

Can different contexts affect memory recall?

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Abstract. To address questions about the dependence of human memory on the contingent context in which events occur, the author review research on contingent context-dependent memory in humans. The relationship between the context in which an item is stored and retrieved has a significant impact on a person's ability to recognize the item. The theoretical approach to this problem stems from Bjork's (1978) experiments on the effects of environmental context on recall and recognition. If a person learns and remembers in the same contextual environment, then learning and memory are dependent on the environmental context in which these activities occur. This paper discusses each of the three mental processes of memory in relation to their stimulus context. For example, the impact of inference methods of retrieval on context-dependent memory methods, and the improvement in retrieval of information by encoding environmental information along with plot specific objects or contexts in the storage information session. Further, this paper explores the effects of contextual stimuli in real-life contexts, particularly in classroom and examination settings of environmental context.

Keywords: Context-dependent theory; memory recall; recognition.

1. Introduction

The mental process of retrieving knowledge from the past is defined as recall in memory. Recall is one of the three fundamental functions of memory, along with encoding and storing ("Recall (memory)", 2022) [1]. It is undeniable that the relationship between an item's storage and retrieval contexts has a significant impact on one's capacity to recover (or recognise) that item. Tulving (1974) asserted that when we learn something, we also store information about the environment in which we learnt it as well as our mental and physical condition at the moment [2]. Tulving proposed that learning takes place concurrently with the storage of information about the learner's physical environment and psychological or physical condition. When the setting during recollection is different from the one a person is in when learning, context-dependent forgetting may take place. Context-dependent memory theory refers to improved recall of specific episodes or information when contextual cues relating to the environment are the same during encoding and retrieval [3]. However, "context" is a conceptual dumping ground that refers to a wide range of intrinsic or extrinsic aspects of how an item is presented or tested. Looking at external cues, the external context is what we find ourselves influencing our memory [4]. This study focuses on the question of whether the general environmental context in which an item is shown or evaluated may be seen as operating in a similar manner as contextual elements that have a more noticeable impact on the coding of an item [5]. The effects of context change on recall and recognition is an issue well worth investigating. The results of this research have a variety of uses for real-life contextual stimuli, for example in classroom and exam settings, and also for word memorisation apps on mobile phones.

2. Analysis on the problems

2.1 Case analysis

This study focuses on Experiment 3 in Bjork et al. (1978) [1], where memory for categories and for words within a category was better in the same context than in different contexts. The two environments were very different from one another; they each had distinctive locations, features, and time of day referents. The first setting was bare, with tiled flooring and a lot of electrical equipment

strewn around. The experimenter was dressed in pants and a T-shirt. The second location was a basement with carpeted flooring, photographs and posters on the walls, and books and plants in the space. The researcher is dressed in a suit and tie. The experiment's purpose was to study how linguistic content was categorised, thus the volunteers were obliged to attend two sessions where they were informed of this. This process allowed the subjects to spend a lot of time digesting the words. On day two, in the same or a different setting, participants were given a blank piece of paper and instructed to list all the instances of the categories they could think of [1]. The findings of the studies demonstrate that for both words and categories as well as words per recalled category, the memory of the same context is greater than the recall of the different context. Eight out of ten categories were recalled more frequently by individuals in the same-context condition, according to the study of the number of categories recalled, which demonstrated a substantial influence of context. This result supports the idea that the context of the environment aids in the retrieval and demarcation of the search set. When the number of words in each memory category was examined, the influence of the environmental context was similarly substantial. When compared to participants in various contexts, subjects in the same environment often remembered more terms from each category. This finding does not necessarily imply that word memory inside categories and category memory are not separate processes. It does, however, indicate that in addition to search set retrieval, there are memory mechanisms that are affected by changes in the environmental context. It's possible that the environment, or a component of it, has a direct bearing on certain list terms, or that individuals use the environment to assess if a prospective retrieval pathway is reliable. According to Anderson and Bower (1974) [6], list words are encoded with environmental data. Contextual recurrence might benefit the identification of implicit retrieval words in this situation. The overlap between implicitly retrieved terms and their context would be greater. Environment plus words will overlap the encoded memory trail more. The likelihood of being identified as an accurate response is greater, and there is more overlap with the encoded memory traces [1].

