

The Role of Attention and Consistency with Schema Expectation in Memory for Objects in Place

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Abstract: *The role of attention and consistency with schema expectation in memory for objects in place were examined in one experiment. Forty participants were asked to study a picture of either the graduate student office or the preschool classroom, and either under full attention condition or under divided attention condition. Sixteen stimulus items, half consistent and half inconsistent with schema expectation about the room settings were placed throughout the room. Participants were later given a free recall test, followed by a same-changed recognition memory test immediately after that. The results show that participants remembered better under full attention condition than under divided attention condition. Items inconsistent with schema expectation were better recalled and recognized than items consistent with schema expectation both under full attention and divided attention conditions. These results support the findings on the consistency effect in some previous studies. More importantly, the present study reveals the influence of manipulation of attention on the consistency effect. The results show that consistency effect occurs in both conditions, with a greater effect reported under divided attention condition than under full attention condition. Reducing the participants' attention increases the consistency effect.*

INTRODUCTION

The purpose of this study was to investigate the role of attention and consistency with schema expectation in memory for objects in place. The idea of generating this study was initially influenced by Brewer and Treyns' (1981) and Pezdek, Whetstone, Reynolds, Askari and Dougherty's (1989) studies. The two studies reported discrepant findings on the consistency effect in a real world setting. Consistency effect refers to items inconsistent with expectations being better remembered

than items consistent with expectations. This consistency effect has been reported for scenes (Friedman, 1979; Loftus & Mackworth, 1978), faces (Light, Kayra-Stuart & Hollander, 1979), personality characteristics (Hastie & Kumar, 1979), scripts (Lampinen, Faries, Neuschatz & Tonglia, 2000), and objects in real world settings (Pezdek et al., 1989).

In Loftus and Mackworth's (1978) experiment, subjects were told to look at seventy-eight pictures of scenes at 4 sec rate, as if they were going to have a later recognition test. During the picture viewing, their eye movements were recorded. The study found that informative objects (which they defined as "...objects that have a low priori probability of being in the picture given the rest of the picture and the observer's past history in the pictures") were fixated earlier and more often than non-informative objects. This has led to unexpected-schema objects remembered better than expected schema objects. A similar experiment was conducted by Friedman (1979), asking subjects to study pictures of real world scenes containing both expected and unexpected objects. The measures of eye-fixation duration revealed that first fixations to the unexpected objects were longer than first fixations to the expected objects. In the recognition memory test, results showed that subjects noticed only the changes that had been made to the unexpected objects in the pictures. The consistency effect was revealed in this scene study.

The study by Light et al. (1979) reported the consistency effect for faces. The result showed that faces rated as unusual were memorized better than faces rated as usual (typical faces) in appearance. The consistency effect for personality characteristics was revealed in the study by Hastie and Kumar (1979). The results revealed that subjects recalled incongruent behaviors with personality trait better than the congruent behaviors and neutral behaviors with personality trait. Recall of particular behavior descriptions was clearly affected by their relation (congruent, incongruent or neutral) to the salient trait. Additionally, Lampinen et al. (2000) documented consistency effect for scripts. He showed that atypical actions were remembered more frequently than typical actions, that is, actions inconsistent with schema expectations were remembered better than action consistent with schema expectations. In later work by Pezdek et al. (1989), they revealed that items inconsistent with schema expectations were better recalled and recognized than items consistent with expectations. This result was contrary to the result obtained in the earlier study by Brewer and Treyens (1981). In Brewer and Treyens' (1981) study which aims to investigate the role of schemata in memory for places, they revealed a strong

positive correlation between schema expectancy and both recall and recognition. Schema-expected objects like chair and desk were recalled more frequently than schema-unexpected objects like wrench and teaspoon. Mandler and Parker (1976) reported a comparable pattern of results as obtained by Brewer and Treyns (1981). Their experiment revealed that schema-relevant information was more accurately remembered than schema-irrelevant information.

