CogLab: The Online Cognition Lab

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CogLab is an analog of biology, chemistry, and physics labs. Students participate in classic and current experiments from all areas of cognition via a web browser. Importantly, at the end of the lab, the student can see his/her own results, the means for the class, and the global means of every student who has participated. These results appear with a "debriefing" that explains not only the data, but the implications for cognition.

Students using CogLab need three pieces of information to set up a CogLab account.

1. A group name. This is provided by your instructor.
2. A group password. This is also provided by your instructor.
3. A valid registration code. This usually comes bundled with a textbook, or you can purchase it separately. A registration code is made up of 16 letters and numbers, and will look something like this: sjkq8b632dvhd4u0.

You may also be able to purchase an older CogLab registration code that is made up of 11 letters and numbers. This registration code will also work, as long as it was not previously used to set up a different account. **Each CogLab registration code can only be used one time, so do not purchase a used code!**

Most of the information you need to about using CogLab is provided on the web site at

coglab.cengage.com

If you have any questions or problems, please contact tech support on the CogLab site (under the HELP menu).

The remainder of this manual provides some questions that might help students to think further about the experiments, their data, and how the findings relate to other aspects of cognition. They are ordered to match the experiment listings on the web site.

SENSATION

Signal Detection

Basic Questions

1. Define the following terms in relation to signal detection theory: hit, miss, false alarm, and correct rejection.

2. Compare your individual sensitivity measures for each of the three conditions with those of the global average. Are your sensitivity measures higher or lower than the global average? What does this mean?

3. If an individual's hit rate is .79 and his/her correct rejection rate is .71, what is his/her miss rate and his/her false alarm rate?

Advanced Questions

1. While going over some experimental results from a signal detection study you notice an individual's hit rate is .98. What does this tell you about his/her sensitivity measure?

2. Signal detection theory assumes that a signal is always accompanied by a certain amount of noise. Identify at least two sources of noise for the detection of an audio signal.

3. Name at least three jobs that must accurately detect signals to effectively do the job. This means that signal detection methods could be used to evaluate performance.

Discussion Question

1. The C statistic is also known as the response criterion. This is the amount of evidence an individual requires to make a target-present response. What does a negative C statistic mean? What does a positive C statistic mean? What factors can influence someone's response criterion?

Additional References

Santhi, N., & Reeves, A. (2004). The roles of distractor noise and target certainty in search: A signal detection model. *Vision Research, 44*, 1235-1256.

Maylor, E., & Rabbitt, P. (1987). Effect of alcohol on rate of forgetting. *Psychopharmacology, 91*, 230-235.

Kerkhof, G., & Uhlenbroek, J. (1981). P3 latency in threshold signal detection. *Biological Psychology, 13*, 89-105.

Simple Detection

Basic Questions

1. Why is detecting a green dot instantaneous?

2. Suppose another experiment had participants say the word "now" as soon as they detected the green circle, and that the response times were between 100 and 200 milliseconds. What would you conclude about the cognitive tasks involved in these two versions of simple detection?

3. Sometimes a participant in this lab has a response time that is less than 100 milliseconds. How might you explain such very short responses?

Advanced Questions

1. Sometimes people find that a computer game they enjoy playing on a laptop or desktop computer is not as much fun on a tablet. How might the findings of this lab be related to this observation?

2. How might you alter the lab to make the response times even slower?

Discussion Question

1. In major league baseball, the pitcher may throw the ball at 95 mph. This means that it takes about 400 milliseconds for the ball to leave the pitcher's hand and arrive at the plate. Given what you know about response times from this lab, speculate on how a major league hitter might be able to hit the ball.

Additional References

Proctor, R. W. & Van Zandt, T. (2008). *Human Factors in Simple and Complex Systems, 2nd Edition.* CRC Press: Boca Raton, FL.

Warm, J. S., Parasuraman, R. & Matthews, G. (2008). Vigilance requires hard mental work and is stressful. *Human Factors, 50*, 433-441.

Rach, S. Diederich, A. & Colonius, H. (2011). On quantifying multisensory interaction effects in reaction time and detection rate. *Psychological Research, 75*, 77-94.

PERCEPTION

Apparent Motion

Basic Questions

1. What is an ISI? How does it relate to apparent motion?

2. Using your personal data, which dot distance did you assign the shortest ISI? Which distance did you assign the longest ISI? Describe the relationships between the dot distances and the ISIs you assigned (linear, exponential, logarithmic, etc.).

3. What does one experience when an ISI is too slow? What does one experience when an ISI is too fast?

Advanced Questions

1. Using your personal data, what would you predict your optimal ISI to be if the flashing dots had a distance of 300 pixels? Make a prediction for the group data as well.

2. Name two things that use apparent motion that are not already mentioned in the text.

3. Apparent motion is dependent on factors other than ISI. Describe the various factors that would affect one's ability to perceive apparent motion. For each factor you identify, describe a situation in which it would facilitate apparent motion perception and one in which it would impair apparent motion perception.

Discussion Question

1. Describe some of the properties and/or limitations of the visual system that are consistent with the finding that apparent motion is often perceived in the same way as real motion.

Additional References

Muckli, L., Kiregeskorte, N., Lanfermann, H., Zanella, F., Singer, W., & Goebel, R. (2002). Apparent motion: Event-related functional magnetic resonance imaging of perceptual switches and states. *Journal of Neuroscience, 22*, 3342-3444.

Koriat, A. (1994). Object-based apparent motion. *Perception & Psychophysics, 56*, 392-404.

Anstis, S., Giaschi, D., & Cogan, A. (1985). Adaptation to apparent motion. *Vision Research, 25*, 1051-1062.

Garner Interference: Integral Dimensions
Garner Interference: Separable Dimensions

Basic Questions

1. Which version of the experiment did you complete (integral, separable)? Did you find some trials were more difficult than others?

2. Look at the global data for the integral version of the experiment. Using what you know about Garner Interference, do the data follow the predicted pattern? Explain your answer.

3. According to the ideas presented on Garner Interference, what determines whether two stimulus dimensions are integral or separable?

Advanced Questions

1. Using your trial-by-trial data, compute your standard deviation for the baseline and filtering conditions.

2. You are planning on painting your living room, so you go to the local hardware store to buy some paint. You want a color that gives you a perception of a specific kind of blue. The sales clerk lets you brush some of the paint you are interested in on an available piece of drywall. The color matches exactly what you had in mind. Can you now purchase the paint with confidence? Why or why not?

Discussion Question

1. What can the typical findings with Garner Interference tell us about people's perceptual judgments? Explain.

Additional References

Patching, G., & Quinlan, P. (2002). Garner and congruence effects in the speeded classification of bimodal signals. *Journal of Experimental Psychology: Human Perception and Performance, 28,* 755-775.

Huettel, S., & Lockhead, G. (1999). Range effects of an irrelevant dimension on classification. *Perception & Psychophysics, 61*, 1624-1645.

Melara, R. (1989). Dimensional interaction between color and pitch. *Journal of Experimental Psychology: Human Perception and Performance, 15*, 69-79.

Müller-Lyer Illusion

Basic Questions

1. How difficult did you find this task? How accurate do you think you were in this task? Looking at your individual data, do your results support the feelings you had about your performance? Explain.

2. When the line without wings and the line with wings were the same size, how often did you report the line without wings as being bigger?

3. What is the method of constant stimuli? How is it different from other psychophysical methods?

Advanced Questions

1. Describe what your data would look like if you suppose that the wings of the comparison line were drawn inward instead of outward in this demonstration.

2. In this demonstration, the method of constant stimuli was used to measure the effect of a particular type of illusion. What else could this method be used to measure?

3. Compare your data with the global data. Did you show more or less of an illusory effect than the average participant? (Use an objective means of comparison.) Explain how you came to your conclusion.

Discussion Question

1. Experience teaches us to expect certain perceptual relationships among stimuli. Illusions often take advantage of these expectations. Think of an everyday situation that could partly explain the Müller-Lyer illusion.

Additional References

Predebon, J. (2005). A comparison of length-matching and length-fractionation measures of Müller-Lyer distortions. *Perception & Psychophysics, 67*, 264-273.

Welch, R., Post, R., Lum, W., & Prinzmetal, W. (2004). The relationship between perceived length and egocentric location in Müller-Lyer figures with one versus two chevrons. *Perception & Psychophysics, 66*, 1095-1104.

Morikawa, K. (2003). An application of the Müller-Lyer illusion. *Perception, 32*, 121-123.

Brosvic, G., Dihoff, R., & Fama, J. (2002). Age-related susceptibility to the Müller-Lyer and the horizontal-vertical illusions. *Perceptual and Motor Skills, 94*, 229-234.

Visual Search

Basic Questions

1. Did you find the feature search or the conjunctive search to be more difficult? Why?

2. A common observation within visual search tasks, such as the one in this demonstration, is that the conjunctive absent condition takes about twice as long as the conjunctive present condition. Why would this be the case?

3. Why does increasing the number of distractors typically slow reaction times in a conjunctive search but not in a feature search?

