Effects of Transfer Appropriate Processing in Short Term Memory

Nathaniel Lashley, Miranda Thomas, Gracie Romberg, Brittany Morton

INTRODUCTION: KEY TERMS

- **Transfer Appropriate Processing**: theory that suggests memory retrieval will be better if the encoding method matches the retrieval method
- **Encoding**: process of coding information so it can be put in sensory, short-term, or long-term memory
    - **Deep Encoding**: processing information based on meaning
    - **Shallow Encoding**: processing information on a superficial basis (how the information looks, sounds, etc)
- **Retrieval**: process of transferring memory from storage to consciousness, either by methods of recognition or recollection (recall)
    - **Recall**: method of retrieval used given the context but not the target (our focus)
    - **Recognition**: method of retrieval used given the context and the target and having to verify its presence

INTRODUCTION: PRIOR RESEARCH

Transfer-Appropriate Processing in Recognition Memory: Perceptual and Conceptual Effects on Recognition Memory Depend on Task Demands

Colleen M. Parks

- This article focuses on the transfer appropriate processing effects (as well as the effects of the dual process theory) on recognition rather than recall as the retrieval method, but the principles observed can still be applied to our study, which focuses on recall.

** dual process theory: combination of recognizing information based on familiarity and explicit recollection **

INTRODUCTION: PRIOR RESEARCH HIGHLIGHTS

- **Their Hypothesis**: Perceptual (sensory) features seem to influence recognition when a response relies on familiarity, or in other words, when superficial features are important to the test
    - A task that uses sensory processing for discriminating information should show greater perceptual effects and smaller conceptual (meaning-related) effects than standard recognition
- **Their Procedure**: They crossed levels of processing (5 levels) with a modality manipulation (4 levels- 2 for auditory and 2 for visual) and examined those effects in four different recognition tests that varied in their perceptual processing methods (visual and auditory)
    - Increasing response speed also was effective to lessen the use of recollection on a recognition test and increases reliance on familiarity (verifying yes/no)
- **Their Results**: The observed levels of processing effect decreased and the effect of modality increased when tests required perceptual emphasis
    - These results support the idea that superficial features influence performance on recognition tests when they are made more noticeable by the task requirements

INTRODUCTION: PRIOR RESEARCH TABLE

Table 1
Memory Performance

Test	Hits and false alarms				
	Auditory		Visual		
	Deep	Shallow	Deep	Shallow	New
Standard	0.81 (0.12)	0.57 (0.16)	0.84 (0.13)	0.54 (0.14)	0.13 (0.10)
Degraded	0.78 (0.16)	0.55 (0.18)	0.84 (0.14)	0.59 (0.17)	0.17 (0.14)
Speeded	0.64 (0.18)	0.56 (0.19)	0.72 (0.20)	0.62 (0.19)	0.35 (0.22)
Speeded–degraded	0.59 (0.16)	0.55 (0.14)	0.68 (0.18)	0.58 (0.19)	0.37 (0.19)
Fragment completion	0.45 (0.12)	0.44 (0.14)	0.56 (0.13)	0.52 (0.13)	0.33 (0.11)

Note. Means (standard deviations in parentheses) for the recognition tests are mean hits and false alarms. Means (standard deviations in parentheses) for the fragment completion test are the proportion of items completed with the target.

- Essentially, memory performance decreased significantly when using deep recognition processing for tests with more fragmented information/in less time, and memory performance did not change very much when using shallow recognition processing for tests because they did not require as much effort. These are significant for both modality conditions (visual and auditory)

INTRODUCTION- HYPOTHESIS

- **Our Hypothesis**: Short term memory will be more efficient when the subjects recall the target words using similar encoding processes rather than different ones.
    - Here, subjects will recall the target words based upon how they sound, so their memory will perform more efficiently when they encode the words using the same shallow processes (the associated words rhyme) rather than when they encode using deep processes (words associated by meaning).
    - Our experiment tests this theory with a One Independent Variable Repeated Measures Design (2 levels of encoding processes)
        - Independent Variable (IV): encoding process
            - Deep Encoding: focus on words based on meaning
            - Shallow Encoding: focus on words based on how they sound
        - Dependent Variable (DV): scores on tests