All studies mentioned above generally produced two opposite findings on the consistency effect with considerable research suggesting that schema-unexpected items or information are better remembered than schema-expected items or information, and few studies suggested the other way around. Thus, it is thought that expected and unexpected elements are processed differently. According to Bobrow and Norman (1975), information that is expected would not require much processing, therefore, would not be well remembered, while information discrepant with the schema would receive deeper processing and should therefore be better remembered. Studies that reported the consistency effect seemed to support this trend. Furthermore, according to schema-theoretic explanations of the consistency effect (Friedman, 1979; Loftus & Mackworth, 1978), memory is better for unexpected objects than expected object because capacity-demanding analytic processing is involved for schema inconsistent items, whereas the activation of the underlying schemata results in relatively automatic processing of schema-consistent items.

Friedman (1979) proposed a process model that differentiates the processes of feature detection and feature analysis. According to Friedman, feature detection involves activation of appropriate scene frame and identification of expected items. Thus expected items will only be processed to the extent that their correspondence with an appropriate frame verified, and subjects might be able to identify objects by using automatized encoding procedures that operate on global physical features. On the other hand, unexpected items require more analysis of local visual details. Thus, feature analysis is required in encoding unexpected items, which involve a more elaborative analyses of their meaning and physical appearance.

Several findings of consistency effect in memory are well established in many studies including those involve with pictures and scenes (e.g. Friedman, 1979; Loftus & Mackworth, 1978) and the real world settings (e.g. Brewer & Treyns, 1981; Pezdek et al., 1989). However, the findings on consistency effect in memory for objects had been particularly reported by Brewer and Treyns (1981) and Pezdek

et al. (1989). Following Brewer and Treyns (1981) and Pezdek et al. (1989), the consistency effect in memory for objects in place was further investigated in the present study. In contrast to the two mentioned studies, the present study used pictures instead of the real world settings for the experiment. The present study also researched on the role of attention in memory for objects in place.

One example of a study that suggested how the different types or levels of attentions could affect people's performance on memory task was by Baroni, Job, Mainardi Peron and Salmaso (1980). Baroni et al. showed that memory for items in a natural setting was affected by instructions, which influence the direction of attention. The findings from Baroni et al. revealed that the different types or levels of attention could affect people's performance in a memory task, regardless of the types of item or object they remembered.

The experiment in the present study was designed based on one experiment in Pezdek et al.'s (1989) study. Firstly, the present study aims to test the generality of the consistency effect reported in Pezdek et al. The same kind of settings and, consistent and inconsistent items were used. Although the materials used in Pezdek et al. appear similar to those used in the present study, their study was set up to examine consistency effect under conditions in which the individual's ability to recall and recognize inconsistent and consistent items could be expected to be reduced after a delay time. On the other hand, the present study examines consistency effect under conditions in which the individual's attentional capacity to remember items could be expected to be reduced because of the divided attention task given to them. This leads to the second aim of the present study, that is to examine how the two different types of attention namely full attention and divided attention affect people's ability to remember objects in the room. It is expected that participants will perform better under full attention condition than under divided attention condition. Importantly, the third aim of the present study is to examine the influence of the manipulation of attention on the consistency effect. Will consistency effect be observed in the present study as what had been reported in Pezdek et al.'s (1989) study? By reducing the level of attention under the divided attention condition, will consistency effect be reduced too, or will it be increased, or will it be eliminated? These are the critical questions that the present study aims to answer. Furthermore, Pezdek et al. (1989) used real-world settings but the present study used pictures scene of the real world settings. Thus, the generality of the consistency effect if found in this

study would affirm several findings on consistency effect in memory for pictures reported in some previous studies.

METHODS

Participants

Forty students (35 female, 5 male) from the University of Sussex participated voluntarily in this study. The age range for the participants was between 18 and 31 years ($M = 21.5$, $SD = 3.1$).

Design

The design of the experiment was a 2 (Setting: Graduate Student Office versus Preschool Classroom) \times 2 (Attention: Full Attention versus Divided Attention) \times 2 (Consistency: Consistent Items versus Inconsistent Items) mixed factorial design. Setting and Attention were varied between-participants, while Consistency was varied within-participants. Participants were randomly assigned to any one of the setting and attention conditions. Twenty participants studied a picture of a graduate student office while another twenty studied a picture of a preschool classroom. Additionally, they were tested either under the full attention condition or under the divided attention condition. Ten participants in each setting studied the picture of the room under full attention condition while another half studied the picture of the room under divided attention condition. The picture contained 16 stimulus items, 8 consistent and 8 inconsistent with expectations in each setting.