Advanced Questions

1. Identify two products/items in which applying the concepts of visual search would be useful.

2. Visual search is a process we use many times throughout the day. Go back through your day and identify a few of the instances in which you had to employ a visual search process.

3. For each of the instances you identified in advanced question two, identify the features of your target and categorize them as unique to the target or shared by the distractors. How many distractors were there? How long did your search take and was this search time consistent or inconsistent with the predictions of visual search?

Discussion Question

1. What role does attention play in visual search?

Additional References

Herd, S. & O'Reilly, R. (2005). Serial visual search from a parallel model. *Vision Research, 45*, 2987-2992.

Bichot, N., Rossi, A. & Desimone, R. (2005). Parallel and serial neural mechanisms for visual search in macaque area V4. *Science, 308*, 529-534.

Wolfe, J. (1994). Guided search 2.0: A revised model of visual search. *Psychonomic Bulletin & Review, 1*, 202-238.

ATTENTION

Attentional Blink

Basic Questions

1. What is the main function of attention?

2. What does attentional blink tell us about attention?

3. Human behavior is often broken down into three stages: perception, cognition, and response execution. With what stage is attentional blink associated?

Advanced Questions

1. Use your personal data plot to calculate your attentional blink (in ms) for this activity. Do the same for the global data.

2. What are some occupations in which a workers' performance could be adversely affected by attentional blink?

3. Using the occupations identified in question 2, what types of problems/mistakes might occur?

Discussion Question

1. In this demonstration, letters were used as targets. The target used can influence the duration of one's attentional blink. What other targets could have been used for this experiment? Predict the effects each of these targets would have on the duration of one's attentional blink as compared to the activity you recently completed. Explain the reasoning behind your predictions.

Additional References

Dell'Acqua, R., Jolicoeur, P., Pesciarelli, F., Job, R., & Palomba, D. (2003). Electrophysiological evidence of visual encoding deficits in a cross-modal attentional blink paradigm. *Psychophysiology, 40*, 629-639.

Maki, W., Frigen, K., & Paulson, K. (1997). Associative priming by targets and distractors during rapid serial visual presentation: Does word meaning survive the attentional blink? *Journal of Experimental Psychology: Human Perception and Performance, 23*, 1014-1034.

Raymond, J., Shapiro, K., & Arnell, K. (1992). Temporary suppression of visual processing in an RSVP task: An attentional blink? *Journal of Experimental Psychology: Human Perception and Performance, 18*, 849-860.

Change Detection

Basic Questions

1. Was it harder for you to detect a scene change in the trials with or without a flicker between photographs? Does your data support your evaluation? Explain.

2. What effect does the flicker have on attention?

3. What type of search strategy is commonly used in the no-flicker condition? What type of search strategy is commonly used in the flicker condition?

Advanced Questions

1. Why is reaction time reported with your experimental results, instead of just reporting your percent correct?

2. Which condition of the demonstration is equivalent to the following driving situations: looking down to turn the radio station, picking up your cell phone, or checking your speedometer? What types of problems can arise from these behaviors?

3. The flash used in the flicker condition is also used to divert or attract your attention in many experiences you have probably had. Describe an experience you have had that utilized a flash. What was the effect of the flash?

Discussion Question

1. Identify and describe at least two factors that will determine one's ability to detect a change in a scene?

Additional References

Eimer, M., & Mazza, V. (2005). Electrophysiological correlates of change detection. *Psychophysiology, 42*, 328-342.

Cole, G., Kentridge, R., Gellatly, A., & Heywood, C. (2003). Detectability of onsets versus offsets in the change detection paradigm. *Journal of Vision, 3*, 22-31.

Simons, D. (2000). Current approaches to change blindness. *Visual Cognition, 7*, 1-15.

Inhibition of Return

Basic Questions

1. Did it feel like the cue was helping or hurting you in detecting the square?

2. The data of many people indicate that the response time is longer for the no cue condition than for the cue condition for CTOA equal to zero. Does this finding indicate inhibition of return? Why or why not?

3. What do you think would happen to the data curves for the cue and no cue conditions for even longer CTOA values?

Advanced Questions

1. Why were trials where the subject responded too quickly or too slowly discarded?

2. Why is it important to keep the eyes fixated on the middle square during the experiment?

3. How might inhibition of return cause problems for a task like in the Change Detection experiment?

Discussion Question

1. How might inhibition of return help a person perform a task like in the Visual Search experiment?

Additional References

Klein, R. M. (2000). Inhibition of return. *Trends in Cognitive Sciences, 4*, 138-147.

Posner, M. I., & Cohen, Y. (1984). Components of visual orienting. In H. Bouma & D. Bouwhuis (Eds.), *Attention and performance vol. X* (pp. 531-556). Hillsdale, NJ: Erlbaum.

Pertzov, Y, Zohary, E. & Avidan, G. (2010). Rapid formation of spatiotopic representations as revealed by inhibition of return. The *Journal of Neuroscience, 30*, 8882-8887.

Simon Effect

Basic Questions

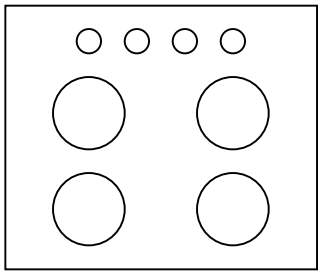
1. The Simon Effect is the result of a conflict between two sources of information. Describe this conflict.

2. According to human information-processing theory, at what stage does the Simon Effect occur?

3. Compare your data to the global data. Did you display a smaller or larger Simon Effect than the group? Explain.

Advanced Questions

1. Consider the stove design below, using your knowledge about the Simon Effect. Identify a positive aspect of the design as well as an aspect with the design that could be problematic. (The knob on the far left corresponds to the stove coil on the bottom left, the knob second from the left corresponds to the stove coil on the top left, the knob second from the right corresponds to the stove coil on the top right, and the knob on the far right corresponds to the stove coil on the bottom right.)



2. While you are driving, a pedestrian walks in front of your car from the right side and you do not have time to stop. Thinking only in terms of the Simon Effect, what would be your best course of action? Explain.

3. Many designs that utilize what is known about stimulus location and response compatibility (the Simon Effect) are evident in transportation. Think about the last few times you have been in a car and identify two of them.

Discussion Question

1. In this demonstration, you were shown targets to the left and right of your eye fixation and had to make a right or a left key press depending on the target. Describe another experimental setup in which you might find a Simon Effect. Be sure to identify the targets, responses, target locations, and the conflict that would cause the Simon Effect.

Additional Resources

Urcuioli, P., Vu, K., & Proctor, R. (2005) A Simon Effect in Pigeons. *Journal of Experimental Psychology: General, 134*, 93-107.

Van der Lubbe, R., & Verleger, R. (2002). Aging and the Simon task. *Psychophysiology, 39,* 100-110.

Proctor, R., & Lu, C. (1999). Processing irrelevant location information: Practice and transfer effects in choice-reaction tasks. *Memory & Cognition, 27*, 63-77.

Spatial Cueing

Basic Questions

1. Does visual attention always follow a person's eye movements? Explain.

2. What is the independent variable in this demonstration? What is the dependent variable?

3. In this demonstration, the cue arrows are examples of an endogenous cue. What is an endogenous cue? What is an exogenous cue?

Advanced Questions

1. In soccer, goalies find themselves in a difficult position during a penalty kick. In this situation, they often observe the opposing player as he/she approaches the ball to try and find an indicator of the direction the ball might go. Why would a goalie take this strategy and what are its implications?

2. Name a profession (other than a professional soccer player) in which an individual might give an invalid spatial cue. Why do they use these invalid cues?

3. Envision an experiment similar to the one you just completed where you have to make a response in relation to the location of a target. In this experiment you are given either a blue or a red square as a target. Furthermore, instead of being given a location cue you are given a cue about the color of the upcoming target. Do you think your valid-cue condition reaction times would increase, decrease, or stay the same as compared to an uncued condition?

Discussion Question

1. In this demonstration, the arrow predicted the location of the target with 80% accuracy. What do you think the results would have looked like had the arrow predicted the target location with 50% accuracy? What about with 20% accuracy?

Additional Resources

Richards, J. (2005). Localizing cortical sources of event-related potentials in infants' covert orienting. *Developmental Science, 8*, 255-278.

Golla, H., Ignashchenkova, A., Haarmeier, T., & Thier, P. (2004). Improvement of visual acuity by spatial cueing: A comparative study in human and non-human primates. *Vision Research, 44*, 1589-1600.

Theeuwes, J. (1989). Effects of location and form cueing on the allocation of attention in the visual field. *Acta Psychologica, 72*, 177-192.

Stroop Effect

Basic Questions

1. Look at your individual data. Were you faster on congruent trials or incongruent trials? Does this surprise you? Why or why not?

2. What is the most commonly accepted explanation of why most people are slower on incongruent trials than on congruent trials in the Stroop task?

3. Imagine that in this demonstration you were asked to read the color words and to ignore the ink color in which the words are written. Using the explanation of the Stroop Effect given in the text, do you think your reaction times on the incongruent trials would be faster, slower, or similar to the congruent trials?

