different colours. This effect was so extraordinary that two participants had to withdraw because they felt sick. In another strange experiment, Rand & Wapner (1967) strapped their participants to a board so they could rotate them to a standing or lying position. Since such environmental changes were so different from those we experience in day-to-day life, Godden & Baddeley felt that they lacked ecological validity – the findings might not generalise to other situations.

Egstrom et al (1972) asked divers to learn a prose passage either under water or at the surface. When recall was tested on the diving boat, the divers who had learned underwater were poorer than those who had learned and recalled the passage on the boat. However, such an effect could have been due to the change in environment, so Godden & Baddeley used a counterbalanced design to overcome this. The difference between the two environments was felt to be realistic – divers really were having problems recalling tasks when underwater – and the physical experiences were very different, for example, underwater the diver is weightless and has restricted vision.

Aim

To investigate the effect of context on memory, specifically to test whether the probability of recalling words would be affected by a change in environment between learning and recall.

Experiment 1: Procedure

The study was a field experiment with a repeated measures design. The 13 male and 5 female participants were all trained divers and each was using their own SCUBA equipment. They listened to word lists either on land or 20 feet under water. The words were presented in blocks of 3 at a rate of one word every 2 seconds. There was a 4 second gap between blocks to allow the divers to breathe. The list of words was presented twice, with a 10 second gap in between. The participant then heard 15 digits which they copied down, followed an

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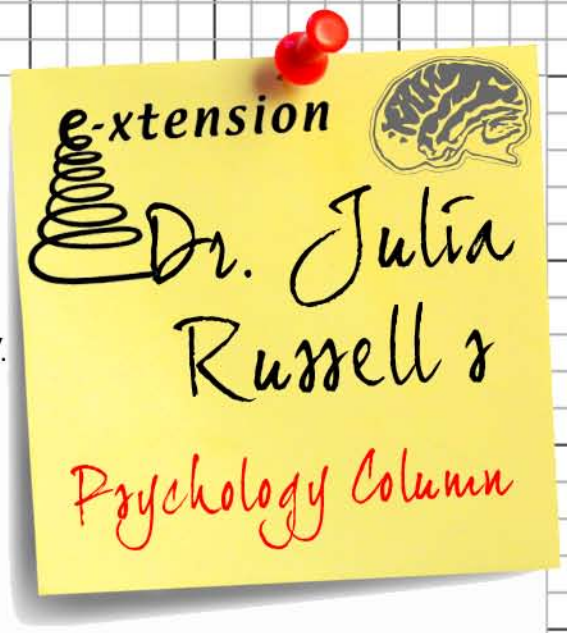

an instruction (eg to return to the shore). Finally, they waited for 4 minutes before recalling the words by writing them in pencil on a plastic covered board (in any order, within 2 minutes). The number of correctly recalled words was the DV.

Each participant was tested in each of the four possible combinations of learning/recall environments (on different days):

- Land/land
- Land/water
- Water/water
- Water/land.

These conditions produced two levels of the independent variable, ie were whether the learning and recall environments were the same (land/land and water/water) or different (water/land and land/water).

Underwater, the divers were weighted so that they could sit on the bottom. On land they sat at the water's edge with their SCUBA equipment on with the masks tipped back and breathing tubes off. This controlled for position, comfort and noise.

Experiment 1: Findings

Recall was not affected by the initial learning environment; it was similar for 'learn and recall on land' and 'learn and recall in water'. However, when recall took place in a different location from learning, recall was not as good.

Table 1: Mean number of words recalled	Learning environment	
Recall environment		
Land	Land	13.5
Water	Water	8.6
		8.4
		11.4

Experiment 1: Conclusion

Being in the same context for recall as for learning does appear to enhance recall. This difference could, however, have been due to the disruption of changing environment disadvantaging the 'different environment' group so a second experiment was conducted.

