

Precept Assignment 1

Your name here

Week 1

The American criminal justice system currently holds more than 2.3 million people. Mass incarceration directly translates into problems of prisoner reentry, which arise when formerly incarcerated individuals are released from prison and seek to reintegrate into society. To investigate the scale of these challenges, Devah Pager conducted an innovative project in Milwaukee to measure how a criminal record influences an individual's chances of getting hired. Pager's study was also designed to measure whether the effects of a criminal record differ for black and white job applicants.

This exercise is based on: Pager (2003) "The Mark of a Criminal Record".

To isolate the causal effect of a criminal record for black and white applicants, Pager ran an audit experiment. In this type of experiment, researchers present two similar people that differ only according to one trait thought to be the source of discrimination. This approach was used in the resume experiment described in Chapter 2 of our textbook Imai (2017), where researchers randomly assigned stereotypically African-American-sounding names and stereotypically white-sounding names to otherwise identical resumes to measure discrimination in the labor market (Bertrand and Mullainathan 2004).

To examine the role of a criminal record, Pager hired a pair of white men and a pair of black men and instructed them to apply for existing entry-level jobs in the city of Milwaukee. The men in each pair were matched on a number of dimensions, including physical appearance and self-presentation. As much as possible, the only difference between the two was that Pager randomly varied which individual in the pair would indicate to potential employers that he had a criminal record. Further, each week, the pair alternated which applicant would present himself as an ex-felon. To determine how incarceration and race influence employment chances, she compared callback rates among applicants with and without a criminal background and calculated how those callback rates varied by race.¹

In the data you will use (that's `pager_mark_2003.csv` in the data folder), nearly all these cases are present, but 4 cases have been redacted. As a result, your findings may differ slightly from those in the paper. The names and descriptions of variables are shown below.

Name	Description
<code>jobid</code>	Job ID number
<code>callback</code>	1 if tester received a callback, 0 if the tester did not receive a callback.
<code>black</code>	1 if the tester is black, 0 if the tester is white.
<code>crimrec</code>	1 if the tester has a criminal record, 0 if the tester does not.
<code>interact</code>	1 if tester interacted with employer during the job application, 0 if tester does not interact with employer.
<code>city</code>	1 if job is located in the city center, 0 if job is located in the suburbs.
<code>distance</code>	Job's average distance to downtown.
<code>custserv</code>	1 if job is in the customer service sector, 0 if it is not.
<code>manualskill</code>	1 if job requires manual skills, 0 if it does not.

You may not need to use all of these variables for this activity. We've kept these unnecessary variables in the dataset because it is common to receive a dataset with much more information than you need.

¹The ethical issues raised by this experiment are also interesting. In essence these actors were deceiving the employers about their intention and background. However, there is a sound ethical argument for running this kind of experiment as articulated in Riach and Rich (2004). By the end of the experiment, Pager's "auditors" had applied to 350 jobs in pairs, making 700 total job applications.

Part 1: Thinking about the design of the study

Question 1.1

Before we begin analyzing the data, let's first consider the design of the study. Black men have, on average, earned less money and struggled more than white men in the labor market. The argument has been made that this disadvantage is attributable to how employers perceive race.

We are going to first assess the internal validity of the study. How does Pager's study allow us to isolate the effect of race? In other words, before reading this study, what will allow us to argue that the race of the applicant is *causing* any differential impact in outcome? Is this study better described as a laboratory experiment, field experiment, or observational study? Why?

Answer 1.1

Question 1.2

Imagine instead that this had been an observational study. In this hypothetical, rather than randomizing applicants, imagine Pager had surveyed employers, asking about the rate at which they gave callbacks based on the race and criminal history of the applicants. Assume all employers were truthful and accurate and imagine, again hypothetically, that the results from this survey were *exactly* identical to the included data.

Would this observational study have yielded a causal estimate? Discuss confounders that could instead be driving the results.

Answer 1.2

Question 1.3

When carrying out this experiment, Pager made many decisions. For example, she opted to conduct the research in Milwaukee; she could have done the same experiment in Dallas or Topeka or Princeton. She ran the study at a specific time: between June and December of 2001. But, she could have also run it at a different time, say 5 years earlier or 5 years later. Pager decided to hire 23-year-old male college students as her testers; she could have done the same experiment with 23-year-old female college students or 40-year-old male high school drop-outs. Further, the criminal record she randomly assigned to her testers was a felony conviction related to drugs (possession with intent to distribute, cocaine). But, she could have assigned her testers a felony conviction for assault or tax evasion.