Advanced Questions

1. What strategy could one use to overcome the Stroop Effect observed in this demonstration?

2. Name three tasks that are automatic for most people.

3. If you look at the trial-by-trial data, you will probably note that the incongruent trials show more variability than the congruent trials. That is, the incongruent tend to have some very long and some moderately long trials, while the congruent trials tend to not have so many long trials. Usually subjects have a greater standard deviation on the incongruent trials than on the congruent trials. Why do you think this might be?

4. At a cross walk, there is often a signal that tells pedestrians when to walk and when not to walk. Typically these signals use an upright hand to represent do not walk and a human figure to indicate when walking is permitted. What colors are usually associated with these symbols? Do the colors and symbols seem congruent (support a correct response) or incongruent (inhibit a correct response)? Explain.

Discussion Question

1. What types of effects would you predict if a subject were given extensive training in a Stroop task before being tested? Why?

Additional Resources

Henik, A. & Salo, R. (2004). Schizophrenia and the Stroop Effect. *Behavioral and Cognitive Neuroscience Reviews, 3*, 42-59

Durgin, F. (2000). The reverse Stroop effect. *Psychonomic Bulletin & Review, 7*, 121-125.

Green, E. & Barber, P. (1981). An auditory Stroop effect with judgments of speaker gender. *Perception & Psychophysics, 30*, 459-466.

Blind Spot

Basic Questions

1. Describe the location of your blind spot identified by this demonstration. Was its location consistent with the global data?

2. What is the cause of your blind spot?

3. In this demonstration, what would affect the size of an individual's blind spot?

Advanced Questions

1. Why is it important to keep your left eye closed for this demonstration to work?

2. Could you change anything about the target stimulus to overcome your blind spot? Explain.

3. Describe a situation in which an individual might be susceptible to missing something in the environment because of their blind spot.

Discussion Question

1. Your blind spot typically goes unnoticed. Describe a few of the reasons why this is the case.

Additional References

Matsumoto, M., & Komatsu, H. (2005). Neural responses in the macaque V1 to bar stimuli with various lengths presented on the blind spot. *Journal of Neurophysiology, 93*, 2374-2387.

Kawabata, N. (1982). Visual information processing at the blind spot. *Perceptual and Motor Skills, 55*, 95-104.

Cumming, G., & Friend, H. (1980). Perception at the blind spot and tilt aftereffect. *Perception, 9*, 233-238.

Brain Asymmetry

Basic Questions

1. Does your data provide evidence that you have an asymmetric brain? Explain your answer. Do the same for the global results.

2. Describe another experiment that would test for brain asymmetry. It should be different from this experiment.

3. What skills/processes are primarily associated with the left hemisphere? What about the right hemisphere?

Advanced Questions

1. What types of professions might benefit from using what we know about brain asymmetry?

2. Describe a task that might be more difficult for a split-brain patient than a normal individual.

3. The interpretation of the experimental results only applies for right-handed participants. Why is this the case?

Discussion Question

1. Why might it be advantageous for us to have a brain in which some processes are specific to one hemisphere?

Additional References

Rueckert, L. (2005). A web-based study of cerebral asymmetry for perception of emotion. *Behavior Research Methods, 37 (2),* 271-276.

Gazzaniga, M. S., Bogen, J. E., & Sperry, R. W. (1965). Observations on visual perception after disconnection of the cerebral hemispheres in man. *Brain*, *88*, Part 2, 221-236.

SENSORY MEMORY

Metacontrast Masking

Basic Questions

1. What is SOA?

2. Using your data, at what SOA was your performance the best? At what SOA was your performance the worst? Are your results consistent with the typical findings of a metacontrast masking experiment? Explain.

3. What do the findings of masking experiments tell us about visual perception?

Advanced Questions

1. Using your data, at what SOA would your performance be near perfect? Do the same for the group data.

2. In this demonstration, if you identified the thin rectangle correctly 25% of the time, is your performance above random guessing, below random guessing, or equal to random guessing? Explain.

3. This demonstration used a specific type of visual masking, but masking can also be utilized in other modalities. Describe a situation in which auditory masking is used or would be useful.

Discussion Question

1. Why is performance high at long and short SOAs and low at medium SOAs in metacontrast masking?

Additional References

Francis, G., Rothmayer, M., & Hermens, F. (2004). Analysis and test of laws for backward (metacontrast) masking. *Spatial Vision, 17*, 163-185.

Kondo, H., & Komatsu, H. (2000). Suppression on neuronal responses by a metacontrast masking stimulus in monkey V4. *Neuroscience Research, 36*, 27-33.

Francis, G. (2000). Quantitative theories of metacontrast masking. *Psychological Review, 107*, 768-785.

Lachter, J., & Durgin, F. (1999). Metacontrast masking functions: A question of speed? *Journal of Experimental Psychology: Human Perception and Performance, 25*, 936-947.

Modality Effect

Basic Questions

1. Describe your personal data. For which list position was your recall performance the highest? For which was it the lowest?

2. Does your data show the modality effect? Why or why not?

3. What is sensory memory?

Advanced Questions

1. Using what you have learned from this demonstration, what study tips would you give to a friend who has an important exam coming up?

2. When looking up a phone number in the yellow pages, what can you do to improve your recall of that phone number later?

3. What occupations might be able to use the findings from experiments on the modality effect in their work? Explain.

Discussion Question

1. Why does the modality effect only show up for the last one or two items in the list?

Additional References

Beaman, C. P. (2002). Inverting the modality effect in serial recall. *Quarterly Journal of Experimental Psychology A: Human Experimental Psychology, 55*, 371-389.

Crowder, R. (1986). Auditory and temporal factors in the modality effect. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 12*, 268-278.

Engle, R., & Roberts, J. (1982). How long does the modality effect persist? *Bulletin of the Psychonomic Society, 19*, 343-346.

Partial Report

Basic Questions

1. In this experiment, what does the Tone delay measure?

2. At what Tone delay did you show the most accurate recall? At what Tone delay did you show the least accurate recall?

3. In general, participant's recall accuracy decreases as Tone delay increases. Explain why this relationship exists.

Advanced Questions

1. Suppose that in a partial report experiment like the one in this demonstration you are shown a 4 x 4 matrix of letters and are cued to report the letters from the first row. Assuming you recalled three of the four letters in the cued row, how many of the letters in the matrix were available in your sensory memory at the offset of the letter matrix?

2. Using your personal data, what would you predict your recall accuracy would be with a 0.7s Tone delay? Using the global data, make a prediction for someone's recall accuracy with a 0.7s Tone delay.

3. You only briefly see a holiday shopping list for your family members before it gets taken away by a gust of wind. What strategy should you employ to maximize your accuracy in remembering what was on the list?

Discussion Question

1. Say you're watching television with a group of friends and something happens that makes everyone laugh but you. Afterward, everyone is talking about what made them laugh, but you do not remember seeing it at all. Is it that you did not see it or that you do not remember it? Explain.

Additional References

Fenske, M., & Stolz, J. (2001). Disengaging attention: On the locus of the cue-duration effect in partial report. *Journal of Experimental Psychology: Human Perception and Performance, 27*, 1335-1346.

Gugerty, L. (1998). Evidence from a partial report task for forgetting in dynamic spatial memory. *Human Factors, 40*, 498-508.

Di Lollo, V., & Dixon, P. (1992). Inverse duration effects in partial report. *Journal of Experimental Psychology: Human Perception and Performance, 18*, 1089-1100.

Suffix Effect

Basic Questions

1. What is the current explanation of the suffix effect that was given in the text?

2. Did your recall performance vary based on whether the target list was followed by the tone or the digit? Did you show the suffix effect? Explain.

3. What property of the suffix determines the magnitude of its effect in recall performance?

Advanced Questions

1. One of your parents has just listed some items for your brother to get at the grocery store. What could you do to make his recall of these items difficult?

2. Using your personal data, calculate your suffix effect. Using the global data, calculate the group suffix effect.

3. You have forgotten your password (a sequence of numbers and letters) for your home security system, so you call your security provider to get it. They read you the password over the phone and then ask you if there is anything else they can do for you. You say no, thank them, and hang up. Assuming you try to remember the password instead of writing it down, what was problematic about this phone call regarding your future recall performance for your password?

Discussion Question

1. If you are orally given information that you want to remember later, discuss some things you can do to maximize your recall performance.

Additional References

Parmentier, F., Tremblay, S., & Jones, D. (2004). Exploring the suffix effect in serial visuospatial short-term memory. *Bulletin & Review, 11*, 289-295.

Penney, C. (1985). Elimination of the suffix effect on preterminal list items with unpredictable list length: Evidence for a dual model of suffix effects. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 11*, 229-247.

Watkins, M., & Watkins, O. (1974). A tactile suffix effect. *Memory & Cognition, 2*, 176-180.

