I Spy (Assessing the Reliability of Eye-Witness Testimony)

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Abstract

This paper discusses an activity that allows students to utilize introductory statistical techniques to assess the reliability of eye-witness testimony. Students watch a video re-enactment of a crime and are then asked to recall specific details pertaining to the crime. Students apply appropriate graphical analyses to the data collected in order to try to ascertain whether or not eye-witness testimony can be viewed as being reliable.

Keywords: Active learning, Bar chart, Pie chart, Frequency table, Box plot

1. Introduction

In this paper, we will discuss an interactive activity that revolves around a video that shows an enactment of a crime. The activity can be used to collect data that can later illustrate constructing graphs for categorical and quantitative data.

2. The Activity

We tell the class that we are going to show a video. We say nothing about the details of or the purpose of showing the video. We show the video and then we follow-up by circulating a questionnaire that asks students to recall facts about the crime depicted in the video. In addition, we collect pertinent information about the students who are completing the questionnaire.

A copy of the video can be downloaded from:
http://www.stat.gvsu.edu/faculty/richamar/Hulse_Abdn_scenario.html

FACTS ABOUT THE VIDEO:

MALE PERPETRATOR

Age: 33 years

Height: 6 ft

Build: medium to stocky
Hair: short, black (or dark brown), with fringe/combed forward at front, short sideburns

Facial features: brown eyes, thick dark eyebrows, slight stubble

Clothing: dark blue fleece jacket, light beige/grey/green khaki-coloured casual trousers, dark footwear

FEMALE VICTIM

Age: 26 years

Height: 5 ft 5 inches

Build: slim/petite

Hair: long, blonde/light brown, wavy

Facial features: [can't really see her face]

Clothing: long black coat, jeans, heeled boots

CAR

Color: blue

Make and Model: Honda Civic

License Plate: yellow

Figure 1 contains an illustration of the questionnaire that we circulate to students immediately after showing the video.

Figure 1. Class Questionnaire

Answer the following questions, to the best of your recollection, and as precisely as possible.

The following questions pertain to the male who appeared throughout the video.

Height (inches):

Age (years):

Weight (pounds):

Hair:

(a) length (long, short, medium):

(b) color:

Facial hair:

(a) sideburns (yes, no):

(b) moustache (yes, no):

(c) beard (yes, no):

Clothing:

(a) pants (color):

(b) shirt (color):

(c) jacket? (if so, color):

What type of weapon was used?

Getaway car:

(a) color:

(b) make and model:

(c) color of license plate:

(d) license plate number:

The following list of features pertains to the female who appeared throughout the video.

Height (inches):

Age (years):

Weight (pounds):

Hair:

(a) length (long, short, medium):

(b) color:
Clothing:

(a) pants (color):

(b) shirt (color):

(c) jacket? (if so, color):

(d) purse? (if so, what color):

The following questions pertain to you, the eyewitness:

Gender:

Height (inches):

Age (years):

Weight (pounds):

2.1 Analysis

After the responses to the questionnaire have been collected, we input the data into a spreadsheet. We then circulate an assignment that has students utilize the responses to the questionnaire to construct pie charts and bar charts to summarize the data. Figure 2 shows the assignment, along with typical answers that would be obtained.

Figure 2. Assignment

Background:
        Previous research findings demonstrate that jurors overestimate the accuracy of eyewitnesses. To illustrate this point, in one study mock jurors were presented with a case of an armed robbery that resulted in two deaths. Eighteen percent of the mock jurors, who heard only circumstantial evidence, convicted the defendant. However, 72% of the mock jurors who heard eyewitness testimony in addition to circumstantial evidence convicted the defendant. Even when the eyewitness had 20/400 vision, 68% found the defendant guilty.

(Resource: http://psy.ucsd.edu/~hflowe/)

Directions:
        In class you viewed a video of a crime being committed. Then, you answered a series of questions about the video. In this project we will construct graphical summaries of categorical data to help analyze the accuracy of eyewitness testimony.

1. Make a bar graph of the variable Male Pants Color. Plot percentages.
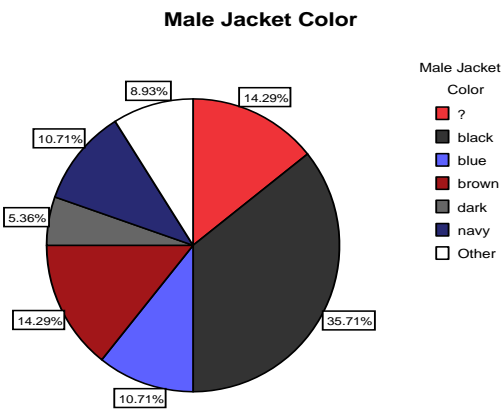
Distribution of Witness Guesses for

Male Pants Color
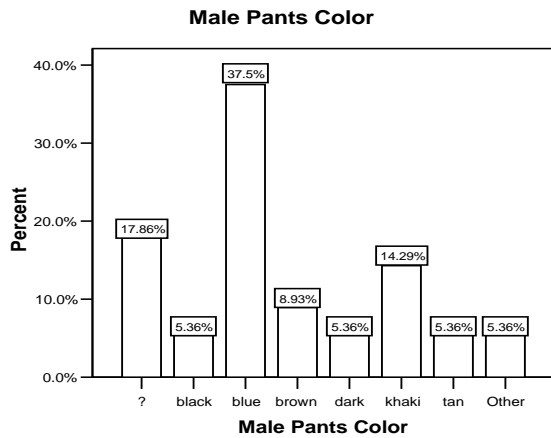
Based on the bar graph, what color pants do you believe that the perpetrator was wearing? Explain.

