State, Slicing, and A3

Learning goals:

- Understand how state works within a notebook.
- Understand slicing DataFrames.
- Get hints for a bunch of questions on A3.

COGS 108 Winter 2020
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Discussion 5

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Why does my code sometimes break?

Keeping track of notebook state is very, very subtle!

What is df_income?

	first_name	id	income	last_name
0	Lauren	1592	23951.49	Murphy
1	Rebecca	27495	31019.37	Walls
2	Alejandra	19776	19058.09	Garcia
...	...	...	...	...
12662	Mark	58060	50696.11	Torres
12663	Peter	13881	0.00	Gibson
12664	Michele	35147	19864.48	Robinson

```
df_income.drop(['first_name', 'last_name'], axis=1)
```

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1	27495	31019.37
2	19776	19058.09
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12665 rows × 2 columns

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What happens if you run the first cell one time? Two times?

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In [ ]:
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Edited to ->

```
df_income = df_income.drop(['last_name'], axis=1)
```

```
In [ ]: df_income
```

You will pass the local tests but **fail the autograder**! Be very careful when editing cells that mutate variables.

Okay, so I how do not screw things up?

- Avoid mutation until absolutely necessary!
  - Use temporary variables to work around this.
- If a cell has code that results in mutation, only run it once.
  - If you need to run it again (e.g. because of a bug), run all cells above it first.
- Restart kernel and run all cells often, and especially before you turn in your assignment.

What's the deal with brackets?

- **Why do I need brackets? When do I use parentheses and when do I use brackets?**
- **Why do I sometimes put strings in brackets but other times an expression?**
- **Why do I sometimes need double brackets??**

For more on this: http://bit.ly/sam-pandas-01

Use brackets when taking slices (subsets) of a DF

Key idea: Only **one** value goes into the brackets.

	Candidate	Party	%	Year	Result
0	Obama	Democratic	52.9	2008	win
1	McCain	Republican	45.7	2008	loss
2	Obama	Democratic	51.1	2012	win
3	Romney	Republican	47.2	2012	loss
4	Clinton	Democratic	48.2	2016	loss
5	Trump	Republican	46.1	2016	win

How do I grab a single column?

```
elections["Candidate"].head(6)
```

```
0      Reagan
1      Carter
2    Anderson
3      Reagan
4     Mondale
5        Bush
Name: Candidate, dtype: object
```

This is a Series!

How do I grab multiple columns?

```
elections[["Candidate", "Party"]].head(6)
```

	Candidate	Party
0	Reagan	Republican
1	Carter	Democratic
2	Anderson	Independent
3	Reagan	Republican
4	Mondale	Democratic
5	Bush	Republican

This is a DF!

Use brackets when taking slices (subsets) of a DF

	Candidate	Party	%	Year	Result
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4	Clinton	Democratic	48.2	2016	loss
5	Trump	Republican	46.1	2016	win

How do I grab rows?

```
elections[0:3]
```

	Candidate	Party	%	Year	Result
0	Reagan	Republican	50.7	1980	win
1	Carter	Democratic	41.0	1980	loss
2	Anderson	Independent	6.6	1980	loss

This is a DF!

```
elections[elections['Party'] == 'Independent']
```

	Candidate	Party	%	Year	Result
2	Anderson	Independent	6.6	1980	loss
9	Perot	Independent	18.9	1992	loss
12	Perot	Independent	8.4	1996	loss

Whoa, what's going on here?

Demo with Elections Data

(Full video walkthrough available on the discussion GitHub page in extras column.)