SHORT TERM MEMORY

Brown-Peterson Task

Basic Questions

1. At what distractor duration was your performance best? For what duration was your performance the worst?

2. What is the function of the distractor task in the Brown-Peterson paradigm?

3. To what was the Brown-Peterson findings attributed?

Advanced Questions

1. Using your personal data, at what distractor duration would you predict your recall performance to be approximately 15%?

2. Utilizing your understanding of the Brown-Peterson data, what type of environment would you suggest for someone trying to learn new material?

3. Do you or anyone you know like to study with the television or the radio on? Now that you have done this experiment, what do you think about this practice? Explain

Discussion Question

1. Other than the explanation given in Basic Question # 3, what else could have explained the data?

Additional References

Sebastian, M., Menor, J,& Elosua, R. (2001). Patterns of errors in short-term forgetting in AD and aging. *Memory, 9*, 223-231.

Nairne, J., Whiteman, H., & Kelley, M. (1999). Short-term forgetting of order under conditions of reduced interference. *Quarterly Journal of Experimental Psychology A: Human Experimental Psychology, 52*, 241-251.

Puckett, J., & Lawson, W. (1989). Absence of adult age differences in forgetting in the Brown-Peterson task. *Acta Psychologica, 72*, 159-175.

Position Error

Basic Questions

1. When trying to recall a list of items in order, what are the two most common position errors?

2. What does a position error analysis tell about memory as compared to an overall performance analysis?

3. What target position did you most accurately recall? What target position did you have the most trouble with at recall?

Advanced Questions

1. Look at your data as well as the global data. What items in the list seem to have related response patterns?

2. If you plotted item number on the x-axis and percent correct on the y-axis, what would the graph look like (assuming the errors follow the predicted pattern)?

3. Imagine you are completing a history assignment and one of the questions asks you to complete a timeline for the prominent historical events discussed in class. You know you have all the important events down, but your instructor tells you you've made one error. The good news is your instructor allows you to correct your error if you can find it. Where is the best place to look for your error? What type of errors should you keep an eye out for?

Discussion Question

1. Many people report that it is easier to recall the number sequences for the early trials of the experiment as compared to the trials that occur toward the end of the experiment. Why do you think this might be the case?

Additional References

Smyth, M., Hay, D., Hitch, G., & Horton, N. (2005). Serial position memory in the visual-spatial domain: Reconstructing sequences of unfamiliar faces. *Quarterly Journal of Experimental Psychology A: Human Experimental Psychology, 58*, 909-930.

Davis, C. & Bowers, J. (2004). What do letter migration errors reveal about letter position coding in visual word recognition? *Journal of Experimental Psychology: Human Perception and Performance, 30*, 923-941.

Maylor, E. (2002). Serial position effects in semantic memory: Reconstructing the order of verses of hymns. *Psychonomic Bulletin & Review, 9*, 816-820.

Sternberg Search

Basic Questions

1. What is the relationship between memory set size and reaction time in a typical Sternberg Search task?

2. What is a self-terminating search? What is an exhaustive search?

3. Is your personal data consistent with Sternberg's findings? Explain.

Advanced Questions

1. Does your data support an exhaustive STM memory search or a self-terminating STM search? Why?

2. Use your data to predict your reaction time for a memory set of seven items for a probe present and a probe absent response.

3. What does it mean to say there is a linear relationship between two variables? Would you classify the relationship between memory set and reaction time from your personal data as linear?

Discussion Question

1. Do you think it is to our advantage that we use an exhaustive search of short-term memory as opposed to a self-terminating search? Why or why not?

Additional References

Houlihan, M., Pritchard, W., & Robinson, J. (2001). Effects of smoking/nicotine on performance and event-related potentials during a short-term memory scanning task. *Psychopharmacology, 156*, 388-396.

Scheffers, M., Humphrey, D., Stanny, R., Kramer, A., & Coles, M. (1999). Error-related processing during a period of extended wakefulness. *Psychophysiology, 36*, 149-157.

Kotchoubey, B., Jordan, J., Grozinger, B., Westphal, K., & Kornhuber, H. (1996). Event-related brain potentials in a varied-set memory search task: A reconsideration. *Psychophysiology, 33*, 530-540.

WORKING MEMORY

Irrelevant Speech Effect

Basic Questions

1. In this demonstration, did you show the Irrelevant Speech Effect? Explain how you know.

2. How is visual information stored in working memory, and how might this explain the Irrelevant Speech Effect?

3. Irrelevant Speech is thought to impair one's ability to recall list items and/or impair one's ability to recall list items in the correct order. Based on your experience with this demonstration, which of these two hypotheses do you think is most accurate? Why?

Advanced Questions

1. You have an important exam tomorrow and your roommates ask you if they can have people over for a small party. They promise that you can have the whole upstairs to yourself so no one will bother you. Will this allow you to effectively study for your exam? Why or why not?

2. If you get a phone call while watching television, you always make a point to mute the television. You have always thought this allowed you to hear the person you were talking to more clearly. After having done this demonstration, can you think of another reason why muting the television allows you to communicate on the phone more effectively?

3. In this demonstration, if you were presented with auditory tones instead of irrelevant speech when being shown the sequence of numbers, do you think your recall performance would be improved, further impaired, or the same? Why?

Discussion Question

1. How might attention play a role in the Irrelevant Speech Effect?

Additional References

Toppino, T., & Pisegna, A. (2005). Articulatory suppression and the irrelevant-speech effect in short-term memory: Does the locus of suppression matter? *Psychonomic Bulletin & Review, 12*, 374-379.

Neeley, C., & LeCompte, D. (1999). The importance of semantic similarity to the irrelevant speech effect. *Memory & Cognition, 27*, 37-44.

LeCompte, D., Neely, C., & Wilson, J. (1997). Irrelevant speech and irrelevant tones: The relative importance of speech to the irrelevant speech effect. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 23*, 472-483.

Memory Span

Basic Questions

1. For which type of stimuli was your memory span the longest? For which was it the shortest?

2. What three types of mistakes could one make in recalling the stimulus sequence that would lead to it being scored as incorrect?

3. Approximately how many items can the average person hold in short-term memory?

Advanced Questions

1. Typically, when the stimulus sequence consists of words, one's memory span is shorter than when the stimulus sequence consists of letters. Why might this be the case?

2. Typically, when the stimulus sequence consists of similar sounding letters, one's memory span is shorter than when the stimulus sequence consists of dissimilar sounding letters. Why might this be the case?

3. Most phone numbers are seven digits long, and this fits within the memory span of digits for most people. When is it helpful to convert the numbers into the letters on the phone keypad? How does such a conversion relate to memory span?

Discussion Question

1. Memory span has been linked to intelligence. Suppose two individuals from different parts of the world were given the same memory test (in their respective native languages) and one individual showed a much longer memory span than the other. Using what you have learned from this demonstration, why is it unfair to say that the individual with the longer memory span is most likely more intelligent than the individual with the shorter memory span?

Additional References

Kawai, N., & Matsuzawa, T. (2000). Numerical memory span in a chimpanzee. *Nature, 403*, 39-40.

May, C., Hasher, L., & Kane, M. (1999). The role of interference in memory span. *Memory & Cognition, 27*, 759-767.

Baddeley, A. (1994). The magical number seven: Still magic after all these years? *Psychological Review, 101*, 353-356.

Operation Span

Basic Questions

1. Operation span correlates with other tasks involving working memory. What does in mean if two variables have a positive correlation? What does in mean if they have a negative correlation?

2. How is operation span calculated in this demonstration?

3. How is operation span different from what is typically described as memory span?

Advanced Questions

1. Operation-span experiments provide evidence that we have a general pool of resources for working memory. What implication does this have for multi-tasking?

2. While you are driving, your roommate reads you a list of items you need to get at the store. Why might it be difficult for you to effectively remember these items?

3. Name a job that would require someone with a high operation span. Explain your answer.

Discussion Question

1. In this demonstration, the math problems typically impair one's ability to remember the list words. Why do you think this is the case?

Additional References

Conway, A., Kane, M., Bunting, M., Hambrick, D., Wilhelm, O., & Engle, R. (2005). Working memory span tasks: A methodological review and user's guide. *Psychonomic Bulletin & Review, 12*, 769-786.

Hitch, G., Towse, J., & Hutton, U. (2001). What limits children's working memory span? Theoretical accounts and applications for scholastic development. *Journal of Experimental Psychology: General, 130*, 184-198.

Towse, J., Hitch, G., & Hutton, U. (2000) On the interpretation of working memory span in adults. *Memory & Cognition, 28*, 341-348.

Phonological Similarity

Basic Questions

1. In the phonological loop model, what is the phonological store?

2. What is the purpose of saying numbers aloud on half of the trials in this demonstration?

3. Did you show the phonological similarity effect? Explain.

Advanced Questions

1. Would it be harder to recall the word sequence of house, mouse, and spouse or the word sequence house, cabin, and mansion? Why?

2. In this demonstration, on half of the trials you were asked to count to four aloud over and over throughout the presentation of the sequence of letters. What other tasks could have taken the place of the counting task?

3. Using your trial-by-trial data, evaluate the types of errors you made on your first 10 trials. How many times did you fail to report a letter from the original list? How many times did you make an error in the order that you recalled the letters? Where did most of your errors occur (beginning, middle, or end of the list)?