**2.** Make a pie chart of the variable Male Jacket Color.

Distribution of Witness Guesses for

Male Jacket Color

Based on the pie chart, what color jacket do you believe that the perpetrator was wearing? Explain.

3. Does there appear to be a relationship between gender of the eyewitness and whether or not the eyewitness believes the perpetrator had facial hair? Why?/Why not? **Construct a clustered bar graph in order to answer this question. Plot percentages.**

The Relationship Between Gender and

Belief of the Presence of Facial Hair
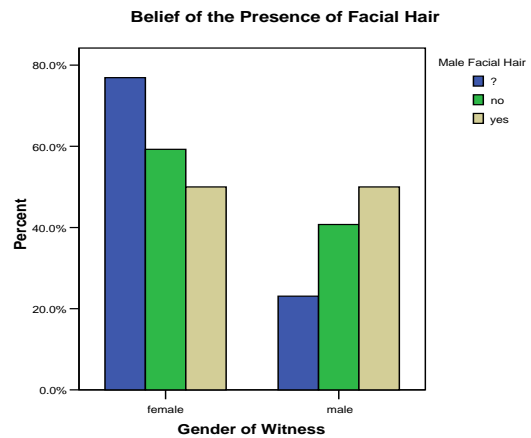
4. Make **relative frequency tables** of the variables Weapon and Getaway Car Color.

Weapon

		Frequency	Percent
Valid	?	8	14.3
	bar	1	1.8
	club	1	1.8
	fist	1	1.8
	gun	1	1.8
	hammer	32	57.1
	knife	1	1.8
	mallet	1	1.8
	metal	1	1.8
	none	2	3.6
	pole	1	1.8
	small	2	3.6
	stick	3	5.4
	wrench	1	1.8
	Total	56	100.0

Getaway Car Color

		Frequency	Percent
Valid	?	9	16.1
	black	1	1.8
	blue	33	58.9
	gray	1	1.8
	ltblue	3	5.4
	navy	1	1.8
	red	3	5.4
	teal	1	1.8
	turquois	1	1.8
	white	1	1.8
	yellow	2	3.6
	Total	56	100.0

3. Extensions

3.1 One Quantitative Variable

In addition to utilizing this activity to have students construct graphs to represent the distribution of a single categorical variable or two categorical variables, the instructor can use the collected data to help illustrate constructing graphs for a single quantitative variable. For example, Figure 3 displays a boxplot of the distribution of the witness responses for the perpetrator's height.

Figure 3. Distribution of witness responses for perpetrator's height

Male Height (in inches)
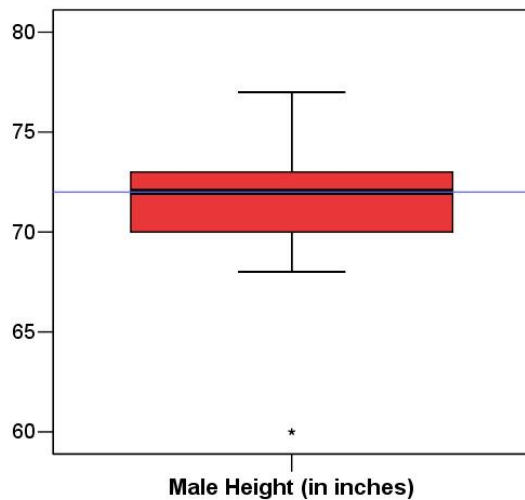
And, Figure 4 displays a boxplot of the distribution of the witness responses for the perpetrator's age.

Figure 4. Distribution of witness responses for perpetrator's age

Male Age
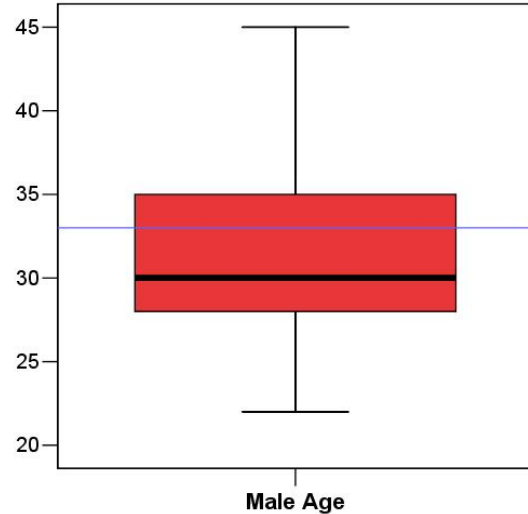
4. Conclusions

Students enjoy participating in this activity and develop an interest in analyzing the data to determine just how reliability eye-witness testimony is.

The activity gives the instructor an opportunity to discuss graphical representations of univariate categorical data, frequency tables, bivariate categorical data, and quantitative data.

References

Hulse, L.M., Memon, A., & Allan, K. (2003, July). Affecting memories: Emotional arousal and eyewitness testimony. In L.M. Hulse, & A. Memon (Chairs), True and false memories for events: The effects of emotional arousal. Symposium conducted at the 5th Biennial Meeting for the Society for Applied Research in Memory and Cognition, Aberdeen, Scotland.