

# AP<sup>®</sup> PSYCHOLOGY

## 2011 SCORING GUIDELINES

### Question 1

A researcher designs a study to investigate the effect of feedback on perception of incomplete visual figures. Each participant stares at the center of a screen while the researcher briefly projects incomplete geometric figures one at a time at random positions on the screen. The participant's task is to identify each incomplete figure. One group of participants receives feedback on the accuracy of their responses. A second group does not. The researcher compares the mean number of figures correctly identified by the two groups.

- A. Identify the independent and dependent variables in the study.
- B. Identify the role of each of the following psychological terms in the context of the research.
- Foveal vision
  - Feature detectors
  - Gestalt principle of closure
- C. Describe how each of the following terms relates to the conclusions that can be drawn based on the research.
- Random assignment
  - Statistical significance

### *General Considerations*

1. Answers must be presented in sentences, and sentences must be cogent enough for students' meaning to be apparent. Spelling and grammatical mistakes do not reduce students' scores, but spelling must be sufficiently accurate for the reader to be convinced of the word intended.
2. Within a point, students will not be penalized for misinformation unless it directly contradicts or obscures correct information that would otherwise have scored the point.
3. Students can only score points if information is presented in context. This means that they must clearly convey which part of the question is being answered before a point can be earned. Mentioning "figures," "results," or "participants" is enough to establish that students are applying the concept to the example. However, it is also possible to infer context from the order of the essay, if it is consistent with the order of the question.

### **Point 1: Independent variable**

There is one and only one independent variable in the study. Students must state that feedback, or participants' being told whether their responses are accurate, is the independent variable.

### Score

- References to a level of the independent variable (e.g., "no feedback").

### Do not score

- References to only the people in the experimental and/or control group (e.g., "The independent variable is people in the group who received feedback").
- The listing of more than one variable (even if one is "feedback").
- "Effect of feedback."

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### Question 1 (continued)

#### **Point 2: Dependent variable**

The student must refer to either:

- A. Number (or mean number) of figures identified, **OR**
- B. Accuracy of the participants' responses, **OR**
- C. Perception of visual figures.

#### **Do not score**

- “Effect of the feedback,” unless accompanied by A, B, or C above.
- Answers with any other variables in addition to A, B, or C above.

#### **Point 3: Foveal vision**

Students must refer to a part of the eye or the central visual field as allowing participants to see figures:

- A. Clearly/distinctively/in fine detail/with acuity, **OR**
- B. More accurately.

*Note:* Students may confuse the fovea with other eye structures and still receive the point.

#### **Point 4: Feature detectors**

Students must refer to the role of feature detectors in helping participants identify the geometric figures by recognizing their elements/parts.

*Note:* Students must use a synonym for “feature” or offer a specific example (e.g., line, edge, curve, angle), if the word “feature” is used.

#### **Do not score**

- Mere references to the detection of missing elements of the figures or specific references to closure.

#### **Point 5: Gestalt principle of closure**

Students must refer to the idea that participants tend to:

- A. “Fill in” features of the incomplete figures, **OR**
- B. Perceive an incomplete figure as complete.

*Note:* Students may use a picture to support an answer.

#### **Point 6: Random assignment**

Students must refer to the idea that random assignment:

- A. Allows cause-and-effect conclusions to be drawn, **OR**
- B. Reduces the possibility that participant/subject characteristics (e.g., gender, skill level, prior knowledge) may bias the results.

#### **Do not score**

- References to random selection or sampling.
- An argument stating merely that random assignment reduces bias or increases validity/accuracy.

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### Question 1 (continued)

#### **Point 7: Statistical significance**

Students must communicate the idea that statistical significance is a way of determining that the results are not likely to have occurred by chance (are not random).

#### Score

- “Statistical significance means that the researcher can reject the null hypothesis.”
- “Statistical significance means that there is a high probability that the independent variable caused changes in the dependent variable.”

(A) The independent variable of this study is whether or not the participants receive feedback on the accuracy of their responses. The dependent variable is the amount of figures that are correctly identified.

(B). Foveal vision refers to the enhanced clarity of sight when we focus the image on to our fovea, a spot in the eye densely populated by rods. The people able to focus, and thus use their foveal vision, will have a clearer image of the figure presented and thus be more likely to answer it correctly. Feature detectors refer to parts of the brain that detect certain aspects to allude to what an image could be. For example, people may use these to recognize if they see a curve then it is likely the shape will be a circle or an oval. As well as if they see 3 sides to the incomplete figure they may infer it needs a fourth making it either a square or rectangle. The Gestalt principle of closure refers to the tendency our mind has to fill in gaps in images. This principle is the one that, when given two sides and half of a third, would tell us it's a triangle. Or it would complete the curve of a circle, or the last side of a square.

(C) Random assignment will help to prevent experimenter bias. By assigning participants randomly to either group the researcher is prevented from grouping together people better at recognizing shapes to make

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Write in the box the number of the question you are answering on this page as it is designated in the exam.

his hypothesis more plausible, or from putting those unusually bad at recognizing shapes in the control group to make the experimental group's performance seem significantly better. For a conclusion about whether or not the hypothesis is supported to be drawn the results must be statistically significant. It must be near absolute that any change in performance or lack thereof was the effect of the independent variable and not a different factor, such as chance. If the results were to lack statistical significance then they would not be a valid ~~standard~~<sup>means</sup> by which to draw conclusions about the study.