Materials

Two pictures of different room settings were used namely the graduate student office and the preschool classroom. The pictures were saved in .ppt format. In each picture, sixteen stimulus items composed of 16 objects, with 8 items consistent and 8 items inconsistent with expectations about the room setting were placed throughout the room. The same items used in Pezdek et al.'s (1989) study were implemented in this present study. The list of the items is presented in Appendix A.

For the full attention condition, an audio file was inserted in the picture file. The audio file consisted of 5 sequences of two consecutive odd numbers, which occurred within a string of 21 random digits. Several restrictions applied on this generated string. All numbers in the string ranged from 1 to 20. No more than two odd numbers

ever occurred consecutively. The number of digits between the sets of two consecutive odd numbers ranged from one to three. The digits were recorded at a 2-sec rate.

Procedure

Participants were tested one at a time. Participants studied a picture of a graduate student office or a preschool classroom containing the sixteen stimulus items. The pictures were displayed on a 14-inch color monitor. (See Appendix B for the instructions given to the participants)

Free Recall Memory Test

After studying the picture for one minute, participants were given a free recall memory test. In this test, they were instructed to write down a list of as many of the items as they could remember from the picture of the room that they have seen. Participants completed this test at self-pace. While the participants were completing the free recall test, the experimenter substituted the picture that participants studied earlier to a slightly different picture of the room for the recognition memory test.

Recognition Memory Test

Two different pictures for each setting were used in the recognition test. Both pictures consisted of the sixteen stimulus items, half old and half changed new items. Four of the old items and four of the new items were consistent and the other half was inconsistent. However, in each picture, different sets of old and changed new items were used. The presentation of the old and changed items in the pictures was counter balanced across room settings and study conditions. Participants were arbitrarily tested on either one of the two recognition pictures.

After completing the free recall test, participants were given a recognition memory test. In this following test, participants were asked to look at the picture of the room again. This time they were instructed to look at each of the sixteen items (as listed in the recognition task sheet given to them) in the picture and decide if it was the same as the original item or changed. They were asked to circle their corresponding response on the sheet. A changed item was defined as the one that has the same kind of item as the original but look physically different from the corresponding original item. For the purpose of this test, participants were provided with a sheet of recognition memory test,

which contains a list of all sixteen stimulus items, arranged randomly (Refer to Appendix C).

RESULTS

Recall test

The recall data were scored in terms of the number of the consistent and inconsistent items correctly recalled. One point was given to each item correctly recalled, up to a maximum of 8 points for each group of consistent and inconsistent items.

The mean numbers of consistent and inconsistent items correctly recalled under full and divided attention in the two different settings, and also the strength of consistency effect in each condition were calculated across subjects and are presented in Table 1.

Table 1. *Mean Correct Recall Data*

Setting	Types of Attention	Consistent Items (A)	Inconsistent Items (B)	The strength of consistency effect (B-A)
Graduate Student	Full	4.5	5.1	0.6
Office	Divided	2.3	3.0	0.7
Preschool	Full	4.4	4.9	0.5
Classroom	Divided	2.1	3.4	1.3

As seen from the first four columns in Table 1, overall recall was lower under divided attention condition. Inconsistent items were better recalled than consistent items across attention conditions and settings. The consistency effect was clearly observed here.

A three-way analysis of variance (ANOVA) was carried out on the correct recall data. The ANOVA considered two between subject factors, setting (graduate student office versus preschool classroom) and attention (full attention versus divided attention), and one within subject factor, consistency (consistent items versus inconsistent items). The analysis revealed significant main effects of attention, $F(1, 36) =$

37.1, $p < .001$ and consistency $F(1, 36) = 5.1$, $p = 0.03$. The main effect of setting was non-significant, $F(1, 36) = 0.006$, $p = 0.94$.