Pager was very aware of each of these decisions, and she discusses them in her paper. Now you should pick *two* of these decisions described above or another decision of your choosing. Speculate about how the results of the study might (or might not) change if you were to conduct the same study but alter this specific decision. Does this pertain more to the *internal validity* or *external validity* of the study?

Answer 1.3

Part 2: Analyzing the Data

Question 2.1

Begin by loading `pager_mark_2003.csv` into R and explore the data. How many cases are there in the data? Call the `summary` function to get a sense of things. In how many cases is the tester black? In how many cases is he white?

Answer 2.1

```
## NOTE make sure your working directory is the one this file is in!
audit <- read.csv("data/pager_mark_2003.csv")

## (1) Number of observations
dim(audit)

## [1] 696    9

## (2) quick summary
summary(audit)
```

##	jobid	callback	black	crimrec
##	Min. : 1.00	Min. :0.0000	Min. :0.000	Min. :0.0000
##	1st Qu.: 87.75	1st Qu.:0.0000	1st Qu.:0.000	1st Qu.:0.0000
##	Median :1024.50	Median :0.0000	Median :1.000	Median :0.0000
##	Mean : 658.57	Mean :0.1638	Mean :0.569	Mean :0.4986
##	3rd Qu.:1112.25	3rd Qu.:0.0000	3rd Qu.:1.000	3rd Qu.:1.0000
##	Max. :1200.00	Max. :1.0000	Max. :1.000	Max. :1.0000

##	interact	city	distance	custserv
##	Min. :0.0000	Min. :0.0000	Min. : 0.00	Min. :0.0000
##	1st Qu.:0.0000	1st Qu.:0.0000	1st Qu.: 8.00	1st Qu.:0.0000
##	Median :0.0000	Median :0.0000	Median :12.00	Median :1.0000
##	Mean :0.2428	Mean :0.3919	Mean :11.96	Mean :0.6282
##	3rd Qu.:0.0000	3rd Qu.:1.0000	3rd Qu.:16.00	3rd Qu.:1.0000
##	Max. :1.0000	Max. :1.0000	Max. :25.00	Max. :1.0000
##		NA's :2	NA's :2	NA's :2

##	manualskill
##	Min. :0.0000
##	1st Qu.:0.0000
##	Median :0.0000
##	Mean :0.4813
##	3rd Qu.:1.0000
##	Max. :1.0000
##	NA's :2

Question 2.2

Next, we are going to begin learning how to subset data. We will spend some time over the next few weeks building this skill. The following command will create a new data frame that contains only black respondents.

```
audit.black <- audit[audit$black==1, ]
```

Data frames are organized using the following,

```
data[rows, columns]
```

where the first argument in the brackets tells you what rows to consider and the second tells what columns. By leaving the second element empty, we are telling R to return all columns. The first argument is telling R to return all rows in the data frame for which `audit$black` is exactly equal to one.

Avoid common mistakes: use two equal signs when subsetting and do not forget the comma!

Run this command and summarize the data frame. Then, create a data frame 'audit.white' with only white respondents. Summarize this data frame.

Who has a higher callback rate: white applicants or black applicants? Is this estimated effect causal, in the sense that it is not driven by a confounding variable? Why or why not?