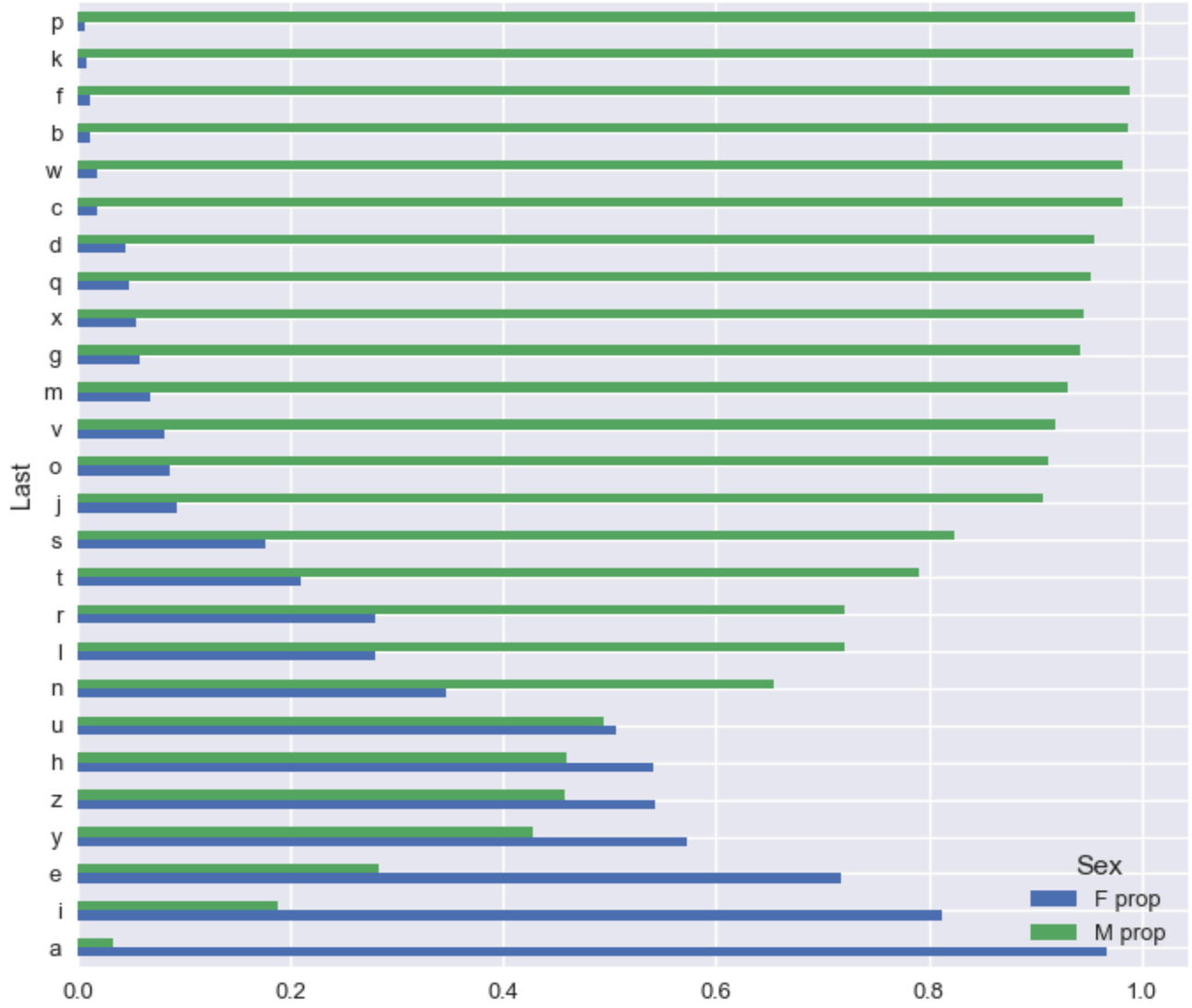
Bracket Takeaways?

- **Brackets = slicing a DF.**
  Parentheses = calculating something about a DF.
- **Strings in brackets = grabbing column (Series)**
  List of strings in brackets = grabbing columns (DF)
- **Slice in brackets = grabbing rows (DF)**
  Boolean expression in brackets = grabbing rows (DF)
  (You will need this last one for question 4b.)

Preview of next week

String methods: how do I work with text?

Using last letter of a person's first name to predict birth sex



`

- 1b: Use pd.read_json
- 1e: Leave blank if your columns are already in the right order.
- 2a: Use Series.isna()
- Part 3: Use plt.hist(). Ignore warnings for 3d.
- 4b, 4f, 5e: Use boolean slicing
- 4d: Use np.log10(), not np.log()
- 6i: the better predictor is the one with the most non-zero correlation.