2.2 Relationship between different mental processes and contexts

2.2.1 Retrieval

The information being accessed is often not directly stored, but can be deduced or generalised from other directly recorded information. However, it can be deduced or generalised from other assumptions of long-term memory. Therefore, given that Spinoza was a guy, it is reasonable to assume that the answer to the question of whether he had knees was yes. A yes response, given that Spinoza was a man and that all men have knees. Substantial development of inference systems to support fact retrieval was deferred in the work of Anderson and Bower (1973). A recent theoretical worry is with this method of reasoning. Inferential retrieval is the dominant type of information retrieval that will be examined in connection to recognition memory. For instance, when reading the test word "cat," one may recall seeing the word printed in red ink and recall that all of the study list's words were displayed in red ink. The person would consequently assume, even if he did not personally recall, that cat was one of the terms on the list. This illustration makes use of probabilistic reasoning. In contrast, Spinoza's prior illustration employed just a logical argument [6]. The method of reasoning used to retrieve the information therefore has the potential to affect the accuracy of the validation context and memory recall.

2.2.1 Encoding and Storage

The memory is determined by how much the probe and the memory trace overlap or resemble one another. The likelihood of retrieving the memory trace increases with the number of characteristics that match the probe and the memory trace. This similarity principle is in line with the idea of encoding specificity, which holds that the encoded data in the sought-after memory trace might serve as a trigger for episodic memories. Therefore, it should be obvious that incorporating objects, relationships, and/or contextual information stored in the memory trace relating to a specific episode

into the memory probe will improve memory for that episode. The policies employed in creating the memory traces and probes determine whether a certain piece of information is included in each. Glenberg (1997) [7] asserts that conceptual processing requires a suppression of the environment, and the suggested default policy for one is to record external environmental elements directly in memory traces and probes. Even when recalling something, people often have a keen awareness of their surroundings. As a result, environmental information is frequently encoded with the information to be recalled. Environmental alterations would have less of an impact if participants were encouraged by the learning environment to concentrate more on the course topic and disregard their surroundings [8].

The surroundings may be muted with some work to improve conceptual processing. As a result, individuals may learn to encode inter-item relationships while also engaging in extra conceptual processing, which might lead to little to no encoding of the contextual context. When environmental suppression happens during learning, it may result in masking, or the inability to maintain environmental information in memory. According to the principle of specificity of encoding, if contextual information is concealed during learning, contextual signals offered during testing will have no impact. On the other hand, refers to the idea that the environment can be suppressed at test time, reducing the likelihood that environmental information will be used to construct memory probes. Even if the environmental information is successfully encoded during learning, the environmental cues may be invalid at test time if the memoriser does not use them [8]. In conclusion, these fundamental theoretical ideas offer a way to comprehend the function of incidental contextual settings as memory cues. The reintroduction of context cues, which are by default recorded in memory traces and probes, ought to improve memory for knowledge acquired in the reintroduced environment [8].

3. Suggestions

Contextual stimuli like contextual stimuli can make it possible for more different stimuli to emerge. In other words, the physical characteristics in the environment constitute background stimuli if a person is reading this textbook in his dorm room on a Wednesday night. These triggers include the desks and other furniture, the wall art and posters, the paint and carpet colour in the space, and the potent raspberry scent coming from the candles your roommate insisted on lighting every evening. Contextual stimuli are essential to the representation of learning and memory, and all of these stimuli constitute the context for the current learning session [9].

We employ retrieval cues, or stimuli connected to an event, whenever we recall anything to make it easier to remember other details connected to that experience. For instance, context can serve as a retrieval cue much like conditioned and unconditioned stimuli do in classical conditioning. Environmental retrieval signals are lost when the context connected to the initial learning session is removed (shifted or altered). In other words, the remove of context can lead to a circumstance where there aren't enough clues to help us recall that specific experience. In other words, when the context changes, we lose the ability to encode the memory by using contextual clues as retrieval cues [9].

When the circumstances at the moment of retrieval and encoding are the same, memory functions will be the best. However, what if having a matching environment at the time of encoding and retrieval is not practical or possible? Does this mean, for example, that you need to study for the exam where you will take it? If the context effect is so strong and robust, it seems appropriate to do so in order to reduce the likelihood of context switching effects when taking the next exam.

Abernethy (1940) assessed the impact of changes in the environment on the outcomes of common classroom assessments. Previous reports of tests have used settings in a lab. Compared to classroom settings, laboratory settings are more formal and typically require a tighter face-to-face interaction between the examiner and subject when measuring retention [10]. In order to determine the impact of these environmental variables on student performance, Abernethy (1940) sought to totally regulate circumstances in the real classroom setting. The study's classroom data were consistent with the overall findings of laboratory experiments, pointing to a link between memory effectiveness and the

consistency of environmental elements. In university classes that were tested in a variety of contexts, analysis of the results revealed that there was a propensity for student performance to decline in the presence of alternative proctors, a consistent decline in student performance when tests were given in settings to which students were not accustomed, and a more pronounced disadvantage when both the teacher and the classroom were changed [11].