None of the two-way interaction between main effects; consistency and setting, $F(1, 36) = 0.13$, $p = 0.72$; consistency and attention, $F(1, 36) = 0.43$, $p = 0.52$; and attention and setting, $F(1, 36) = 0.14$, $p = 0.71$ were significant. The three-way interaction of main effects was also non-significant, $F(1, 36) = 0.26$, $p = 0.61$.

In conclusion, the statistical results revealed only two significant effects—that is from the two main factors, attention and consistency. The other main factor, setting and the interactions of any of the factors were not significant. The main effect of attention tells that the type of attention used in the experiment had a significant influence on participants' recall ability of the stimulus items regardless of which settings they were involved in and the types of item (i.e. consistent versus inconsistent items) they recalled. On the other hand, the main effect of consistency indicates that if the types of attention and settings are ignored, participants still recalled inconsistent items better than consistent items significantly differently. Additionally, the numerical values in the last column, which represent the strength of consistency effect in each of the condition, reveal that in both settings, the consistency effects were greater under divided attention condition than under full attention condition.

Recognition test

The recognition data were scored in terms of the number of the consistent and inconsistent items correctly recalled. One point was given to each item correctly recalled, up to a maximum of 8 points for each group of consistent and inconsistent items.

The mean numbers of consistent and inconsistent items correctly recognized under full and divided attention in the two different settings, and also the strength of consistency effect in each condition were calculated across subjects and are presented in Table 2.

Table 2 reveals that overall recognition was lower under the divided attention condition. Inconsistent items were better recognized than consistent items under divided attention condition. Under full attention condition, the inconsistent items were better recognized than consistent items in the preschool classroom setting only. In the graduate office

setting, the means for inconsistent items and consistent items correctly recognized were same ($M=6.8$).

Table 2. *Mean Correct Recognition Data*

Setting	Types of Attention	Consistent Items (A)	Inconsistent Items (B)	The strength of consistency effect (B-A)
Graduate Student	Full	6.8	6.8	0
Office	Divided	4.6	5.5	0.9
Preschool	Full	6.3	6.7	0.4
Classroom	Divided	4.5	5.5	1.0

A three-way analysis of variance (ANOVA) was performed on the correct recognition data. The ANOVA considered two between subject factors, setting (graduate student office versus preschool classroom) and attention (full attention versus divided attention), and one within subject factor, consistency (consistent items versus inconsistent items). The analysis of ANOVA conducted on the recognition data showed a comparable pattern of results to the one reported on the recall data. The analysis revealed significant main effects of attention, $F(1, 36) = 17.5, p < .001$ and consistency $F(1, 36) = 4.7, p = 0.04$. The main effect of setting was non-significant, $F(1, 36) = 0.2, p = 0.66$.

None of the two-way interaction between main effects were significant; consistency and setting, $F(1, 36) = 0.13, p = 0.64$; consistency and attention, $F(1, 36) = 2.0, p = 0.17$; and attention and setting, $F(1, 36) = 0.1, p = 0.75$. The three-way interaction of main effects was also non-significant, $F(1, 36) = 0.08, p = 0.78$.

In conclusion, the statistical results revealed only two significant effects-that is from the two main factors, attention and consistency. The other main factor, settings and the interactions of any of the factors were not significant. Additionally, the numerical values in the last column, which represent the strength of the consistency effect in each of the condition, reveal that in both settings, the consistency effects were greater under divided attention condition than under full attention condition.

DISCUSSION

Consistent with many of the prior researches, participants were more likely to recall and recognize inconsistent items than consistent items.

Recall test

As it can be seen in Table 1, consistency effect was reported across all settings and attention conditions in the recall data. That is, participants recalled inconsistent items more frequently than consistent items. In both settings, participants under full attention condition, when tested later, recalled inconsistent items better than consistent items. Similarly, participants under divided attention condition, when tested later, also recalled inconsistent items better than consistent items.

As compared specifically to Pezdek et al.'s (1989) study, overall recall in the present study replicates the consistency effect reported by Pezdek et al. That is, items inconsistent with expectations were recalled better than items consistent with expectations. This finding follows the trend that has been reported by Bobrow and Norman (1975), Loftus and Mackworth (1978) and Friedman (1979).

