Excerpt from

LABORATORY MANUAL

PRINCIPLES OF PSYCHOLOGY: EXPERIMENTAL FOUNDATIONS

PSYCHOLOGY 122
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Experiment 7

Sensation and Perception: Illusions

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begins on the next page and constitutes pp. 90-95 of the full manual

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Sensation and Perception: Illusions

Bonnie S. Sherman

Introduction

Illusions are a function of our neuroanatomy and physiology. They are real; we see them, feel them, and/or hear them. The largest visual illusion that has been created in the United States is in St. Louis, Missouri. The St. Louis Arch, which stretches over downtown St. Louis, is as wide as it is high. However, even after measuring the height and width and "seeing" that these dimensions are the same, the height of the arch still "looks" greater than the width. The illusion persists in spite of knowledge. It is as if one part of the mind is unable to use the information that arises in another part.

"Certainty of knowledge" may be a cognitive illusion, just as the St. Louis Arch is a visual illusion.

Objectives

- to examine illusions
- to define an illusion, noting that illusions can be auditory or tactile as well as visual
- to measure an illusion
- to investigate the extent to which we can control our response to an illusion

Terms

Vase-face (figure-ground)

Escher drawings (figure-ground)

Ponzo illusion

Müller-Lyer illusion

Garbage can illusion (also known as the vertical-horizontal illusion)

Disappearing prong

Illusory cube

Illusory contours

Poggendorf illusion

Irradiation illusion

Twisted cord illusion

Zöllner illusion

MacKay effect

Pitch paradox

Cognitive illusion

McGurk effect

PART 1
Illusion Slides

CT **What is an illusion?**

CT **In what way(s) might you categorize different illusions?**

CT **Can you measure an illusion? If not, why not? If so, how would you measure it? What would the measurement mean?**

PART 2
Investigation of the Müller-Lyer or Garbage Can Illusion

Method

Materials

Illusion boards portray the Müller-Lyer and garbage can illusions. One line present on a sliding strip of wood can be adjusted until the two lines appear to be the same length. On the reverse side of the board, a scale in centimeters (cm) permits measurement of the physical degree and of the direction from equality.

Procedure

Create a hypothesis that suggests the following:

1. which type of line will be perceived as longer AND / OR
2. whether repeated trials will affect the amount of error AND / OR

3. whether you are measuring the degree to which you normally experience an illusion or the degree to which you can compensate for it

Plan your group's procedure so you answer your hypothesis. Work in teams of three persons, rotating so each person plays each of the three roles. Choose the illusion with which you would like to experiment.

- Researcher A will create a list of different lengths for presentation and will manipulate the apparatus as described below.
- Researcher B will be the participant.
- Researcher C will record the data and compute the average error.

Before beginning the experiment, Researcher A determines five starting points for the presentation of the illusion. Those starting points are recorded in four different orders, for a total of 20 points. To begin the trials, Researcher A adjusts the movable line to the first of the five predetermined starting points.

Researcher B sits before the apparatus. Researcher B's job is to adjust the apparatus until the lines are perceived to be equal (that is, until they look equal). Researcher B should make adjustments until the lines look the same; after he/she has removed hands from the apparatus, the apparatus should be left as it is. Or Researcher B may make the adjustment, sit back and reconsider, and then make finer adjustments if desired. Researcher B should determine his/her criterion for adjusting the apparatus and use the same criterion for all 20 settings.

Researcher C records the amount of error (to the nearest 0.1 cm). This is determined by reading the sliding scale on the back of the apparatus. The magnitude of the error should be noted as being "positive" (+) or "negative" (-).

At no point does one researcher give information to another. Researcher B sets the apparatus for each trial, but is not given any feedback as to performance--no smile, laugh, or nod should reveal how accurate or inaccurate the measurement is.

After completing the first set of five, repeat the procedure three more times using the different orders of the same five starting points which Researcher A has listed. Now rotate and repeat the procedure so each group member performs each role at least once. When finished, you may share your data with each other.

Interview each researcher to see what he/she did while playing the role of the participant. How did he/she decide where to place the sliding board? Note differences in the group.

Researcher A:

Researcher B:

Researcher C:

Compute the average error, using absolute values, for each researcher and share your tabulated results with the instructor and preceptor, and then finally with the other four groups in the laboratory.