However, in Abernethy's previous studies, there were no statistics available. In a typical curricular environment, Saufley et al. (1985) looked into whether altering the classroom (context) for a test would affect student performance [10]. Context is not a discrete event that constitutes the coding of stimuli throughout the learning process, but refers to the complex of environmental stimuli during the lesson. The walls, the number and configuration of the chairs, the room's location, the lighting, noise, scents, the presence of other people in the space, and even the students' customary seating all contribute to the overall atmosphere. To be successful for memory, all learning that takes place in context must be consistently linked to characteristics of the space that set it apart from its surrounds. When students try to recollect what they have learned in the environment, the physical presence of pertinent contextual clues should increase the possibility that previously taught knowledge will be maintained. Similar to how these cues are present, their absence should reduce the likelihood that the information will be remembered [10].

The laboratory study by Jensen et al. (1971) is typical of such studies where data demonstrate recall following learning in the same or different contexts, demonstrating dependency on the environment [12]. Children from grade 2 to grade 12 showed worse recall when learning and assessment took place in various types of classroom settings. On the other hand, Saufley et al. (1985) represent a typical non-laboratory scenario where the classroom is a location that is quite similar to reality. Laboratory tests have shown that recollection is context-dependent. It is not a question of whether context affects recall; rather, the question is whether context necessarily matters in the context of a more complex reality. University exams are not only rote memory assessments, in contrast to laboratory testing. There are also features of the university classroom which can be attributed to a lack of contextual relevance and which may not lend themselves to context-dependent testing. The influential factors include the method that variables are described, the literate community's educational objectives, and the characteristics of the circumstances that are portrayed [10].

Contextual knowledge may be preserved along with other knowledge. Context is important in everyday events, such as involuntary recall, which is attributed to incidental contact with relevant contextual stimuli. It is unclear if contextual signals remain relevant as situational circumstances change. There is no proof in these naturalistic studies that modifications to the classroom environment alter test results. A comparison of the data from the classroom and other laboratory settings may allow for the drawing of conclusions regarding the nature of the human subject. The human mind is quite skilled at thinking in ways that are helpful for the current job. Students utilise their memory differently in a university lecture than they do in a lab because the demands of each setting are different. A compelling explanation might emerge since the typical university classroom environment offers a relatively low-probability collection of recall signals for evaluating performance and seems to be an irrelevant site for testing contextual reliance. Contextual relevance is seldom advantageous in the natural ecology of the undergraduate classroom, and it is unquestionably detrimental for students whose knowledge will be connected to the prior opulent odours of study halls, dorms, or even nearby students [10].

4. Discussion & Conclusion

In summary, research based on several experiments has shown that the same environmental context is remembered more. For example, free recall in one room is preferable to learning and relearning in one room and being assessed in a neutral environment. Smith, Glenberg, and Bjork (1978) found that learning a list of words in one room and then reviewing that list in a second room

was preferable [1]. Other studies have found that memory is better when encoding and testing environments are matched and use background colour and video as a backdrop [12, 13]. The utility of odour as a signal for memory recall was investigated when Schab (1990) used ambient odour and accidental learning techniques as the context [14]. They found that when participants smelled the same environment during encoding and retrieval, they recalled more words. Changes in the environmental context have an impact on several memory processes other than search set retrieval, according to Smith, Glenberg, and Bjork (1978). This result is compatible, for instance, with the idea that the environment—or at least how memory represents it—is more intimately connected to the linguistic information that is encoded than search set theory would imply. A list phrase may be directly related to the environment, or a portion of it may be, or a subject may utilise the environment to determine if a suggested search method is the most effective one. A list phrase may be directly related to the environment, or a portion of it may be, or a subject may utilise the environment to determine whether a suggested retrieval method is the optimal one. Contextual information is included in the list words' encoding. As compound test stimuli (which include the implicit retrieval word plus the environment) will have greater overlap with the encoded memory trace and are more likely to be recognised as correct responses, contextual recurrence in this case improves the ability to identify implicit retrieval words [1]. Whether the contextual signal stays meaningful when the context changes is another issue worth investigating. There was no proof that alterations to the testing setting affected the test results in these naturalistic experiments [10]. In further research, the application of situational relevance in real-life situations, such as exams and memory environments changing to be as consistent as possible to improve memory improvement, or reducing situational relevance of items to improve memory is an issue worth exploring.

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