Discussion Question

1. In a demonstration similar to this one, do you think you would be more likely to report seeing an item not on the original list in the similar quiet condition or in the dissimilar quiet condition? Explain.

Additional References

Gupta, P., Lipinski, J., & Aktunc, E. (2005). Reexamining the phonological similarity effect in immediate serial recall: The roles of type of similarity, category cuing, and item recall. *Memory & Cognition, 33*, 1001-1016.

Li, X., Schweickert, R., & Gandour, J. (2000). The phonological similarity effect in immediate recall: Positions of shared phonemes. *Memory & Cognition, 28*, 1116-1125.

Nairne, J., & Kelley, M. (1999). Reversing the phonological similarity effect. *Memory & Cognition, 27*, 45-53.

Saito, S. (1993). Phonological similarity effect is abolished by a silent mouthing task. *Perceptual and Motor Skills, 76*, 427-431.

Word Length Effect

Basic Questions

1. How is the word length effect related to rehearsal?

2. At a work party you are introduced to the families of two co-workers. One co-worker has children named: Chris, Jill, Greg, and Ann. Another co-worker has children named: Alexander, Sophia, Martin, and Hillary. Which names are you more likely to remember if you meet the children later? Why?

3. Did you show the word length effect? Explain.

Advanced Questions

1. In this experiment, all lists contained five words. Do you think the word length effect would be found for a list of only one word? Why?

2. Look at your trial-by-trial data for the 3 syllable word lists. How does your proportion correct vary with trials? It might be useful to copy the data into a spreadsheet and sort the trials by Word Length.

3. Can you think of a strategy to overcome the word length effect?

Discussion Question

1. The lab scored memory accuracy by requiring that a word be recalled in the correct list position that it was presented. Do you think it would make a difference if accuracy were scored as "free recall", where the recalled order did not matter? Look over your trial-by-trial data and score the trials with free recall. Do you still show the word length effect?

Additional References

Jalbert, A., Neath, I., Bireta, T. J. & Surprenant, A. M. (2011). When does length cause the word length effect? *Journal of Experimental Psychology: Learning, Memory, and Cognition, 37*, 338-353.

Jacquemot, C., Dupoux, E. & Bachoud-Lévi, A-C. (2011). Is the word-length effect linked to subvocal rehearsal? *Cortex, 47*, 484-493.

Baddeley, A. (2010). Working memory. *Current Biology, 23*, R136-R140.

MEMORY PROCESSS

Encoding Specificity

Basic Questions

1. Which cells in the data table are important for identifying an encoding specificity effect?

2. According to the encoding specificity principle, what is the most important factor for recall?

3. Do cues always help memory study and recall? Explain your answer.

Advanced Questions

1. To get a driver's license, one usually must pass a written exam as well as an in-car driving test. From what you know about encoding specificity, why is the in-car test so important?

2. You have a friend who is taking a physics course at 8am and is performing poorly on the exams. He/she tells you that he/she has been studying for the class almost every evening, but still is not performing well. Using the information your friend has given you and what you know about encoding specificity, what advice would you give your friend?

3. On Sunday morning you see someone at brunch that you recognize but you can't think of his/her name or where you know him/her from. The next day at work you see the same person again, but this time you know his/her name right away. Why might this be?

Discussion Questions

1. Using the findings surrounding encoding specificity, what suggestions about studying would you give someone who wanted to improve his/her performance on tests?

2. You have lost your keys. What can you do to help yourself remember where you might have left them?

Additional References

Hannon, B., & Craik, F. (2001). Encoding specificity revisited: The role of semantics. *Canadian Journal of Experimental Psychology, 55*, 231-243.

Reddy, B., & Bellezza, F. (1983). Encoding specificity in free recall. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 9*, 167-174.

Krane, R., & Hatton, L. (1980). Encoding specificity and modality effects in episodic memory. *Psychological Research, 42*, 353-362.

Levels of Processing

Basic Questions

1. In this demonstration, how are you asked to evaluate words to induce a shallow level of processing? How are you asked to evaluate words to induce a deep level of processing?

2. What is incidental learning? How do researchers typically study incidental learning?

3. Was your recall performance affected by your level of processing at study? Explain.

Advanced Questions

1. A friend reads you a phone number to put in your cell phone's phonebook. Approximately how long do you have to put this number into your phonebook before you forget it?

2. Suppose you slept in on Saturday, read a book, drove to your parents' house, made your parents dinner, ate, drove home, and went to bed. On Monday, according to levels of processing theory, are you more likely to remember if you were stopped by a traffic light on your way to your parents' house or what you had for dinner? Why?

3. What methods, other than the one used in this demonstration, could be used to induce a deep level of processing for a given word?

Discussion Question

1. Describe a situation in which a shallow level of processing might be preferred over a deeper level of processing.

Additional Resources

Kronlund, A. & Whittlesea, B. (2005). Seeing double: Levels of processing can cause false memory. *Canadian Journal of Experimental Psychology, 59*, 11-16.

Royet, J., Koenig, O., Paugam-Moisy, H., Puzenat, D., & Chasse, J. (2004). Levels-of-processing effects on a task of olfactory naming. *Perceptual and Motor Skills, 98*, 197-213.

Eich, J. (1985). Levels of processing, encoding specificity, elaboration, and CHARM. *Psychological Review, 92*, 1-38.

Production Effect

Basic Questions

1. How might saying the words out loud provide information to improve recognition?

2. Would you expect a production effect for a recall task?

3. Did you show the production effect? Explain.

Advanced Questions

1. You might some new people at a party and want to remember their names. How might you use the production effect to improve your odds of remembering the names?

2. Is the color of the words important to the production effect? Why or why not?

3. Given the explanation for the production effect, do you think a similar memory enhancement would occur if someone else read some of the words out loud to you instead of having you read them out loud?

Discussion Question

1. How might the production effect be related to the effects of levels of processing?

Additional Resources

MacLeod, C. M., Gopie, N., Hourihan, K. L., Neary, K. R., & Ozubko, J. D. (2010). The production effect: Delineation of a phenomenon. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 36,* 671-685.

Rinne, L., Gregory, E., Yarmolinskaya, J. & Hardiman, M.. (2011). Why arts integration improves long-term retention of content. *Mind, Brain, and Education, 5*, 89-96.

Lin, O. Y. H., MacLeod, C. M. (2012). Aging and the production effect: A test of the distinctiveness account. *Canadian Journal of Experimental Psychology, 66*, 212-216.

Serial Position

Basic Questions

1. What is the primacy effect? Does your data show a primacy effect? Why or why not?

2. What is the recency effect? Does your data show a recency effect? Why or why not?

3. Serial position experiments typically have subjects use free recall during the test phase. What is free recall in this context?

Advanced Questions

1. If this demonstration added two items at the end of the ten item list, based on the typical serial position effects, how would the longer list change your recall of the early list items (positions 1, 2, and 3), the middle list items (positions 4, 5, 6, and 7) and the late list items (positions 8, 9, and 10)?

2. A technology company is holding open interviews from 8am to 2pm this Friday. You are very interested in the job and want to make sure the interviewer remembers you. Using what you have learned in this demonstration, what can you do to make this happen?

3. You are putting together a presentation for your psychology class and you notice that parts of your presentation are better than others. How should you organize your presentation to leave the class with the best impression possible?

Discussion Question

1. What types of professions could utilize what we know about serial recall? For each profession you come up with, describe specifically what they could do.

Additional References

Smyth, M., Hay, D., Hitch, G., & Horton, N. (2005). Serial position memory in the visual-spatial domain: Reconstructing sequences of unfamiliar faces. *Quarterly Journal of Experimental Psychology A: Human Experimental Psychology, 58*, 909-930.

Haberlandt, K., Lawrence, H., Krohn, T., Bower, K., & Thomas, J. (2005). Pauses and durations exhibit a serial position effect. *Psychonomic Bulletin & Review, 12*, 152-158.

Surprenant, A. (2001). Distinctiveness and serial position effects in tonal sequences. *Perception & Psychophysics, 63*, 737-745.

Reed, P. (2000). Serial position effects in recognition memory for odors. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 26*, 411-422.

Von Restorff Effect

Basic Questions

1. Does your personal data reveal a Von Restorff Effect? How do you know?

2. What was done in the experimental trials of this demonstration to distinguish one of the list items from the others?

3. Excluding the distinctive list item, for which two items do you show the highest recall? Why might this have been the case?

Advanced Questions

1. In this demonstration, some of the trials had one list item that stood out from the other list items because it had a feature that was unique. This item is typically remembered with a higher frequency than its matched control, and is called the Von Restorff Effect. What do you think would happen to this effect if two of the list items shared this distinctive feature instead of one?

2. You've just started a new job and on the first day you've been told you're going to meet twelve of the company's employees, one of whom is your new supervisor. Using what you've learned about the Von Restorff Effect, what can you do to make sure you remember your new supervisor's name?

