Introduction to
Programming with R

Representing Data

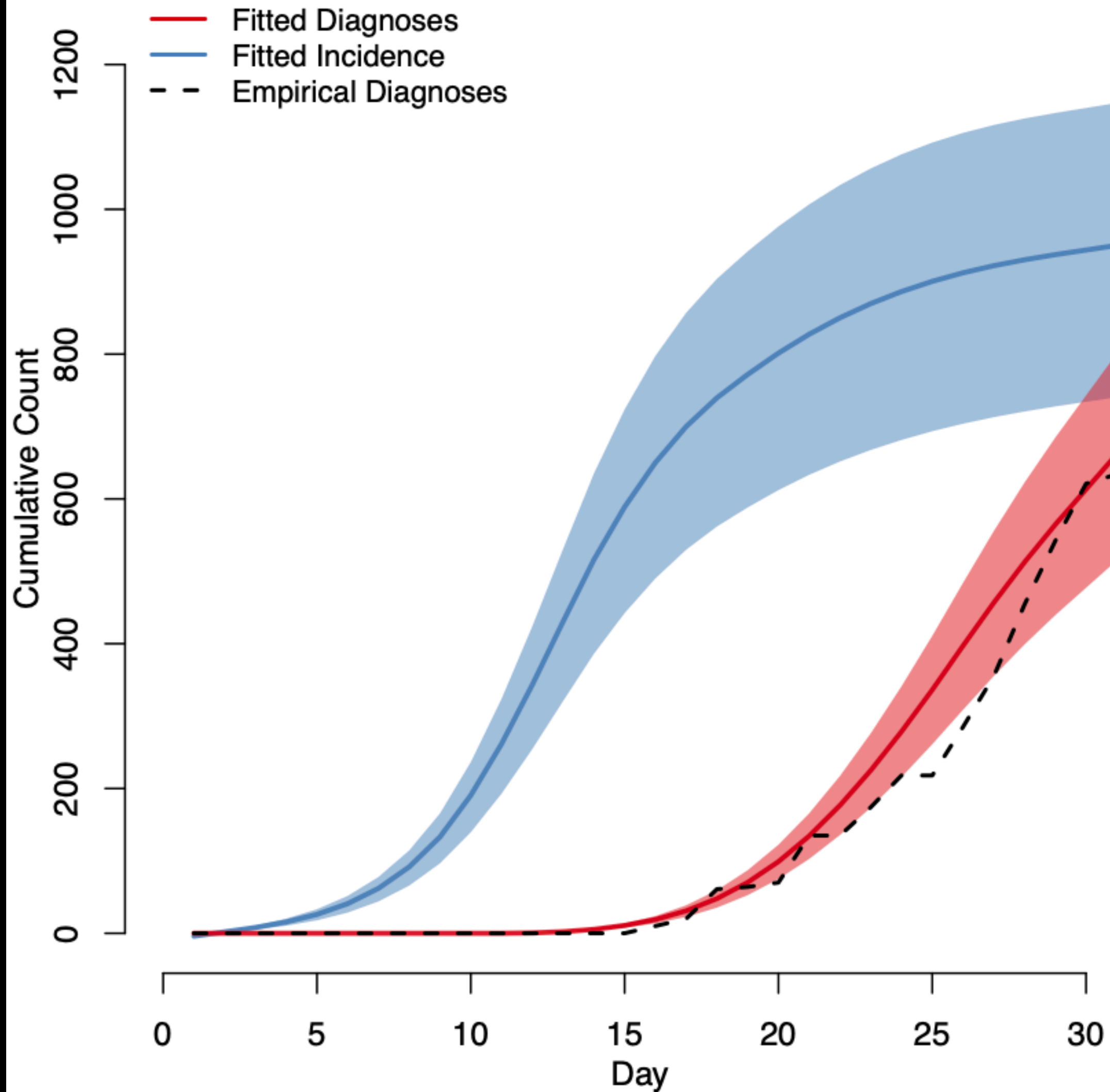Data Science

Data Visualization

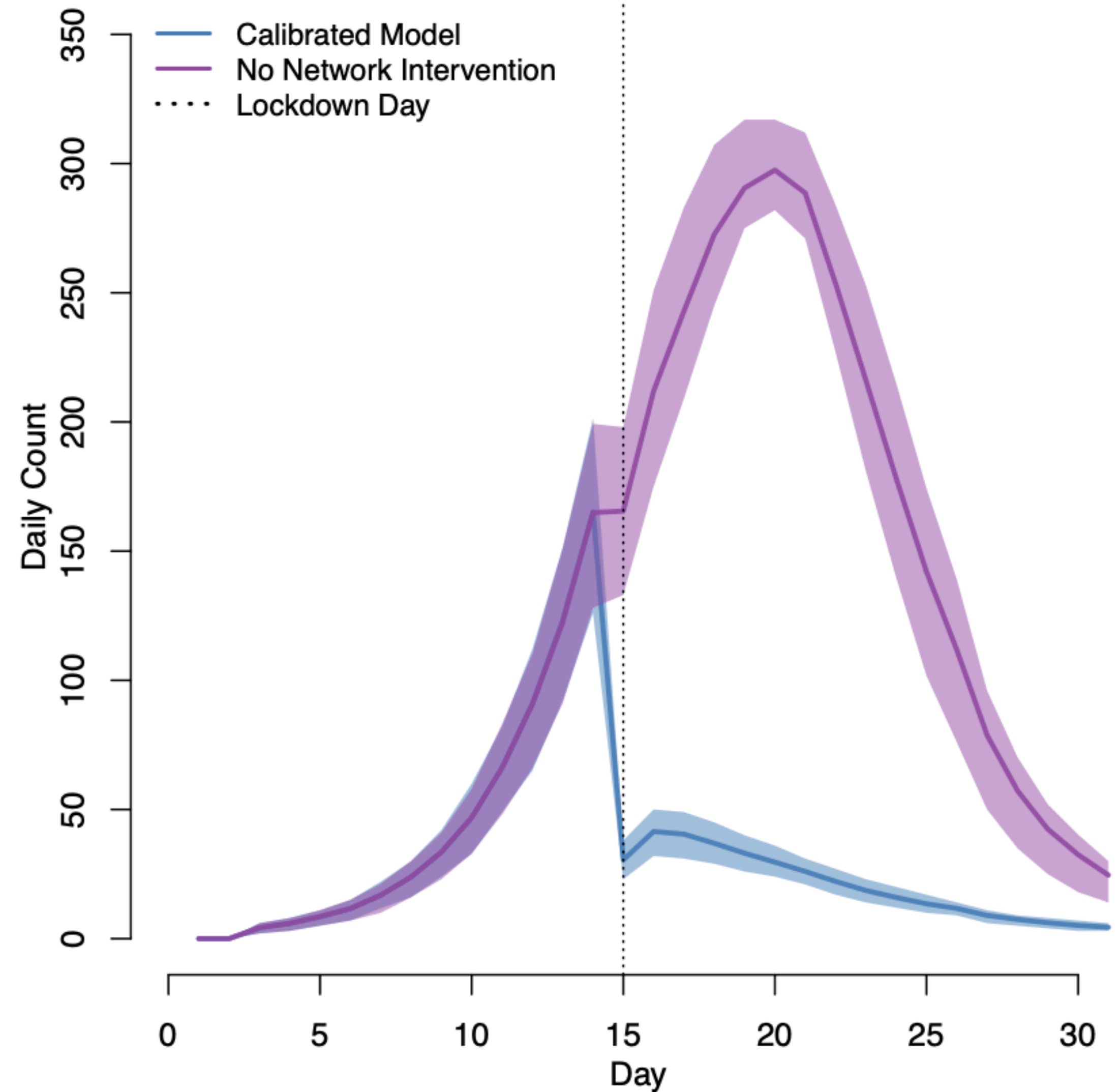Research

Statistical Computing

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A. Model Calibration

Fitted Diagnoses
Fitted Incidence
Empirical Diagnoses

B. Estimated Daily Incidence

Calibrated Model
No Network Intervention
Lockdown Day

https://github.com/EpiModel/COVID-CruiseShip

The Most Common Unisex Names In America

Names for which at least one-third of recipients were male and at least one-third were female, through 2013

