Exam 2

Name ____________________________

Purdue ID __________________________

Your score on this exam will count toward 17% of your final grade.

The following short answer questions are worth 10 points each. All answers should be legible and in complete sentences and may include figures or diagrams. You might lose points for extremely bad handwriting, grammar, or syntax.

(A) Explain how a motion gated dipole circuit produces a motion aftereffect. Briefly describe a stimulus that produces a motion aftereffect and describe the motion aftereffect.

A motion gated dipole consists of two pathways that receive input from motion detectors tuned to opposite directions (e.g., up-down) at the same position. Each pathway also receives the same small tonic input. These signals pass through habituating transmitter gates before competing, so that only one pathway produces an output at a time.

When a stimulus is present, say, motion going down, the gate for the down-motion pathway habituates, but the down-motion signal still wins the competition. When the stimulus disappears (e.g., you look away from the motion stimulus), the gate remains habituated for a few seconds, so the down-pathway now has a weaker signal than the up-pathway. When they compete, the up-pathway wins: this corresponds to a motion aftereffect. The same kind of thing happens at every position with a motion signal.

A stimulus that produces a motion aftereffect is a waterfall. Watching a waterfall involves seeing continuous downward motion. When you look away from the waterfall at dry land, the land seems to be moving up. This is the motion aftereffect.
(B) Describe the attentional blink experiment, the typical data, and the interpretation of the data in terms of information processing and processing resources.

In an attentional blink experiment, each trial displays a rapid stream of letters. The subject’s task is to report whether the stream included either of two target letters (e.g., J or K). Across trials, the temporal separation (intervening letters) between the target letters is varied. The behavioral measure is the proportion of time across trials that subjects detect the second letter (performance on the first letter is not very important). The results are typically plotted against the separation between the target letters. When the second letters follows right after the first letter, people tend to miss the second letter. Performance detecting the second letter improves as the temporal separation between the letters increases.

The interpretation of the attentional blink is that the observer has to expend resources to monitor the letter stream to detect a target and also to process a target once it is seen (e.g., so that it will be remembered for reporting). When the first target is detected, some resources that were being used to monitor the stream are shifted to processing the target. If the second letter appears during this processing, it will likely be missed: this is the attentional blink. When the second letter comes later, the processing of the first target is likely to be finished and resources are reallocated back to monitoring the stream, and the second target is likely to be detected.

(C) Describe the suffix effect and explain how the properties of echoic memory account for the suffix effect.

The suffix effect refers to the loss of recency (good recall for the last few items in a list) for auditory stimuli in an immediate serial recall task. In a normal situation (without a suffix), recency in an immediate serial recall task can occur because the last few items in the list are in echoic memory (sensory memory for auditory stimuli), which promotes good recall.

In a suffix condition, the end of the list is followed by another item (e.g., a word like “go” or “report”). This suffix acts like a mask that writes over information that would otherwise be in echoic memory. When that information is overwritten, it cannot be recalled and the recency effect largely disappears.
(D) Explain how the phonological loop explains the word-length effect.

The word-length effect is that memory for a list of words is better when the words are short (e.g., nap, time, pen, book, door) than when they are long (e.g., dreaming, temporal, pencil, magazine, doorway). In the phonological loop, the number of items that can be held in short-term memory is established by how many items can be rehearsed before anything fades from the phonological store. The phonological store only holds items for about 2 seconds, so the articulatory control process has to rehearse all the items within 2 seconds, or at least one item will fall out of the loop and thus be forgotten.

The words simply take longer to rehearse, just as they take longer to say out loud. With longer rehearsal, you cannot get through the whole set within the required 2 seconds. Thus, memory is better for a list of short words than for a list of long words. (An equally fine way to say it is that memory span is longer for short words than for long words.)

The following multiple choice questions are worth 2 points each. Enter your answer on the scantron sheet. Enter only one choice for each question.

(1) In the brightness contrast illusion, which neurons possibly contribute to the percept?:
   (a) a center-surround cell, with the receptive field entirely inside the middle gray square.
   (b) a center-surround cell, with the excitatory part in the gray square and the inhibitory part outside the middle gray square.
   (c) a Reichardt detector.
   (d) a center-surround cell that only responds to gray light.

(2) What conclusion did we make from the disappearing pink circle effect?:
   (a) center-surround cells do not respond to homogeneous regions.
   (b) simple cells are not involved in color perception.
   (c) color information spreads from edges to interiors of regions.
   (d) offset of a color produces an afterimage.

(3) Which of the following choices is not part of the explanation of the Hermann grid illusion? Center-surround cell receptive fields on:
   (a) an intersection receive inhibition from four “roads”.
   (b) a street receive inhibition from two “roads”.
   (c) an intersection do not receive inhibition.
   (d) an intersection and on a street receive close to maximum excitation.
(4) If you stare at a set of concentric circles for several seconds and then look at a blank surface, the orientation gated dipole circuits would cause you to see:
(a) circles of the opposite color.
(b) rectangles.
(c) lines radiating outward.
(d) a persisting percept of the circles.

(5) The critical flicker frequency refers to how quickly a visual stimulus must turn on and off so that appears to be on all the time. For many situations it is about:
(a) 10 Hz.
(b) 50 Hz.
(c) 200 Hz.
(d) 1000 Hz.

(6) For the explanation of visual persistence provided in class, the source of persisting percepts was:
(a) slow responses in photoreceptors.
(b) excitatory feedback in neural networks.
(c) short-term memory.
(d) long-term memory.

(7) Visual masking makes it difficult to detect very brief stimuli because the mask:
(a) replaces items in short-term memory.
(b) triggers Reichardt motion detectors.
(c) shortens visual persistence.
(d) causes an afterimage.