Bobrow and Norman (1975) reported that the depth of processing required for unexpected information is greater than expected information. This has led to the inconsistent items being better remembered than consistent items. As in the present study, items such as ashtray and laptop for instance, which were inconsistent with expectation about the preschool classroom setting, would require deeper processing than items such as the blocks, toy vehicle and plastic ball, which were consistent with the expectations about such a room. As consistent items would have been given not much processing, therefore they were not recalled well as inconsistent items. This explanation is further supported by the schema-theoretic explanation of the consistency effect as reported by Loftus and Mackworth (1978) and Friedman (1979). That is, memory is better for unexpected items than expected items because unexpected items require capacity-demanding, feature-analytic processing whereas, the processing of expected items involves a relatively automatic activation of schematic knowledge structures. According to Loftus and Mackworth (1978), informative objects which have a low priority of being in the picture, were remembered better than non-informative objects which have a high priority of being in the picture, due to the fact that these informative objects were fixated earlier and more often than non-informative objects. As in the present study, participants who studied the picture of

a graduate student office, would have fixated inconsistent items for instance, a stuffed bear, earlier and more often than consistent items for instance, a textbook.

Nevertheless, when the level of attention was reduced by means of dual task requirements under the divided attention condition, it seemed that the consistency effect was increased and this finding was true in both settings, as can be seen in the last column of Table 1. The numerical values in the last column in Table 1 represent the strength of the consistency effect. The greater the value, the bigger the consistency effect is. In the graduate student office setting, the strength of the consistency effect was slightly greater under divided attention condition (represented by the numerical value of 0.7) than under full attention condition (represented by the numerical value of 0.6). In the preschool classroom setting, the strength of the consistency effect was also greater under divided attention condition (represented by the numerical value of 1.3) than under full attention condition (represented by the numerical value of 0.5). That is, the difference between the numbers of inconsistent items recalled to the number of consistent items recalled was much greater under divided attention condition than under full attention condition. It seemed that, reducing the level of attention under the divided attention condition has increased the consistency effect. The finding from the present study indicated that the consistency effect was influenced and affected by the types of attention conditions manipulated in the experiment.

Furthermore, regardless of the setting and consistency factors, the dual-task requirements in the divided attention condition, apparently did affect participants' performance in the recall task. This can be seen clearly from Table 1, in both room settings, regardless whether the items were consistent or inconsistent with expectations of the room setting, in overall, the means show that the number of items recalled under divided attention condition were smaller than the number of items recalled under full attention condition. This finding was in accordance with the significant main effect of attention reported in the statistical analysis results. When studying the picture under divided attention condition, participants' attention was now divided, as they had to perform the secondary task at the same time, which was to listen to the series of random digits. This finding was in agreement with the prediction made earlier.

Recognition test

Overall recognition in the present study also replicates the consistency effect reported in the Pezdek et al.'s (1989) study. As it can be seen in Table 2, in the preschool setting, participants recognized inconsistent items better than consistent items both under full and divided attention conditions. In the graduate student office setting, participants also recognized inconsistent items better than consistent items under divided attention, but they perform equally well in recognizing inconsistent and consistent items under the full attention condition.

As compared to the recall data, overall recognition data shows that participants had performed better in the recognition test than in the recall test. All means reported in the recognition test (see Table 2) were higher than means reported in the recall test (see Table 1) across all conditions. These results were in agreement with what have been reported by Friedman (1979) in her study, that is, in a recognition test, participants were more likely to accurately detect the changes made to inconsistent items than in consistent items in the picture.

In accordance with the explanation on the consistency effect given by Loftus and Mackworth (1978) and Friedman (1979), participants recognized inconsistent items better than consistent items in the picture. According to Friedman's (1979) explanation, to make recognition on a consistent item in the picture, participants would first need to activate an appropriate scene frame to verify and detect the item. This is what Friedman (1979) called a feature detection process. Thus, consistent items processed only to the extent that is necessary to activate the scene frame with little analysis of the physical appearance consistent items. However, to process an inconsistent item, a further feature analysis is required which involves a more elaborative analysis of their meaning and physical features of the inconsistent items. Because of the need for deeper processing in inconsistent items, a longer period of time is required to process inconsistent items than to process consistent items. This has led to a better memory for inconsistent items than consistent items when performing in the recognition test.