	NAME	ESTIMATED PEOPLE WITH NAME	MALE SHARE	FEMALE SHARE
1	Casey	176,544	59%	42%
2	Riley	154,861	51	49
3	Jessie	136,382	48	52
4	Jackie	132,929	42	58
5	Avery	121,797	34	66
6	Jaime	109,870	56	44
7	Peyton	94,896	43	57
8	Kerry	88,964	48	52
9	Jody	80,401	35	65
10	Kendall	79,211	37	63
11	Payton	64,152	33	67
12	Skyler	53,486	65	35
13	Frankie	51,288	62	38
14	Pat	44,782	37	63
15	Quinn	41,921	64	36
16	Harley	41,238	57	43
17	Reese	36,361	36	64
18	Robbie	32,636	55	45
19	Tommie	29,529	66	34
20	Justice	27,351	53	47

Integrated Development Environments

Functions

Arguments

Side Effects

Return Values

Objects

<-

String Concatenation

"Hello, "

"Hello, "   "Carter"

"Hello, Carter"

Function Composition

```
print(paste0("Hello, ", name))
```

```
print(paste0("Hello, ", name))
```

```
print("Hello, Carter")
```

```
print("Hello, Carter")
```

"Hello, Carter"

Arithmetic

+

−

*

/

...

Storage Modes

Character

Double

Integer

...

Coercion

```
as.character

as.double

as.integer

…
```

Break

Tables

candidate	poll	mail
Mario		
Peach		
Bowser		

candidate	poll	mail
Mario	37	
Peach	43	
Bowser	84	

candidate	poll	mail
Mario	37	63
Peach	43	107
Bowser	84	36

candidate	poll	mail
Mario	37	63
Peach	43	107
Bowser	84	36

?

candidate	poll	mail
Mario	37	63
Peach	43	107
Bowser	84	36

?

CSV Files

```
candidate,poll,mail
Mario,37,63
Peach,43,107
Bowser,84,36
```

Data Frames

candidate	poll	mail
Mario	37	63
Peach	43	107
Bowser	84	36

votes

candidate	poll	mail
Mario	37	63
Peach	43	107
Bowser	84	36

```
votes[row, column]
```

candidate	poll	mail
Mario	37	63
Peach	43	107
Bowser	84	36

votes[, 1]

candidate	poll	mail
Mario	37	63
Peach	43	107
Bowser	84	36

votes[, 2]

candidate	poll	mail
Mario	37	63
Peach	43	107
Bowser	84	36

votes[, 3]

candidate	poll	mail
Mario	37	63
Peach	43	107
Bowser	84	36

votes$candidate

candidate	poll	mail
Mario	37	63
Peach	43	107
Bowser	84	36

votes$poll

candidate	poll	mail
Mario	37	63
Peach	43	107
Bowser	84	36

votes$mail

Vectors

candidate	poll	mail
Mario	37	63
Peach	43	107
Bowser	84	36

votes$candidate

Mario
Peach
Bowser

votes$candidate

Mario
Peach
Bowser

votes$candidate[1]

votes$candidate[3]

Mario	Peach	Bowser

votes$candidate

Vector Arithmetic

candidate	poll	mail
Mario	37	63
Peach	43	107
Bowser	84	36

votes

votes$poll

37
43
84

votes$mail

63
107
36

votes$poll

37
43
84

+

votes$mail

63
107
36

= ?

votes$poll		votes$mail		total
37		63		
43	+	107	=	
84		36		

votes$poll		votes$mail		total	
37		63		100	
43	+	107	=		
84		36			

votes$poll

37
43
84

+

votes$mail

63
107
36

=

total

100
150

votes$poll

37
43
84

+

votes$mail

63
107
36

=

total

100
150
120

total

100
150
120

Break

"You previously indicated that you are not currently registered to vote. Which of the following reasons best describes why you are not currently registered to vote?"

1. "I don't have time to register to vote"
2. "I don't trust the political system to serve my needs"
3. "I don't know how to register"
4. "I don't want to register"
5. "I am not eligible to vote"
6. "I don't think my vote matters"
7. "Other"