3. You're a sports agent and your new client will be competing in an open tryout in front of professional scouts. Your client is a good athlete but not well known. What advice would you give to your client help him/her get noticed during the tryout?

Discussion Question

1. How might you explain the Von Restorff Effect using interference?

Additional References

Hunt, R., & Lamb, C. (2001). What causes the isolation effect? *Journal of Experimental Psychology: Learning, Memory, and Cognition, 27*, 1359-1366.

Holmes, C., & Arbogast, R. (1979). An auditory von Restorff effect. *Journal of General Psychology, 101*, 199-204.

Deutsch, M., & Sternlicht, M. (1967). The role of "surprise" in the von Restorff effect. *Journal of General Psychology, 76*, 151-159.

METAMEMORY

False Memory

Basic Questions

1. In regard to false-memory experiments, what are related distractors?

2. Did you report seeing words that were not on the original list? If so, were these inaccurately remembered words mostly normal distractors or related distractors?

3. How can one access the accuracy of someone's memory?

Advanced Questions

1. Come up with a list of 10 words that you think could create a false memory. Using this list, what particular word/words do you think could be falsely remembered?

2. You are driving your brother and sister to your aunt's house for dinner. You haven't been to her house in a while, so you ask your siblings if either of them knows the way. Your sister says she believes she knows the way. Your brother is much more confident that he knows the way and says he can visualize the last time he went to your aunt's house. The problem is they disagree on how to get there. Whom should you believe?

3. Last time you went to see your doctor, you remembered him/her wearing a stethoscope, but later found out that, because of his/her hearing impairment, your doctor does not use a stethoscope. Why might have you been mistaken?

Discussion Question

1. What kind of implications do experiments on false memory have for evaluating the validity of eyewitness accounts?

Additional References

Lampinen, J., Meier, C., Arnal, J., & Leding, J. (2005). Compelling untruths: Content borrowing and vivid false memories. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 31*, 954-963.

Garry, M., & Wade, K. (2005). Actually, a picture is worth less than 45 words: Narratives produce more false memories than photographs do. *Psychonomic Bulletin & Review, 12*, 359-366.

Slotnick, S., & Schacter, D. (2004). A sensory signature that distinguishes true from false memories. *Nature Neuroscience, 7*, 664-672.

Dehon, H., & Bredart, S. (2004). False memories: Young and older adults think of semantic associates at the same rate, but young adults are more successful at source monitoring. *Psychology and Aging, 19*, 191-197.

Forgot It All Along Effect

Basic Questions

1. Why did Schooler, Bendiken, & Ambadar (1997) use the term "discovered memories" as opposed to recovered memories?

2. Did you forget (in Phase III) that you had correctly remembered items during the test phase (Phase II)? How do you know?

3. Were your individual experimental results similar to the predicted results of this experiment? Why or why not?

Advanced Questions

1. A friend tells you he/she does not remember telling you about his/her senior prom, but you remember him/her telling you about it very clearly. What could you do to make it more likely that he/she will remember?

2. Everyone in your Latin class did poorly on the exam last week, but the instructor tells all of you that he/she would be willing to give everyone a replacement test that would cover exactly the same material if everyone thinks they can do better. One of the other students in the class comments that they could not possibly do worse the second time around. What do you think about that statement? Why?

3. Taking into account the predicted results of this experiment, what effect does context have in memory?

Discussion Question

1. Many people have discovered memories while in therapy and sometimes these memories are of a sensitive nature (i.e., abuse, violence). How do you think these memories should be handled?

Additional References

Padilla-Walker, L., & Poole, D. (2002). Memory for previous recall: A comparison of free and cued recall. *Applied Cognitive Psychology, 16*, 515-524.

Joslyn, S., Loftus, E., McNoughton, A., & Powers, J. (2001). Memory for memory. *Memory & Cognition, 29*, 789–797.

Bouton, M., Nelson, J., & Rosas, J. (1999). Stimulus generation, context change, and forgetting. *Psychological Bulletin, 125*, 171–186.

Memory Judgment

Basic Questions

1. Did you underestimate the effect of the number of presentations of a word?

2. Did you overestimate the effect of font size?

3. Give another example of metamemory.

Advanced Questions

1. The term "stability bias" refers to the finding that people generally believe that studying enhances learning, but they also predict that they will learn little from future study trials. The underestimation of the effect of the number of presentation is consistent with stability bias. What does this bias tell you about study habits?

2. The term "ease-of-processing heuristic" refers to a tendency for people to believe that items that are easily processed will be better remembered. How is this heuristic related to the effect of font size?

3. Identify a variation of this experiment so that variation in font size would produce different recognition memory.

Discussion Question

1. How would you characterize actual memory ability, beliefs about memory, and judgments about memory?

Additional References

Friedman, M. C. & Castel, A. D. (2011). Are we aware of our ability to forget? Metacognitive predictions of directed forgetting. *Memory & Cognition, 39*, 1448–1456.

Hertzog, C. (1992). Improving memory: The possible roles of metamemory. In D. J. Herrmann, H. Weingartner, A. Searleman, & C. McEvoy (Eds.), *Memory improvement: Implications for memory theory* (pp. 61-78). New York: Springer-Verlag.

Kornell, N., Rhodes, M. G., Castel, A. D., & Tauber, S. K. (2011). The ease-of-processing heuristic and the stability bias: Dissociating memory, memory beliefs, and memory judgments. *Psychological Science*, *22*, 787-794.

Tauber, S. K. & Rhodes, M. G. (2012). Multiple bases for young and older adults' judgments of learning in multitrial learning. *Psychology and Aging, 27*, 474–483.

Remember-Know

Basic Questions

1. In the context of this demonstration what does it mean to know something? Give an example of something that you know.

2. In the context of this demonstration, what does it mean to remember something? Give an example of something that you remember.

3. Did you show a levels-of-processing effect for your remember judgments? Explain your answer.

4. Did you show a levels-of-processing effect for your know judgments? Explain your answer.

Advanced Questions

1. You are putting together a school project on NASA, and you want to include personal accounts (how they felt, where they were, what they were thinking, who they were with) of people who watched the first moon landing on live television. In your search for people who can give you these accounts, do you want to look for people who know about this historic event or remember it? Why?

2. You are at the movie theatre and you see someone you recognize. Later you find out it was your 7th grade English teacher. Would you categorize your initial recognition of your teacher as knowing or remembering? Why?

3. Your little sister starts talking about a family vacation that you had gone on quite some time ago when she was only 3 years old. She swears she remembers the trip but you are skeptical. How would you go about trying to figure out if she actually remembers the trip or just knows about the trip?

Discussion Question

1. Do you think people are more confident about things they know or things they remember? Explain your answer.

Additional References

Crawley, S. & French, C. (2005). Field and observer viewpoint in remember-know memories of personal childhood events. *Memory, 13*, 673-681.

Konstantinou, I. & Gardiner, J. (2005). Conscious control and memory awareness when recognizing famous faces. *Memory, 13*, 449-457.

Gardiner, J. & Java, R. (1990). Recollective experience in word and nonword recognition. *Memory & Cognition, 18*, 23-30.

Gardiner, J. (1988). Functional aspects of recollective experience. *Memory & Cognition, 16*, 309-313.

IMAGERY

Link Word

Basic Questions

1. Look at your individual data. How many words did you correctly translate? For the words you correctly translated, did you use the image you visualized during the study phase?

2. There was no control condition in this experiment. What could have been done to add a control condition?

3. How does forming an interactive image between a concept you are not familiar with and a concept you are familiar with help with recall of the unfamiliar item?

Advanced Questions

1. Using the link word method, what types of images are most effective in helping people remember?

2. The Spanish word for dog is perro and the Spanish word for cat is gato. Use the link word method to help yourself remember how to translate perro and gato from Spanish to English. Describe your process.

3. In what other situations could one use the link word method besides learning a foreign language? For each situation you come up with, give an example of one of the images you might use.

Discussion Question

1. What problems do you foresee in using the link word method for learning a foreign language?

Additional References

Beaton, A., Gruneberg, M., Hyde, C., Shufflebottom, A., & Sykes, R. (2005). Facilitation of receptive and productive foreign vocabulary learning using the keyword method: The role of image quality. *Memory, 13*, 458-471.

Campos, A., Amor, A., & Gonzalez, M. (2004). The importance of the keyword-generation method in keyword mnemonics. *Experimental Psychology, 51*, 125-131

Campos, A., Gonzalez, M., & Amor, A. (2003). Limitations of the mnemonic-keyword method. *Journal of General Psychology, 130*, 399-413.

Wieczynski, D., & Blick, K. (1996). Self-referencing versus the keyword method in learning vocabulary words. *Psychological Reports, 79*, 1391-1394.

Mental Rotation

Basic Questions

1. Were your personal experimental results similar to the predicted experimental results? Explain your answer.

2. Why did Shepard & Metzler's (1971) findings suggest that mental images were similar to real images?

3. In demonstrations like this, participants often report that they mentally rotate the objects in their minds in order to make their same/different judgments, so why did researches decide to take reaction time measurements also?