Experiment 2: Procedure

To see whether disruption affected recall, 16 more participants were tested in the land/land condition. The procedure was either the same as before (the 'non-disrupted' condition) or was 'disrupted'. In the latter condition, during the waiting time, the participants had to get into the water, swim a little way, dive to approximately 20 foot and swim back.

Experiment 2: Findings

The mean recall of words in these two conditions were:

- Non-disrupted 8.44 words
- Disrupted 8.69 words.

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Experiment 2: Conclusion

This difference was very slight and in the opposite direction than would have been expected if disruption had caused the land/water and water/land groups to have lower recall scores in the first experiment. It could therefore be concluded that the poorer recall when learning and testing environments were different was an effect of a difference context. Overall, it appears that context cues provided by the physical environment do improve recall.

Comments

Many aspects of the procedure were rigorously controlled. For example, the depth to which they dived, the rate of word presentation, the time allowed for recall and the efforts to ensure that, apart from being on land or underwater, there were few differences between the conditions (eg wearing SCUBA gear on land and the sitting position of the participants). This helped to ensure that any difference in recall between the 'same' and 'different' learning and recall environment groups was due to context effects not extraneous variables.

Nevertheless, some uncontrolled variables did arise. For most participants the 'under water' testing was done in the sea, although at various locations. For two participants, however, a freshwater site had to be used. For health and equipment failure reasons, gaps between testing were not always 24 hours, so this introduced another possible source of error.

There were also appropriate ethical measures. By using trained divers, Godden & Baddeley ensured that the participants were at no greater risk than in their normal lives so satisfied the ethical guideline which says that participants have a right to be protected from physical harm. Even though it introduced the potential for variability, each participant used his or her used their own SCUBA gear. This illustrates the dilemma between ethics, in this case safety, and rigorous, highly controlled science. There were also some potential hazards, one participant was nearly run over by an amphibious truck!

Questions

1. Participants were tested after a days' diving. This meant they all began the experiment each time in approximately the same state, ie cold and wet. Explain why this was an important control.

2. a) Draw an appropriate graph of the results in Table 1.

   b) Justify your choice of graph.

3. Work out the mean recall for the two levels of the independent variable from the data in Table 1.

4. It would have been appropriate to add another condition to Experiment 2. Describe what you would add to this experiment and explain why.

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Ideas for practicals

1. Test the effect of learning a prose passage in the four possible learning and recall conditions:
- Music/music
- No music/no music
- Music/no music
- No music/music.

In planning your experiment, consider the findings of early studies mentioned in the introduction above. Will you choose music with out without lyrics? Why?

2. You can do this as a revision exercise. Divide your class into three groups and give each group a name. Each group should write 20 short answer questions on topics you have covered recently. Do not show the other groups your questions. Write the answers out clearly and keep them hidden too. Each group needs to divide their questions into two blocks of approximately equal difficulty (with 10 questions in each block). Type them up and label each block A or B plus your group name. Print each set (without answers) so that you have enough for every member of your class except your own group. As a class you should now have three sets of questions labelled A or B. Each whole class set should contain 30 questions. Of these, any particular group will not have written 20 of them and these 'new' questions will be labelled with the names of the other groups. The actual questions will be different for each group – an uncontrolled variable.

Arrange with your teacher to use question sets A and B for separate tests. Answer one set in the same room as you are normally taught, and one in a different room. This is similar to the procedure used by Abernethy (1940). What do you expect to find?

References

Abernethy EM (1940) The effect of changed environmental conditions upon the results of college examinations. Journal of Psychology, 10:293-301.

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Rand G & Wapner S (1967) Postural status as a factor in memory. Journal of Verbal Learning and Verbal Behavior, 6: 268-71.

Read Egstrom's paper here:
http://64.233.169.132/search?q=cache:AHriWNrctjkJ:handle.dtic.mil/100.2/AD747701+Egstrom+baddeley+cuccaro+1972+underwater+work+performance+and+tolerance+51&hl=en&ct=clnk&cd=2&gl=uk

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