(8) A given Reichardt motion detector will be sensitive to:
(a) motion in any direction at a certain position.
(b) motion at any speed at a certain position.
(c) opposite directions of motion.
(d) motion at a small set of speeds and a small set of directions at a certain position.

(9) From the perspective of “information processing”, to ignore something is the same as:
(a) actively processing it.
(b) passively processing it.
(c) automaticity.
(d) not processing it.

(10) In the basketball/gorilla video, viewers often do not detect the curtain changing color because:
(a) color changes are masked by afterimages.
(b) they are processing information about the gorilla.
(c) they can only see one color at a time.
(d) iconic memory does not store “changes”.
(11) In the CogLab visual search experiment, the shown image consists entirely of blue squares. Which kind of trial is this?:
(a) feature search, target present.
(b) feature search, target absent.
(c) conjunctive search, target present.
(d) conjunctive search, target absent.

(12) The data from a visual search experiment typically show that for conjunctive searches:
(a) target absent trials take longer than target present trials.
(b) target present trials take longer than target absent trials.
(c) the response time is shorter as the number of distractors increases.
(d) the response time is shorter than for feature searches.

(13) Based on the properties of the Stroop effect, which of the following would be fastest?:
(a) identifying the word name for the word “red” when it is in green ink.
(b) identifying the color of ink for the word “red” when it is in green ink.
(c) identifying the word name for the word “green” when it is in red ink.
(d) identifying the word name for the word “green” when it is in green ink.

(14) In the feature map explanation of the visual search experiment results, the target is quickly detected in a feature search because the:
(a) unique feature of the target is the only signal in the feature map.
(b) unique feature of the target is spread across multiple feature maps.
(c) features of the distractors amplify the representation of the target.
(d) features of the distractor overlap with the feature of the target.

(15) The main conclusion from the study of iconic memory in infants is that:
(a) infants forget things much faster than adults.
(b) infants can only hold one-tenth as much as adults.
(c) infants are much more susceptible to masking effects than adults.
(d) infant iconic memory seem to be rather similar to adults.

(16) Which memory system has the shortest duration?:
(a) iconic memory.
(b) echoic memory.
(c) short term memory.
(d) long term memory.

(17) The *modality effect* for an immediate serial recall memory task refers to:
(a) poor recency for visual stimuli compared to auditory stimuli.
(b) poor primacy for visual stimuli compared to auditory stimuli.
(c) better recall for middle-of-the-list items for auditory stimuli than for visual stimuli.
(d) faster responses for visual stimuli than auditory stimuli.

(18) In the “whole-report” method, subjects can typically report about:
(a) 2 letters.
(b) 4.5 letters.
(c) 1 letter from each row.
(d) all the letters.
(19) In his study of memory, Ebbinghaus used nonsense syllables because they are:
   (a) familiar to subjects.
   (b) easy to remember.
   (c) not already in memory and have no meaning.
   (d) difficult to mask.

(20) Ebbinghaus' experiment suggests the existence of a long-term memory system because:
   (a) iconic memory would not work with letters.
   (b) the savings forgetting curve never goes all the way to zero.
   (c) short-term memory only deals with speech sounds.
   (d) he found essentially perfect memory even a month after study.

(21) In the “modal model” of memory, which system would be responsible for the primacy
     effect in an immediate free recall memory task?:
     (a) echoic memory.
     (b) iconic memory.
     (c) long-term memory.
     (d) short-term memory.

(22) The Brown-Peterson memory experiment suggests that:
     (a) memory loss is due to interference in long-term memory.
     (b) memories in short-term memory fade away if they are not actively maintained.
     (c) items in long-term memory must be rehearsed for them to be activated.
     (d) iconic memory has a high capacity but short duration.

(23) Which of the following is not one of Sternberg’s hypothetical searches of short term
     memory?:
     (a) automatic processing.
     (b) parallel.
     (c) serial terminating.
     (d) serial exhaustive.

(24) The results of Sternberg’s search of memory experiment motivated which part of working
     memory?:
     (a) central executive.
     (b) visuo-spatial sketchpad.
     (c) long term memory.
     (d) phonological loop.

(25) The main difference between short term memory and working memory is that short
     term memory:
     (a) has a smaller capacity than working memory.
     (b) interfaces with long term memory but working memory does not.
     (c) is described as a “container” of memories, while working memory is described as
         processing of information.
     (d) has a longer duration than working memory.
(26) In Brook’s study that suggested the existence of the visuo-spatial sketchpad and the phonological loop people were fastest when:
(a) both the mental task and the response used the same system.
(b) the mental task and the response used different systems.
(c) the central executive stopped the search.
(d) the task did not involve long-term memory.

(27) As children mature, their short-term memory improves. This seems to be due to improvement in which system?:
(a) echoic memory.
(b) articulatory control process.
(c) phonological store.
(d) long-term memory.

(28) People with different native languages have varying abilities to remember numbers over a short span of time (“digit span”). This seems to largely be due to differences in which system?:
(a) echoic memory.
(b) articulatory control process.
(c) phonological store.
(d) long-term memory.

(29) The irrelevant speech effect suggests that if you are reading text that you want to remember, you should:
(a) have the TV or radio on.
(b) only listen to background speech if it is in a foreign language.
(c) study in silence.
(d) occasionally take a break from reading to listen to speech on a different topic.

(30) Phonological similarity leads to worse memory because it produces interference in which system?:
(a) echoic memory.
(b) articulatory control process.
(c) phonological store.
(d) long-term memory.