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1 (A, B, C)

(A) The independent variable of this experiment is the incomplete geometric figures shown to the participants. The dependent variable are the participants' answers.

(B) Foveal vision is the ~~the~~ things we see from our fovea, and it is right in the center, which allows us to see most clearly ~~in the~~ when things are directly forward, and seen in the center. Foveal vision is important to this experiment because the shapes are on a random place on the screen, while participants must look forward.

Feature detectors are things we see and recognize as part of certain schemas. This is relevant because the participants would see an ~~an~~ incomplete shape, but recognize certain parts of it, such as the curvature or angles, and then know what the ~~the~~ shape is.

The Gestalt principle of closure is our tendency to see incomplete parts, and make a whole complete object from it. This is important because the participants are seeing incomplete objects, but must answer as a full shape. They close the object themselves to make a complete figure.

(C) Random assignment is ~~the~~ placing participants into groups, by using a method that will produce random groups. This can be picking names out of a hat because it eliminates bias. This is important to the data because if bias was used to create the two groups, the data would be inaccurate.

Statistical significance is the concept that the

1 (c)

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data in this experiment is valid and useful for ~~students~~<sup>people</sup> outside of this experiment. This is important because the correlations found in the data could then be, possibly, stated as true for everyone.

Within the study the independent variable is ~~the group of test subjects~~, while the dependent variable is the incomplete visual figures, while the group of participants are the dependent variable. This is because both groups are shown the same figure, making the figures independent, while depending on which group you are in you are given feedback makes the participants dependent.

The role of feature detection within the experiment involves the concept of how will someone can distinguish an image when their perception is impaired, via the incomplete visual figures.

Gestalt's principle of closure applies to proximity. The closer the participants are to the image the easier it will be for them to identify it, despite the image being incomplete.

By having random assignments, participants for the study cannot be biased. This means that one group will not have members with 20/20 vision, perfect eye sight, while the other group has people



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that don't have perfect vision. This keeps the data uncorrupted, ~~it~~ because both groups have an equal chance at having members with different levels of eye sight.

The statistical significance would ~~prove~~ show the effect feedback had on the participants. ~~whether it be~~ For example one could analyze the data and see that those who recieved feedback in the study got more answers correct because they were able to get a yes or no. While those who didn't recieve feedback scored lower because they second guessed themselves. The statistics within the study prove the hypothesis.

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## 2011 SCORING COMMENTARY

### Question 1

#### Overview

This question required students to understand key features of experimental design and analysis and to apply visual and cognitive terms to a specific research study. In part A students were asked to identify the independent and dependent variables used in the study. Independent and dependent variables are crucial aspects of experimental design. In part B they were required to explain how principles of sensation and perception contribute to information processing. More specifically they were expected to identify the roles of foveal vision, feature detectors, and the Gestalt principle of closure in the context of the study. Part C required students to understand the importance of random assignment and statistical significance in drawing conclusions from the research data.

#### Sample: 1AA

##### Score: 7

The essay earned point 1 when the student correctly identifies the independent variable as “whether or not the participants receive feedback.” Point 2 was awarded when the student names the number of figures as the dependent variable. The essay gained point 3 when the student refers to “enhanced clarity” and calls the fovea “a spot in the eye.” Credit was granted for point 4 when the student describes feature detectors as a part of the brain that allows an individual to discern aspects, or parts of an image, to help identify the image. Point 5 was merited when the student describes the Gestalt principle of closure as the tendency of the mind “to fill in gaps” in an image. The student explains that “[r]andom assignment will help to prevent experimenter bias,” because it will reduce the possibility that subjects might be grouped together on the basis of their characteristics (for example, skill level), and thus earned point 6. Point 7 was awarded when the student explains that change in performance is the result of the independent variable rather than chance.

#### Sample: 1BB

##### Score: 3

No credit was received for point 1 because the student identifies the “incomplete ... figures,” rather than feedback, as the independent variable. Although the student indicates that “participants’ answers” constitute the dependent variable, point 2 was not awarded because the student does not reference accuracy of the participants’ responses. The essay earned point 3 when the student states that foveal vision refers to the center of the visual field and “allows us to see most clearly.” The essay merited point 4 when the student describes feature detectors as a mechanism that allows us to recognize parts of an object that help to identify a figure. Point 5 was gained when the student explains that the Gestalt principle of closure allows people to interpret “incomplete parts” as complete images. The student describes a process for random assignment. However, the essay did not earn point 6 because the student does not indicate how random assignment allows for cause-and-effect conclusions, nor does the student reference the idea that random assignment reduces the possibility of introducing participants’ characteristics as a source of bias. Point 7 was not granted because the student does not indicate that statistical significance is a way of distinguishing whether results are different from those that might occur based on chance.

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**Question 1 (continued)**

**Sample: 1CC**

**Score: 1**

The essay did not merit point 1 because the incomplete figure, rather than feedback, is identified as the independent variable. Point 2 was not awarded because participants, rather than the number of figures identified, are defined as the dependent variable. The essay makes no attempt to address foveal vision, so it did not earn point 3. The essay received no credit for point 4 because the student does not specify how an element contributes to recognition of a figure. Point 5 was not granted because the student does not indicate how incomplete figures are perceived as complete images. The essay earned point 6 when the student indicates that random assignment reduces the likelihood that subjects' characteristics (for example, "perfect eye sight") will bias the results. The essay did not gain point 7 because the student makes no reference to the role of probability in statistical significance.