As can be seen from Table 2, the strength of the consistency effect under the full attention condition in the graduate office setting is represented by the value of 0. This numerical value of 0 indicates that no consistency effect was reported in this condition as participants performed equally well in recognizing consistent and inconsistent items. Nevertheless, the consistency effect was observed clearly under divided attention condition in the graduate student office setting (represented

by the numerical value of 0.9). In the preschool classroom setting, the consistency effect was greater under divided attention condition (represented by the numerical value of 1.0) than under full attention condition (represented by the numerical value of 0.4). That is, the difference between the numbers of inconsistent items recognized to the number of consistent items recognized was much greater under divided attention condition than under full attention condition. Comparable to what have been reported on the recall data, the recognition data revealed nearly a similar pattern of the impact of manipulation of attention on consistency effect. However, there is a larger numerical effect in the recognition data as compared to what have been reported in the recall data. This trend is clearly depicted in both settings in the recognition data than in the recall data. Overall, greater consistency effect was clearly observed under divided attention condition in both settings. Consistency effect was increased under divided attention condition as compared to what had been reported under full attention condition.

Furthermore, regardless of the setting and consistency factors, participants' level of performance in recognizing items were lower under full attention condition than under divided attention condition. As can be seen from Table 2, the means show that the number of items recognized under divided attention condition were smaller than the number of items recognized under full attention condition. This finding was in accordance with the significant main effect of attention reported in the statistical analysis results. Participants' recognition memories of the items regardless of its type, whether consistent or inconsistent with the room setting, were better under full attention condition than under divided attention condition, across all settings. This finding was also in agreement with the prediction made earlier, that is, generally participants will perform better under full attention condition than under divided attention condition.

Overall, the results of the present study generalises the consistency effect reported in Pezdek et al.'s (1989) study. Examination on participants' memory for objects in a room shows that, participants remembered items inconsistent with expectation about the room setting better than items consistent with expectation about the room setting. Additionally, participants performed better in recalling and recognizing the item, regardless of its type (consistent items or inconsistent items) under full attention condition than under divided attention. The present study also reveals how the manipulation of attention affected the

consistency effect reported in each condition. By reducing the level of attention, consistency effect was increased. Finally, the present study generalised the findings of consistency effect in memory for pictures as had been reported in some earlier studies. As the results from this study shows that recall and recognition are better under full attention condition than under divided attention condition, it is suggested that some learning activities that demand one to memorize the learnt materials, are best done under full attention condition to ensure a better memory performance. Besides that, consistency factor might also be considered in certain conditions such as in creating a creative and fun learning activity especially for small children. For instance, introducing biscuits of various fruit shapes such as banana and apple to replace the ordinary square and circle-shaped biscuits during meal times, perhaps could attract children's attention more as these fruit shapes are inconsistent with the ordinary shapes of a biscuit they are used to seeing and eating. This would not just increase the children's appetite to eat but might also lead them to remember better those different kinds of fruits.

In future research, it would be interesting to investigate further how the manipulation of attention could affect people's ability to recall and recognize items. From the findings in the present study it is thought that the different stages of manipulation of attention could give a different impact on the consistency effect. For instance, in the present study, the task -monitoring the sequences of three consecutive odd numbers, was implemented as a means to reduce participant's attention while studying the picture of the room. What will happen if this task is changed to a more difficult one? It is predicted that participants' attention towards the picture of the room they are required to study will be reduced to a level, which is lower than what had been experienced by the participants in the present study. What would be the impact of the manipulation of a lower level of attention to the consistency effect then? It is predicted that the manipulation of a lower level of attention will cause a greater consistency effect in the recall and recognition data than what have been reported in the present study. The difference between the numbers of inconsistent items recalled/recognized to the number of consistent items recalled/recognized perhaps will be much greater under divided attention condition than under full attention condition as compared to the present study.