Advanced Questions

1. Using the global data, predict the reaction time for making a same response if someone was shown two identical shapes but one of the shapes had been rotated 140 degrees on the y-axis.

2. In this demonstration, why did you have to repeat the trial if you made an incorrect same/different judgment?

3. You are trying to get a new mattress through your front door. Currently, the mattress is laying flat on your front porch. You look at the mattress and mentally rotate the object in your mind to figure out how it might fit through the doorway. There are two ways the mattress could conceivably fit through the doorway: it could be slightly tilted to one side or it could be stood up on end. Using what you have learned in this demonstration, which of these two possibilities are you more likely to come up with first? Why?

Discussion Question

1. Describe some cognitive tasks (not already mentioned in the text) in which one might utilize mental imagery.

Additional References

Ginn, S., & Pickens, S. (2005). Relationships between spatial activities and scores on the mental rotation test as a function of sex. *Perceptual and Motor Skills, 100*, 877-881.

Nakatani, C., & Pollatsek, A. (2004). An eye movement analysis of "mental rotation" of simple scenes. *Perception & Psychophysics, 66*, 1227-1245.

Olivier, G., Velay, J., Labiale, G., Celse, C., & Faure, S. (2004). Mental rotation and simulation of a reaching and grasping manual movement. *Perceptual and Motor Skills, 98*, 1107-1116.

Heil, M. (2002). The functional significance of ERP effects during mental rotation. *Psychophysiology, 39*, 535-545.

SPEECH

Categorical Perception - Discrimination

Basic Questions

1. What is a discrimination task? Give an example.

2. Did your personal experimental results follow a pattern similar to the predicted experimental results? Why or why not?

3. Define VOT (voice onset time).

Advanced Questions

1. List some other properties of speech sounds.

2. Why is it often more useful to look at the global data rather than an individual's data when trying to understand the effects of an experiment's independent variables?

3. Variations caused by mispronunciation, environmental auditory noise, and a variety of other factors could cause one to categorize a speech sound incorrectly. Similar speech sounds are susceptible to erroneous categorization. For example, we have learned that the consonant sounds of /b/ and /p/ are similar. List some word pairs that may be confused with each other because of an incorrectly categorized /b/ or /p/ speech sound.

Discussion Question

1. Can experience and/or training affect one's ability to make perceptual discriminations? Give support for your answer.

Additional References

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Categorical Perception - Identification

Basic Questions

1. What is an identification task? Give an example of an identification task.

2. What aspect of speech sound is the primary factor in determining if one perceives the /ba/ sound or the /pa/ sound?

3. Did your personal data show you had a strong tendency for categorical perception? Explain your answer.

Advanced Questions

1. In this demonstration, there were nine speech sound stimulus conditions (BA1, BA2, … BA9). Each stimulus condition, as displayed on the experimental results page, had a VOT that was delayed 5ms from the condition before. Let's pretend that we also did another experiment similar to this one, except that we used 45 speech sound stimulus conditions and each condition was delayed 1ms from the condition before it. Would you predict the pattern of results to be similar to or different from those of this demonstration? Explain your answer.

2. In many situations we are forced to make categorical judgments. Name a job in which someone has to categorize people/things that actually fall on a continuum. Describe the categorization this person has to make.

3. Why is it useful for us to have categorical speech perception?

Discussion Question

1. Other than its own auditory properties, what do we use to help us identify a given speech sound?

Additional References

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LANGUAGE

Age of Acquisition

Basic Questions

1. What is the "age of acquisition" for a word?

2. Did your results show the expected relationship between age of acquisition and response time? Explain your answer.

3. Is the Age of Acquisition effect a type of semantic priming?

Advanced Questions

1. Would you expect a deaf person to show an Age of Acquisition effect for their signs?

2. The mental lexicon is sometimes described as a dictionary. What aspects of the mental lexicon are similar to a dictionary and what aspects are different?

3. Why might the age of acquisition effect exist?

Discussion Question

1. Some people learn a second language later in life, and studies show that such people show an Age of Acquisition effect for their second language. What does this suggest about a "critical period" for language learning?

Additional References

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Lexical Decision

Basic Questions

1. What types of information are held in one's mental lexicon?

2. Were your results consistent with the demonstration predictions? Explain your answer.

3. Demonstrations like the one you just completed typically show semantic priming. What is semantic priming?

Advanced Questions

1. You enjoy watching game shows and one of your favorites is Jeopardy. Jeopardy is a quiz show in which contestants answer questions from a set of identified categories. When you watch the show, you notice that if you did not see the question category before the question was asked you are never able to come up with the correct answer before the question timer runs out. Using what you have learned from this demonstration, why might this be the case?

2. Identify words that would prime each of the following words: cold, angry, and soft.

3. You are writing a test and you want to make it as challenging as possible. Using what you have learned in this demonstration, how can you organize the test questions to achieve this goal?

Discussion Question

1. This demonstration showed semantic priming. What other types of word priming are there? Describe each one you come up with.

Additional References

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Neighborhood Size Effect

Basic Questions

1. What is an orthographic neighborhood?

2. For the word "lake", which of the following are part of the orthographic neighborhood: lame, wake, kale, lakes, make, lark, lace

3. Did your data show the predicted effect?

Advanced Questions

1. People usually have a difficult time identifying whether a word has a large or small orthographic neighborhood. Do you think explicit knowledge about neighborhood size would influence the effect?

2. Based on descriptions of short-term memory, do you think it is critical that the experimental task was to recall the order of the words, or would other memory tasks also show the neighborhood size effect?

3. Look at the Accuracy column in the trial-by-trial data. Do you show a primacy or regency effect?

Discussion Question

1. Why does the neighborhood size effect cast doubts about memory span being a measure of short-term memory capacity?

Additional References

Roodenrys, S., Hulme, C., Lethbridge, A., Hinton, M., & Nimmo, L. M. (2002). Word-frequency and phonological-neighborhood effects on verbal short-term memory. *Journal of Experimental Psychology: Learning, Memory, and Cogniti*on, *28*, 1019-1034.

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Word Superiority

Basic Questions

1. What is the word superiority effect?

2. Does your data show the word superiority effect? Explain why or why not.

3. Why could one argue that the typical word superiority effect findings are counter intuitive?

Advanced Questions

1. What is bottom-up information? What is top-down information?

2. Using the definitions from your answer to Advanced Question one, which type of information is likely to be the cause of the differences in letter detection performance typically seen in the word superiority effect? Explain your answer.

3. You walk by the same art gallery everyday on your way home from work. Sometimes when walking by the gallery, you glance through the store window, but all you are able to see is that there is something painted on the back wall. You see it clearly enough to describe it very well yet you have no idea what it is. One day you decide to go inside the gallery. You find out that what you were seeing was the nose from a wall mural of a woman's face. Why were you unable to identify what you had seen until you went inside the gallery?

Discussion Question

1. We often encounter ambiguous stimuli in our environment. Describe a situation in which contextual information could be used to help identify an ambiguous stimulus. Be sure to identify the various possibilities of the stimulus, the context, and what one might conclude about the stimulus based on the contextual information.

Additional References

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CONCEPTS

Absolute Identification

Basic Questions

1. In what dimension did the tones in this demonstration vary?

2. If you were given extensive training on this task, how would your results change?

3. Which tones were you most accurately able to identify? Which tones did you have the most difficulty identifying?

Advanced Questions

1. Identify a category of items for which you are good at distinguishing among its members. Why is your identification performance of items within this category so good?

2. You are designing an interface for a control room at a factory. One of the factory employees shows you the interface they currently use. One of the features of the old interface is a light indicator that goes off multiple times a day. Its flashing rate indicates one of 7 responses that the control-room operator needs to make. Why is this aspect of the current interface design problematic? What could you do to make it better?

Discussion Question

1. In what ways are the predicted results of this demonstration similar to the typical results from an ordered serial recall task?

Additional References

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Lacouture, Y., & Lacerte, D. (1997). Stimulus modality and stimulus-response compatibility in absolute identification. *Canadian Journal of Experimental Psychology, 51*, 165-170.

Implicit Learning

Basic Questions

1. What is the main difference between explicit and implicit learning?

2. While doing this demonstration did you feel as though you were learning a pattern of responses? Were you surprised to find out you participated in the version (random/pattern) of the experiment you did?

3. Using the graph from the demonstration's global data, determine if implicit learning is taking place? Explain why you drew the conclusion that you did.

Advanced Questions

1. You have just received your driver's license and the first place you drive to on your own is to your music lesson. When you get to your lesson, your instructor asks you what driving route you took to get there. You have a great deal of trouble describing your driving route to your instructor, but obviously you had no problem getting there. Explain how this could happen.

2. You just finished taking a mid-term exam in your hardest class of the semester. Despite it being a multiple-choice test (there were only four options to choose from for each question), you know you did not do very well. You can honestly say that you did not know the answer to any of the questions; in fact, you could not even eliminate any of the multiple-choice options. When you get your test back, you are pleasantly surprised to see you received a 60%. How could you have thought you did so much worse than you did?

