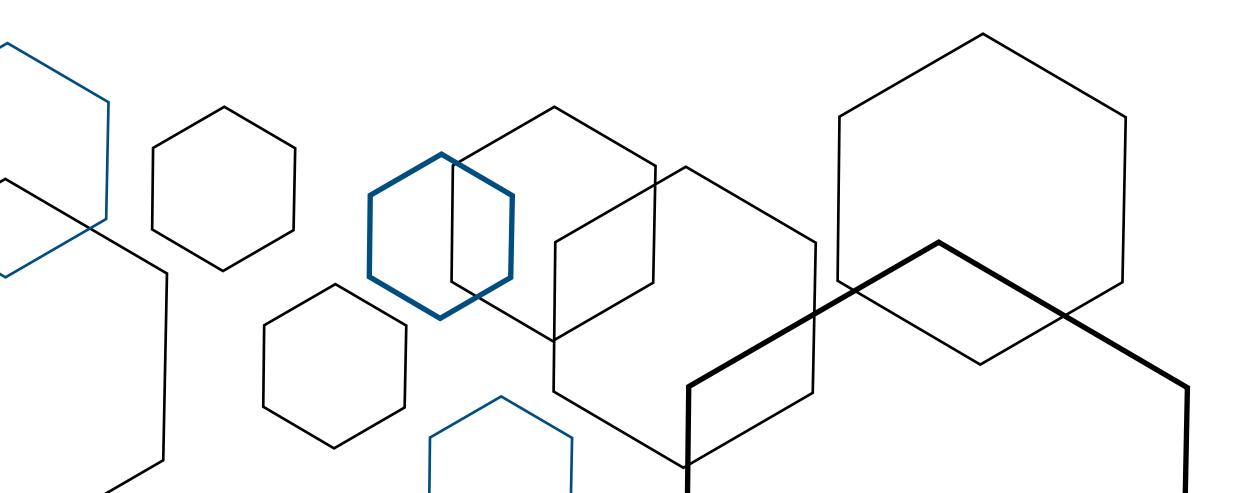






Starting with Data





Questions

- What is a data frame?
- How can I get data into and out of R?
- How can I get summary information about my data?
- How can I change the formatting of my data?

Objectives

- Describe what a data frame is
- Create a data frame manually
- Load external data into a data frame
- Summarize data frame contents
- Describe the various variable formats R recognizes



Data frame structure

Most of us are familiar with viewing data in a form like this:

	A	В	С	D	E	F	G	Н	1	J
1	geoid	state	Designated	county	Туре	dec_score	SE_Flag	Population	medhhincome2014_tract	PovertyRate
2	01001020200	Alabama		Autauga	Low-Income Community	4		2,196	\$ 41,107	24.0%
3	01001020300	Alabama		Autauga	Non-LIC Contiguous	6		3,136	\$ 51,250	10.7%
4	01001020700	Alabama	1	Autauga	Low-Income Community	9		3,047	\$ 45,234	19.0%
5	01001020802	Alabama		Autauga	Non-LIC Contiguous	10		10,743	\$ 61,242	15.3%
6	01001021000	Alabama		Autauga	Non-LIC Contiguous	5		2,899	\$ 49,567	15.1%
7	01001021100	Alabama		Autauga	Low-Income Community	6		3,247	\$ 40,801	19.4%
8	01003010100	Alabama		Baldwin	Non-LIC Contiguous	6		4,013	\$ 45,667	14.0%
9	01003010200	Alabama	1	Baldwin	Low-Income Community	9		3,067	\$ 33,333	27.2%
10	01003010300	Alabama		Baldwin	Non-LIC Contiguous	10		8,079	\$ 47,443	6.8%
11	01003010400	Alabama	1	Baldwin	Non-LIC Contiguous	9		4,578	\$ 46,696	14.8%
12	01003010500	Alabama	1	Baldwin	Low-Income Community	8		5,115	\$ 45,825	16.8%
13	01003010600	Alabama	1	Baldwin	Low-Income Community	9		3,503	\$ 28,219	28.2%
14	01003010904	Alabama	1.07	Baldwin	Non-LIC Contiguous	10		6,523	\$ 48,521	16.3%
15	01003010906	Alabama		Baldwin	Non-LIC Contiguous	10		5,272	\$ 42,120	11.5%
16	01003011000	Alabama		Baldwin	Low-Income Community	10		3,885	\$ 34,883	21.8%
17	01003011401	Alabama		Baldwin	Non-LIC Contiguous	10		10,021	\$ 44,886	11.9%
18	01003011406	Alabama	ļ,	Baldwin	Low-Income Community	10		3,810	\$ 41,867	19.0%
19	01003011407	Alabama		Baldwin	Low-Income Community	10		4,970	\$ 41,840	20.8%
20	01003011501	Alabama	1	Baldwin	Non-LIC Contiguous	9		5,947	\$ 48,191	17.9%
21	01003011502	Alabama	1	Baldwin	Low-Income Community	10		11,575	\$ 39,563	20.3%
22	01003011601	Alabama		Baldwin	Low-Income Community	10		6,640	\$ 39,586	24.3%
23	01005950100	Alabama	1	Barbour	Low-Income Community	6		3,477	\$ 38,571	33.2%
24	01005950200	Alabama		Barbour	Low-Income Community	1		4,404	\$ 32,742	27.2%
25	01005950300	Alabama		Barbour	Low-Income Community	1		1,657	\$ 29,911	36.1%
26	01005950400	Alabama		Barbour	Non-LIC Contiguous	1		3,693	\$ 33,241	19.6%
27	01005950500	Alabama		Barbour	Low-Income Community	8		3,438	\$ 38,859	19.1%
28	01005950600	Alabama		Barbour	Low-Income Community	4		2,003	\$ 27,708	31.0%
29	01005950700	Alabama		Barbour	Low-Income Community	6		1,959	\$ 28,409	31.3%
30	01005950800	Alabama		Barbour	Non-LIC Contiguous	5		2,195	\$ 40,724	14.2%
31	01005950900	Alabama		Barbour	Low-Income Community	4		3,788	\$ 27,027	28.5%
32	01007010001	Alabama		Bibb Cou	Low-Income Community	7		2,783	\$ 44,422	9.6%

Data frame structure

Most of us are familiar with viewing data in a form like this:

- What does each row represent?
- What does each column represent?

	A	В	С	D	E	F	G	Н	1	J
1	geoid	state	Designated	county	Туре	dec_score	SE_Flag	Population	medhhincome2014_tract	PovertyRate
2	01001020200	Alabama	1010	Autauga	Low-Income Community	4		2,196	\$ 41,107	24.0%
3	01001020300	Alabama		Autauga	Non-LIC Contiguous	6		3,136	\$ 51,250	10.7%
4	01001020700	Alabama	1	Autauga	Low-Income Community	9		3,047	\$ 45,234	19.0%
5	01001020802	Alabama		Autauga	Non-LIC Contiguous	10		10,743	\$ 61,242	15.3%
6	01001021000	Alabama		Autauga	Non-LIC Contiguous	5		2,899	\$ 49,567	15.1%
7	01001021100	Alabama		Autauga	Low-Income Community	6		3,247	\$ 40,801	19.4%
8	01003010100	Alabama		Baldwin	Non-LIC Contiguous	6		4,013	\$ 45,667	14.0%
9	01003010200	Alabama	1	Baldwin	Low-Income Community	9		3,067	\$ 33,333	27.2%
10	01003010300	Alabama		Baldwin	Non-LIC Contiguous	10		8,079	\$ 47,443	6.8%
11	01003010400	Alabama	1	Baldwin	Non-LIC Contiguous	9		4,578	\$ 46,696	14.8%
12	01003010500	Alabama	1	Baldwin	Low-Income Community	8		5,115	\$ 45,825	16.8%
13	01003010600	Alabama	1	Baldwin	Low-Income Community	9		3,503	\$ 28,219	28.2%
14	01003010904	Alabama		Baldwin	Non-LIC Contiguous	10		6,523	\$ 48,521	16.3%
15	01003010906	Alabama		Baldwin	Non-LIC Contiguous	10		5,272	\$ 42,120	11.5%
16	01003011000	Alabama		Baldwin	Low-Income Community	10		3,885	\$ 34,883	21.8%
17	01003011401	Alabama		Baldwin	Non-LIC Contiguous	10		10,021	\$ 44,886	11.9%
18	01003011406	Alabama		Baldwin	Low-Income Community	10		3,810	\$ 41,867	19.0%
19	01003011407	Alabama		Baldwin	Low-Income Community	10		4,970	\$ 41,840	20.8%
20	01003011501	Alabama	1	Baldwin	Non-LIC Contiguous	9		5,947	\$ 48,191	17.9%
21	01003011502	Alabama	1	Baldwin	Low-Income Community	10		11,575	\$ 39,563	20.3%
22	01003011601	Alabama		Baldwin	Low-Income Community	10		6,640	\$ 39,586	24.3%
23	01005950100	Alabama	1	Barbour	Low-Income Community	6		3,477	\$ 38,571	33.2%
24	01005950200	Alabama		Barbour	Low-Income Community	1		4,404	\$ 32,742	27.2%
25	01005950300	Alabama		Barbour	Low-Income Community	1		1,657	\$ 29,911	36.1%
26	01005950400	Alabama		Barbour	Non-LIC Contiguous	1		3,693	\$ 33,241	19.6%
27	01005950500	Alabama		Barbour	Low-Income Community	8		3,438	\$ 38,859	19.1%
28	01005950600	Alabama		Barbour	Low-Income Community	4		2,003	\$ 27,708	31.0%
29	01005950700	Alabama		Barbour	Low-Income Community	6		1,959	\$ 28,409	31.3%
30	01005950800	Alabama	Ť	Barbour	Non-LIC Contiguous	5		2,195	\$ 40,724	14.2%
31	01005950900	Alabama	1	Barbour	Low-Income Community	4		3,788	\$ 27,027	28.5%
32	01007010001	Alabama		Bibb Cou	Low-Income Community	7	1	2,783	\$ 44,422	9.6%