REFERENCES

- Baroni, M.R., Job, R., Mainardi Peron, E., & Salmasso, P. (1980). Memory for natural settings: Role of diffuse and focused attention. *Perceptual and Motor Skills, 51*, 883-889.
- Bobrow, D.G., & Norman, D.A. (1975). Some principles of memory schemata. In Bobrow, D.G. & Collins, A.M. (Eds.), *Representation and understanding: Studies in cognitive science*. New York: Academic Press, 1975.
- Brewer, W.F., & Treyens, J.C. (1981). Role of schemata in memory for places. *Cognitive Psychology, 13*, 207-230.
- Friedman, A. (1979). Framing pictures: The role of knowledge in automatized encoding and memory for gist. *Journal of Experimental Psychology: General, 108*, 316-355.
- Hastie, R., & Kumar, P.A. (1979). Person memory: Personality traits as organizing principles in memory for behaviors. *Journal of Personality and Social Psychology, 37*, 25-38.
- Lampinen, J.M., Farries, J.M., Neuschatz, J.S., Toggia, M.P. (2000). Recollections of things Schematic: The influence of scripts on recollective experience. *Applied Cognitive Psychology, 14*, 543-554.
- Light, L.L., Kayra-Stuart, F., & Hollander, S. (1979). Recognition memory for typical and unusual faces. *Journal of Experimental Psychology: Human Learning and Memory, 5*, 212-228.
- Loftus, G.R., & Mackworth, N.H. (1978). Cognitive determinants of fixation location during picture viewing. *Journal of Experimental Psychology: Human Perception and Performance, 4*, 565-572.
- Mandler, J.M., & Parker, R.E. (1976). Memory for descriptive and spatial information in complex pictures. *Journal of Experimental Psychology: Human Learning and Memory, 2*, 38-48.
- Pezdek, K., Whetstone, T., Reynolds, K., Askari, N., & Dougherty, T. (1989). Memory for real-world scenes: The role of consistency with expectation. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 15*, 587-595.

APPENDIX A

Stimulus Items Used in the Experiment

Items consistent with preschool classroom and inconsistent with graduate student office.

1. Stuffed bear
2. Plastic ball
3. Toy truck
4. Blocks
5. Coloring book
6. Coloring set
7. Board game
8. Painted picture

Items consistent with graduate student office and inconsistent with preschool classroom

1. Clock radio
2. Jug kettle
3. Textbook
4. Ashtray
5. Desk lamp
6. Calculator
7. Laptop
8. Beer bottle

APPENDIX B

Instructions

Under Full Attention Condition

In a minute, you will be shown a picture of a graduate student office/preschool classroom. I want you to study the picture carefully as I am going to ask you some questions afterward about the picture you will see. You will be given one minute to study the picture.

Under Divided Attention Condition

In a minute, you will be shown a picture of a graduate student office/preschool classroom. I want you to study the picture carefully as I am going to ask you some questions afterward about the picture you will see. You will be given one minute to study the picture. In addition, you will be listening to a series of random digits simultaneously. I want you to report the occurrence of every sequence of two consecutive odd numbers by tapping the table in front of you. It is important not to miss any sequences of the two consecutive odd numbers as I will monitor your accuracy. You will be prompted if any sequences are missed.

APPENDIX C

Recognition Test Answer Sheet

Instruction

Look at each item as listed below in the picture and decide if it was the same as an original item or changed. Circle your answer.

Note: A changed item is the one that have the same name as an original but look physically different from the corresponding original item.

	<i>Items</i>	Your answer is	
1	Stuffed bear	Same	Changed
2	Plastic ball	Same	Changed
3	Toy vehicle	Same	Changed
4	Blocks	Same	Changed
5	Coloring set	Same	Changed
6	Board game	Same	Changed
7	Painted picture	Same	Changed
8	Coloring book	Same	Changed
9	Clock radio	Same	Changed
10	Jug kettle	Same	Changed
11	Textbook	Same	Changed
12	Ashtray	Same	Changed
13	Desk lamp	Same	Changed
14	Calculator	Same	Changed
15	Laptop	Same	Changed
16	Beer bottle	Same	Changed