3. Name three activities that are typically learned implicitly.

Discussion Question

1. In a complex implicit-learning task, sometimes people are better off just paying attention to the task instead of trying to figure out the underlying pattern or structure. Why do you think this is the case?

Additional References

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Prototypes

Basic Questions

1. Describe what someone's prototype for a dog might be like.

2. Looking at your experimental results, did you show the prototype effect in this demonstration? How do you know?

3. How does a prototype model explain the prototype effect?

Advanced Questions

1. What is the typicality effect? How does the prototype model account for typicality effects?

2. On a school trip to the zoo, a grade school child sees a penguin and a cardinal for the first time. According to the prototype model, which bird will the child classify as a bird more quickly? Why?

3. You are taking a botany course and you are doing some fieldwork. You come across three trees that you identify as conifer trees. You have seen two of the trees before but not the third. You are surprised because, despite not having seen the third tree before, you identify it as a conifer tree before identifying the other two trees you have seen before. Why might this be the case?

Discussion Question

1. A competing model to the prototype model is the exemplar model. Describe the exemplar model and explain how it accounts for prototype effects.

Additional References

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Statistical Learning

Basic Questions

1. Are the particular shapes in this experiment important for the basic effect?

2. Did your data show evidence for statistical learning? How do you know?

3. What does it mean to give a "correct" response on a trial?

Advanced Questions

1. What is being learned in statistical learning? How does it compare to learning from a textbook?

2. Why is it important that some animals also show statistical learning?

3. What is the difference between a Possible and an Impossible triplet?

Discussion Question

1. Why might statistical learning be important for language acquisition?

Additional References

Denison, S. & Xu, F. (2010). Integrating physical constraints in statistical inference by 11-month-old infants. *Cognitive Science, 34*, 885-908.

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JUDGMENT

Decision Making

Basic Questions

1. What is the main difference between a rational and an irrational decision maker?

2. In relation to decision making, what is a framing effect?

3. Does your class data show evidence for rational or irrational decision making? Explain your answer.

Advanced Questions

1. Last week you and a friend went to an electronics store. You purchased a television for $600 and your friend bought a video game for $40. Today you saw in the newspaper that the electronics store was having a huge sale and your television is now $580 and your friend's game is $20. You decide it is not worth it for you to go and get a price change, but you call your friend because you cannot think of a reason why he/she would not want to go and get a price adjustment. The potential savings for you and your friend is exactly the same so why might you assume your friend would want a price adjustment when you did not?

2. You are a factory manager and, unfortunately, today there was a systems failure. Despite the quick work of your employees, 400 out of the 500 units that your factory produced today were lost. How could you frame the day's productivity (number of units produced) in order to keep up your employee's morale?

3. You own a restaurant and decide that all your meals will cost $11 before 5pm and $12 after 5pm. You can advertise this by saying that there will be a discount on meals served before 5pm or you can say there will be a surcharge on meals served after 5pm. How should you advertise your prices? Explain your answer.

Discussion Question

1. Making decisions can be taxing, so people often rely on heuristics. What is a heuristic? Identify and describe one heuristic. Identify a situation when the heuristic you identified would lead you to an erroneous decision.

Additional References

Gonzalez, C., Dana, J., Koshino, H., & Just, M. (2005). The framing effect and risky decisions: Examining cognitive functions with fMRI. *Journal of Economic Psychology, 26*, 1-20.

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Monty Hall

Basic Questions

1. For this demonstration, did you try to maximize your wins or maximize your losses? What strategy did you use to accomplish your goal?

2. What is the probability of a coin landing heads up in a fair coin toss? What is the probability of a randomly selected day of the week starting with the letter S?

3. What is the joint probability of rolling a four on a six-sided die and correctly guessing a randomly picked number as being odd or even?

Advanced Questions

1. Imagine a Monty Hall situation with four doors instead of three (there is still only one correct door). After selecting door number one, you are shown that door number two is incorrect. Should you stay with door number one or switch to one of the remaining doors? What are your chances of choosing the right door if you stay with your original door? What are your chances of choosing correctly if you switch?

2. What is the probability of a coin landing heads up on the next coin toss, assuming you had just seen three consecutive coin tosses in which the coin landed heads up?

3. You go to your refrigerator to find something to eat and see three types of leftovers from meals earlier in the week. One of the meals made you sick the last time you ate it but you do not remember which one. You pick one at random and hope for the best. A moment later your roommate comes in and grabs one of the two remaining dishes and indicates that the dish he/she chose was one of the dishes that were okay to eat. At this point, should you stay with your original food choice or switch? Why?

4. If you have a glass jar with five blue marbles, three red marbles, and two green marbles, what is the joint probability of randomly choosing a blue marble (you keep the marble in your hand) and then choosing a red marble?

Discussion Question

1. What is the main difference between an independent event and a dependent event? Give an example of each type of event.

Additional References

Burns, B., & Wieth, M. (2004). The collider principle in causal reasoning: Why the Monty Hall dilemma is so hard. *Journal of Experimental Psychology: General, 133*, 434-449.

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Risky Decisions

Basic Questions

1. What distinguishes a risky choice from a riskless choice?

2. In relation to decision making, what is risk-seeking behavior? When are people likely to be risk-seekers?

3. In relation to decision making, what is risk-avoiding behavior? When are people likely to be risk-avoiders?

Advanced Questions

1. The city council has a difficult decision to make. For the sale of 3 acres of land, a developer has offered them a lump sum of $10,000 or a percentage of the profits from the land development, which they have been told has a 50% chance of being $15,000 and a 50% chance of being $5000. Which option do you think they will choose? Why?

2. Describe a situation (not involving money) in which one would likely be a risk-avoider?

3. For all of the decisions in this demonstration, the expected value for each of the two choice options was approximately equal. Define expected value and explain why it was important for the expected value of the risky choice to be equal to the expected value of the riskless choice.

Discussion Question

1. Identify some factors not mentioned in this demonstration that might affect a person's likelihood of engaging in risk-seeking or risk-avoiding behavior. Describe how each of these factors might influence one's behavior.

Additional References

Schlottmann, A., & Tring, J. (2005). How children reason about gains and losses: Framing effects in judgment and choice. *Swiss Journal of Psychology, 64*, 153-171.

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Chien, Y., Lin, C., & Worthley, J. (1996). Effect of framing on adolescents' decision making. *Perceptual and Motor Skills, 83*, 811-819.

Typical Reasoning

Basic Questions

1. What is an advantage of using heuristics? What is a disadvantage of using heuristics?

2. Describe the conjunction fallacy.

3. For this demonstration, on average did participants give higher ratings for single events or conjunctions of events? Based on the demonstration results, are participants making their judgments by using objective probabilities? Why or why not?

Advanced Questions

1. You and two of your co-workers have just interviewed a candidate for a job opening at your law firm. Your boss asks you what inferences you drew about the job candidate during the interview. What can you do to maximize your likelihood of making a correct inference?

2. John is a young, energetic, muscular, and outgoing individual. Estimate the likelihood that he a) is tall and likes sports. and b) is tall, likes sports, and has lots of friends.

3. You and a friend are taking a walk. While on your walk, you pass a middle-aged woman. You tell your friend that she seems like someone who is very intelligent. Your friend agrees but adds that she seems to be very confident as well. Who is more likely to be correct? Why?

Discussion Question

1. What is a stereotype? How do stereotypes relate to the findings of this demonstration?

Additional References

Fisk, J., & Slattery, R. (2005). Reasoning about conjunctive probabilistic concepts in childhood. *Canadian Journal of Experimental Psychology, 59*, 168-178.

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Fantino, E., Kulik, J., Stolarz-Fantino, S., & Wright, W. (1997). The conjunction fallacy: A test of averaging hypotheses. *Psychonomic Bulletin & Review, 4*, 96-101.

Wason Selection

Basic Questions

1. What are subjects asked to do in a typical Wason Selection Task?

2. Give an example of an abstract rule. Give an example of a thematic rule.

3. Why do participants typically perform better with thematic rules as opposed to abstract rules?

Advanced Questions

1. You and your family have just finished Thanksgiving dinner and some of your family members are starting to get sick. Your sister thinks that the jello salad is what made everyone sick. During dinner, you noticed that your brother ate some of the jello salad but your aunt did not. You also know that your grandpa got sick, but your mother did not. Which two people should you talk with to test your sister's hypothesis and what do you need to ask them?

2. Logic can be broken down into deductive reasoning and inductive reasoning. Give an example of each type of reasoning.

3. You have an instructor who told your class that anyone who did not have perfect attendance could not receive an A in the course. At the end of the semester, you want to know if your instructor stuck with this attendance policy. You have a friend who was also in the class and he/she received a B. Would it be helpful to find out if your friend had perfect attendance or not? Explain your answer.

Discussion Question

1. Using what you have learned from this demonstration, what advice would you give a student who is struggling with the concepts being used in his/her algebra class?

Additional References

Wada, K., & Nittono, H. (2004). Cancel and rethink in the Wason selection task: Further evidence for the heuristic-analytic dual process theory. *Perceptual and Motor Skills, 98*, 1315-1325.

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