METHODS- PARTICIPANTS

- 40 participants in total
- Participants were chosen via random assignment
- Age of participants ranged from 18 to 70 years old
- Average age of each participant was 31 years old
- Majority of the participants were females

METHODS- MATERIALS

- Computer with the 2 tasks in power point form
- Half sheet of paper to answer questions
- Pencil
- Timer/Stopwatch

METHODS- PROCEDURE

1. First, we randomly selected people and asked them if they were willing to participate an entirely anonymous 10 minute study
2. Next, they were given a half sheet of paper and asked to fill out their age and gender
3. On both sides of the half sheet of paper numbers 1-5 were listed
4. They were then given brief instructions on how the experiment will be conducted and what was expected of them
5. They were shown a series of 10 words and word associations to remember. The word to recall was bolded and upper cased. They did not have to write anything down for the first part of this experiment

6. They were given 5 seconds to view each slide with the words on it

7. After viewing the 10 words at 5 seconds per slide the participants were given a 10 second pause before being asked to recall anything

8. After the pause, they were given a series of statements to complete (fill in the blank) with the target words from the previous activity on the provided paper. Basically they were shown the associative words and asked to recall the bolded word based on the associated word.

9. They were shown 5 fill in the blank statements and on the half sheet of paper with the numbers listed 1-5 they were asked to write down the target word for that slide

10. Each participant underwent this process twice, one for shallow encoding and one for deep encoding

11. Experimenters graded according to number of correct answers

Example word associations

SHEET-beet

Example question

_____ rhymes with “cheat”

RESULTS

Our results were significant meaning we to reject the null. Short term memory seems to be significantly more efficient when using similar encoding processes to retrieve the target words

$t(39) = 4.523$, $p = .001$

Condition 1 $M = 2.800$ $SD = 1.0427$

Condition 2 $M = 3.675$ $SD = 1.0952$

DISCUSSION

- **Summary of major findings**: Our test showed that it was easier to retrieve (recall) information when the subject used the same processes when they encoded information.
    - We found shallow encoding was the appropriate method to use when recalling information using this particular method of retrieval, which required the subject to recall the words not associated by meaning, but with rhyming.
- **Interpretation of each finding as related to the study's hypothesis**: Our hypothesis was based on the transfer appropriate processing theory, which is a model suggesting memory retrieval will improve when the encoding method matches the retrieval method. Our findings support this theory.

DISCUSSION

- **Descriptions of how the study's findings relate to the study's purpose(s), question(s), prediction(s):** Our test showed when our subject recalled based on how they sounded (rhyming), their memory was more efficient when they encoded originally using that same processing, compared to when they encoded the words based upon the meaning of the words.
    - This supports our original hypothesis which we modeled after the transfer appropriate processing theory.
- **Comparisons with results of the study described in the Introduction:** In the article "Transfer- Appropriate Processing in Recognition Memory: Perceptual and Conceptual Effects on Recognition Memory Depend on Task Demands," written by Collen. M Parks, participants generally recognized information quicker when the perceptual processes at encoding were similar to the ones used at the retrieval stage and required less effort and time.
    - This supports the data we found in our study which showed that our subject recalled based on how they sounded (aka rhyming), the subjects memory was more efficient when they encoded originally using that same processing, compared to when they encoded the words based upon the meaning of the words.

DISCUSSION

- **Overall conclusions about our study:** Knowing this information about encoding and retrieval processes, we can apply this research to other fields of study and help students create more effective study methods that will follow them for the rest of their lives.