CT	**Did you measure the illusion, or did you measure how well you could compensate for the illusion?** **When you were the participant, did you maintain your criterion throughout the measurement sequence?**

PART 3
Making an Illusion

Now that you have been exposed to several different types of illusions, move back into your groups of three and create your own illusion. It can be cognitive, auditory, or visual. Be inventive.

PART 4
Video

This video presents some of the illusions developed by M. C. Escher (1898-1972). As you watch the illusions unfold in the video, pay attention to the different techniques he is using to create illusions. For example, does he use a figure-ground technique? Are any of the techniques you saw in the initial slide presentation evident here?

Discussion Questions

1. Provide additional examples of illusions.

2. List and comment on questions you had before, during, or after the lab. Make them into testable hypotheses.

3. Is there value in an illusion? How might an illusion be selected by natural selection?

4. To what extent does perception reflect reality?

References

Required Lab Reading

Fischhoff, B., Slovic, P., & Lichtenstein, S. (1977). Knowing with certainty: The appropriateness of extreme confidence. *Journal of Experimental Psychology: Human Perception and Performance, 3(4*), 552-564.

Optical illusions
http://home.wanadoo.nl/hans.kuiper/optillus.htm
[Hans Kuiper's web pages show some of the optical illusions shown in lab, plus a number of new ones such as the Regibald Neal's Illusions and the optical illusions of three-in-one comprising Neal's illusions, the Zöllner illusions, and the Poggendorff-effect all in one frame.]

Suggested Readings

Piattelli-Palmarini, M. (1994). *Inevitable illusions* (M. Piattelli-Palmarini & K. Botsford, Trans.). New York: John Wiley & Sons. [Piattelli-Palmarini talks about "tunnel vision," cognitive situations that play tricks on us; "they play the same trick on everyone, and *each time in exactly the same way*" (p. ix). He begins with geographical illusions, such as the common thought that Reno, Nevada, is to the east of Los Angeles. After showing many other cognitive illusions, he ends with "a super-tunnel," in which even the "best trained minds get trapped" (p. 161).]

Hoots, R. A. (1993, December). Motion illusions. *The Science Teacher,* 16-21. [This article gives templates for making a number of motion illusions: paper movies, spinning illusions, Fechner's colors, and a magic lift box in which a person appears to walk on air.]

Porac, C. (1994). Decrement and the illusions of the Müller-Lyer figure. *Perceptual and Motor Skills, 79,* 707-717. [Clare Porac explores decrement in the Müller-Lyer illusions, a systemic, time-related reduction in the illusion's magnitude. Although she finds this in the "wings-out" variant for a number of subjects, she does not find it for all, and she finds almost no decrement in the "wings-in" variants. What causes the decrement process?]

References for Illusions Slides

Coren, S., & Girgus, J. S. (1978*). Seeing is deceiving: The psychology of visual illusions.* Hillsdale, NJ: Erlbaum.

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Hanson, N. R. (1961). *Patterns of discovery: An inquiry into the conceptual foundations of science.* London: Cambridge.

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Levine, M. W., & Shefner, J. M. (1991*). Fundamentals of sensation and perception.* Pacific Grove, CA: Brooks / Cole.

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Myers, D. G. (1995). *Psychology* (4th ed.). New York: Worth.

Pentagram. (1992). *Pentamagic.* New York: Simon and Schuster.

Rock, I. (1984). *Perception.* New York: Scientific American Books.

Roediger, H. L. III, Capaldi, E. D., Paris, S. G., Polivy, J., & Herman, C. P. (1996). *Psychology* (4th ed.). St. Paul, MN: West.

Schattschneider, D. (1990). *Visions of symmetry: Notebooks, periodic drawings, and related work of M. C. Escher.* New York: Freeman.

Schiffman, H. R. (1990). *Sensation and perception: An integrated approach.* New York: John Wiley.

Schiffman, H. R. (1996). *Sensation and perception: An integrated approach.* New York: John Wiley.

Tolansky, S. (1964). *Optical illusions.* Oxford: Pergamon Press.

Web Link

Illusionism

http: / / abstract-art.com / ron_davis /

[This is Ron Davis' artwork in a variety of media from watercolor to 3-D plastic forms. He quotes his son's statement, "When the illusion is lost, the art is hard to find." Note the term illusionism.]