Special Values

```
Inf, -Inf
NA
NaN
NULL
```

"[There] will be an election for president, members of the United States Senate, House of Representatives, and other state and local offices. Do you plan to vote in [the election]?"
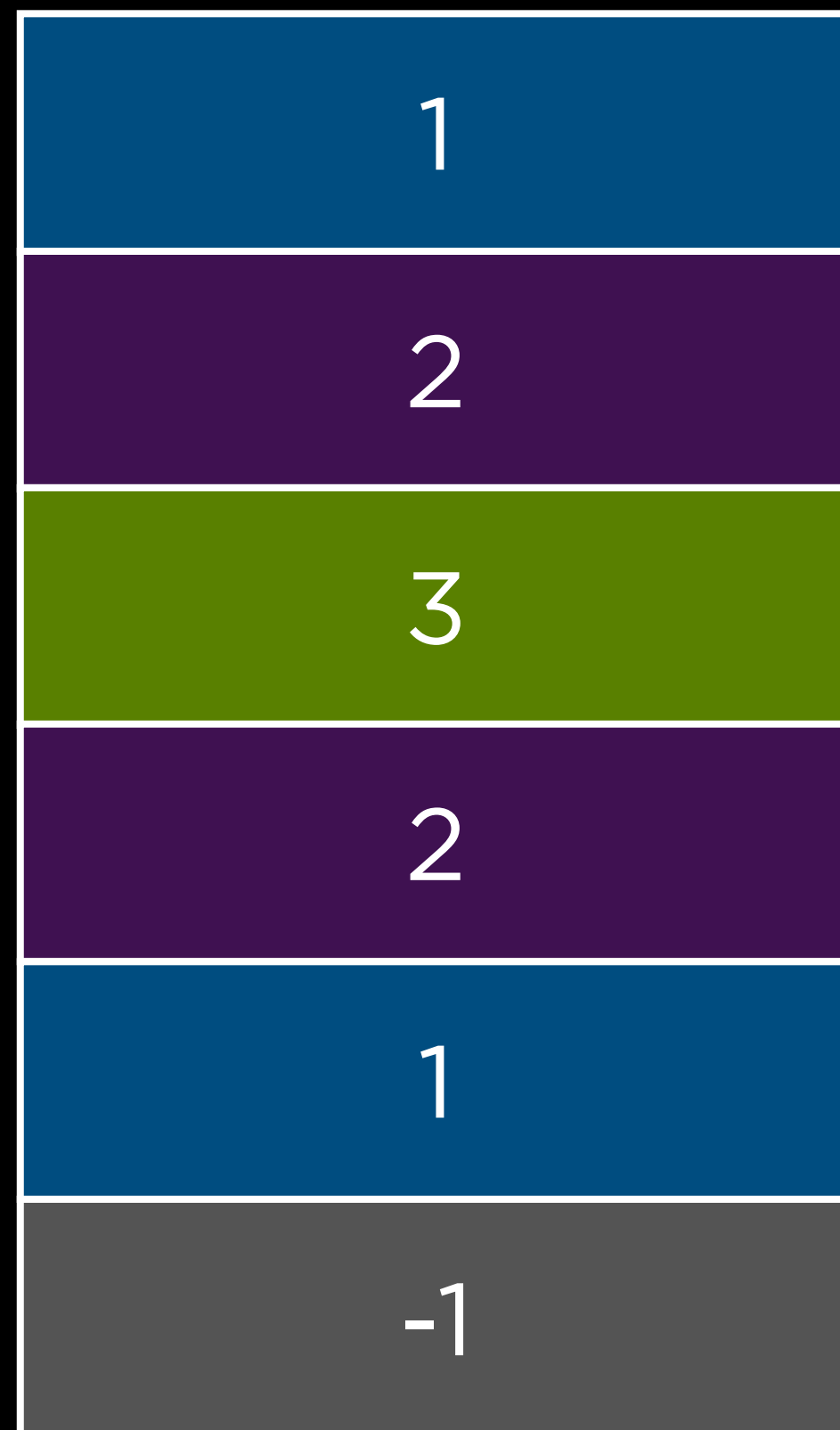
1: "Yes"
2: "No"
3: "Unsure/Undecided"

Factors

voters$Q21

1
2
3
2
1
-1

voters$Q21

voters$Q21

1
2
3
2
1
-1

Level	Label
-1	"?"
1	"Yes"
2	"No"
3	"Unsure/..."

voters$Q21

	"Yes"
	"No"
	"Unsure/..."
	"No"
	"Yes"
	"?"

Level	Label
-1	"?"
1	"Yes"
2	"No"
3	"Unsure/..."

voters$Q21

"Yes"	
"No"	
"Unsure/..."	
"No"	
"Yes"	
"?"	

Level	Label
-1	"?"
1	"Yes"
2	"No"
3	"Unsure/..."

voters$Q21

	Yes
	"Yes"
	"No"
	"Unsure/..."
	"No"
	"Yes"
	NA

Level	Label
1	"Yes"
2	"No"
3	"Unsure/..."

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Programming with R

Representing Data