DISCUSSION

- **Limitations:**
  - Possibility of an order effect: the first condition (deep encoding) was administered prior to the second condition (shallow encoding) and that could have affected how well the subject would perform on the second condition.
    - The order effect: differences in participants' responses resulting from the order (e.g. first, second, third) the experimental materials are presented to them.
  - Recalling information may be affected by how recently one has been required to engage in this sort of testing, aka how long has it been since you have been in school.
    - It is quite possible that adults who have been out of school for years will do worse on these tests than current students or students recently graduated. That would be something to look at in further research.
  - The environment subjects are in when they take this test may play a role in how well they recall.
    - We found that people who took the test in a loud environment or if they were taking the test in a place they were distracted such as in front of the TV their scores were lower. We would have to do further tests to see if this was significant but it is a hypothesis we developed.

DISCUSSION

- **Implications for future research:** Moving forward, if we were to continue with this study we would run tests to observe the limitations in our current study.
    - We could test the differences with age and recall, and the differences with gender and recall. Both of those would be fascinating to test and see if there are significant differences which how genders recall information and how different age groups do.

TABLES AND FIGURES: Table

Table 1: Paired Samples T test for condition 1 and condition 2

		Condition 1: deep encoding		Condition 2: Shallow encoding
	n	*M(SD)*	*n*	*M(SD)*
Scores	40	2.800(1.0427)	40	3.675(1.0592)

TABLES/FIGURES: Figure

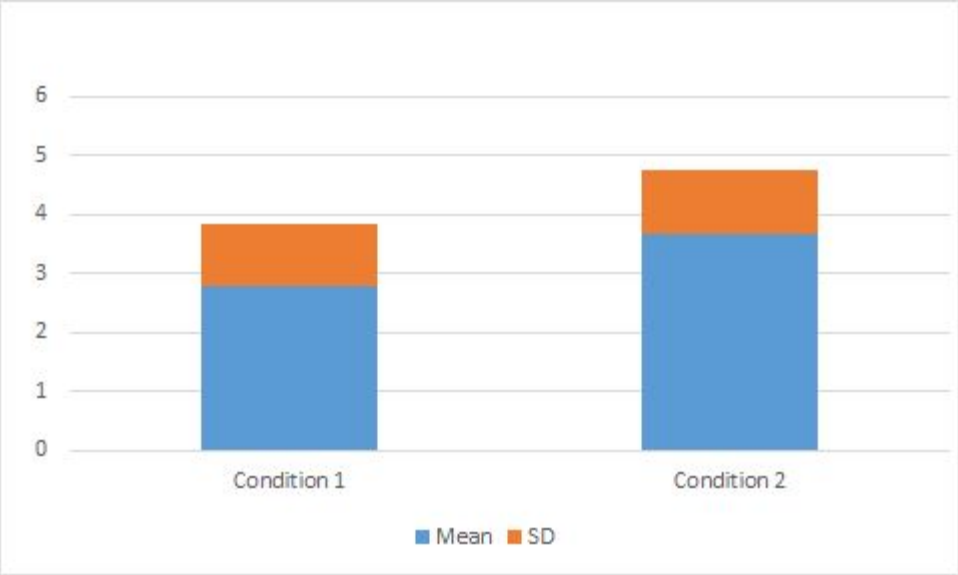

Figure 1: Means and Standard Deviations of Each Condition's Scores

REFERENCES

Bernstein, Douglas A., Louis A. Penner, Alison C. Stewart, and Edward J. Roy. "Chapter 7: Memory." *Psychology*. 6th ed. N.p.: n.p., n.d. N. pag. Cengage Learning. http://college.cengage.com/psychology/bernstein/psychology/6e/students/key_terms/ch07.html

Parks, C. M. (2013). Transfer-appropriate processing in recognition memory: Perceptual and conceptual effects on recognition memory depend on task demands. *Journal Of Experimental Psychology: Learning, Memory, And Cognition*, *39*(4), 1280-1286. doi:10.1037/a0030911