Answer 2.2

```
audit.black <- audit[audit$black==1, ]
audit.white <- audit[audit$black==0, ]
```

```
summary(audit.black)
```

```
##      jobid      callback      black      crimrec
##  Min.   :1001   Min.   :0.00000   Min.   :1   Min.   :0.0000
## 1st Qu.:1050   1st Qu.:0.00000   1st Qu.:1   1st Qu.:0.0000
## Median :1100   Median :0.00000   Median :1   Median :0.0000
## Mean   :1100   Mean   :0.09596   Mean   :1   Mean   :0.4975
## 3rd Qu.:1151   3rd Qu.:0.00000   3rd Qu.:1   3rd Qu.:1.0000
## Max.   :1200   Max.   :1.00000   Max.   :1   Max.   :1.0000
##
##      interact      city      distance      custserv
##  Min.   :0.0000   Min.   :0.0000   Min.   : 0.00   Min.   :0.0000
## 1st Qu.:0.0000   1st Qu.:0.0000   1st Qu.: 7.00   1st Qu.:0.0000
## Median :0.0000   Median :0.0000   Median :11.00   Median :1.0000
## Mean   :0.2475   Mean   :0.4061   Mean   :11.25   Mean   :0.6599
## 3rd Qu.:0.0000   3rd Qu.:1.0000   3rd Qu.:15.00   3rd Qu.:1.0000
## Max.   :1.0000   Max.   :1.0000   Max.   :23.00   Max.   :1.0000
##
##      NA's      :2      NA's      :2      NA's      :2
## manualskill
##  Min.   :0.0000
## 1st Qu.:0.0000
## Median :1.0000
## Mean   :0.5076
## 3rd Qu.:1.0000
## Max.   :1.0000
## NA's    :2
```

```
summary(audit.white)
```

```
##      jobid      callback      black      crimrec
## Min.   : 1.00   Min.   :0.0000   Min.   :0   Min.   :0.0
## 1st Qu.: 38.00   1st Qu.:0.0000   1st Qu.:0   1st Qu.:0.0
## Median : 75.50   Median :0.0000   Median :0   Median :0.5
## Mean   : 75.45   Mean   :0.2533   Mean   :0   Mean   :0.5
## 3rd Qu.:113.00   3rd Qu.:1.0000   3rd Qu.:0   3rd Qu.:1.0
## Max.   :149.00   Max.   :1.0000   Max.   :0   Max.   :1.0
##      interact      city      distance      custserv
## Min.   :0.0000   Min.   :0.0000   Min.   : 0.50   Min.   :0.0000
## 1st Qu.:0.0000   1st Qu.:0.0000   1st Qu.:10.00   1st Qu.:0.0000
## Median :0.0000   Median :0.0000   Median :13.00   Median :1.0000
## Mean   :0.2367   Mean   :0.3733   Mean   :12.89   Mean   :0.5867
## 3rd Qu.:0.0000   3rd Qu.:1.0000   3rd Qu.:18.00   3rd Qu.:1.0000
## Max.   :1.0000   Max.   :1.0000   Max.   :25.00   Max.   :1.0000
##      manualskill
## Min.   :0.0000
## 1st Qu.:0.0000
## Median :0.0000
## Mean   :0.4467
## 3rd Qu.:1.0000
## Max.   :1.0000
```

Call backs are higher for white respondents. No confounding due to randomization

Question 2.3

Now we examine the central question of the study. Take the two data frames we created above and create four more: one for whites with a criminal record (`audit.white.crim`), one for whites without a criminal record (`audit.white.nocrim`), one for blacks with a criminal record (`audit.black.crim`), and one for blacks without a criminal record (`audit.black.nocrim`). What are the callback rates for each group?

(Note: there are more efficient ways to do this calculation than creating four data frames and summarizing each. We will introduce several over the next few weeks. If you can find a more efficient way to answer the question than the way we have taught you, or you know one, use it. That will be a standing rule through the course.)

Answer 2.3

```
audit.white.crim <- audit.white[audit.white$crimrec==1, ]
audit.white.nocrim <- audit.white[audit.white$crimrec==0, ]
audit.black.crim <- audit.black[audit.black$crimrec==1, ]
audit.black.nocrim <- audit.black[audit.black$crimrec==0, ]
```

```
## You can use summary here, I'm using mean
```

```
mean(audit.white.crim$callback)
```

```
## [1] 0.1666667
```

```
mean(audit.white.nocrim$callback)
```

```
## [1] 0.34
```

```
mean(audit.black.crim$callback)
```

```
## [1] 0.05076142
```

```
mean(audit.black.nocrim$callback)
```

```
## [1] 0.1407035
```

Question 2.4

What is the difference in callback rates between individuals with and without a criminal record within each race. What do these specific results tell us?

Answer 2.4

Question 2.5

Compare the callback rates of whites *with a criminal record* versus blacks *without a criminal record*. What do we learn from this comparison?

Answer 2.5

Question 2.6

Summarize the major results from Pager's studies. Do the results seem compelling to you? Were you surprised, or not? Reflect: how do you feel about the study's findings?

Answer 2.6

Let's conclude with a video, where Professor Pager explains her results and their significance. Please [watch Professor Pager discuss the design and result](#).

References

Bertrand, Marianne, and Sendhil Mullainathan. 2004. "Are Emily and Greg More Employable Than Lakisha and Jamal? A Field Experiment on Labor Market Discrimination." *The American Economic Review* 94 (4): 991–1013. doi:[10.1257/0002828042002561](#).

Imai, Kosuke. 2017. *Quantitative Social Science: An Introduction*. Princeton: Princeton University Press.

Pager, Devah. 2003. "The Mark of a Criminal Record." *American Journal of Sociology* 108 (5): 937–75. doi:[10.1086/374403](#).

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