Data frame structure

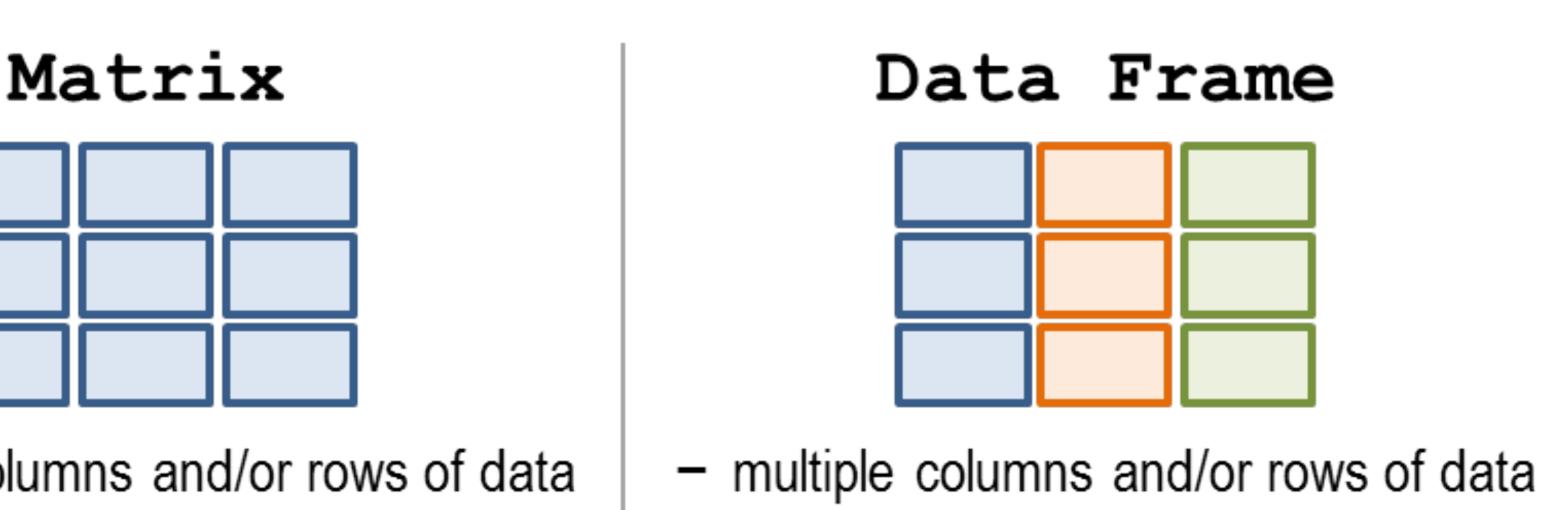
A data frame is R's version of a table. Each column is a vector of the same data type.

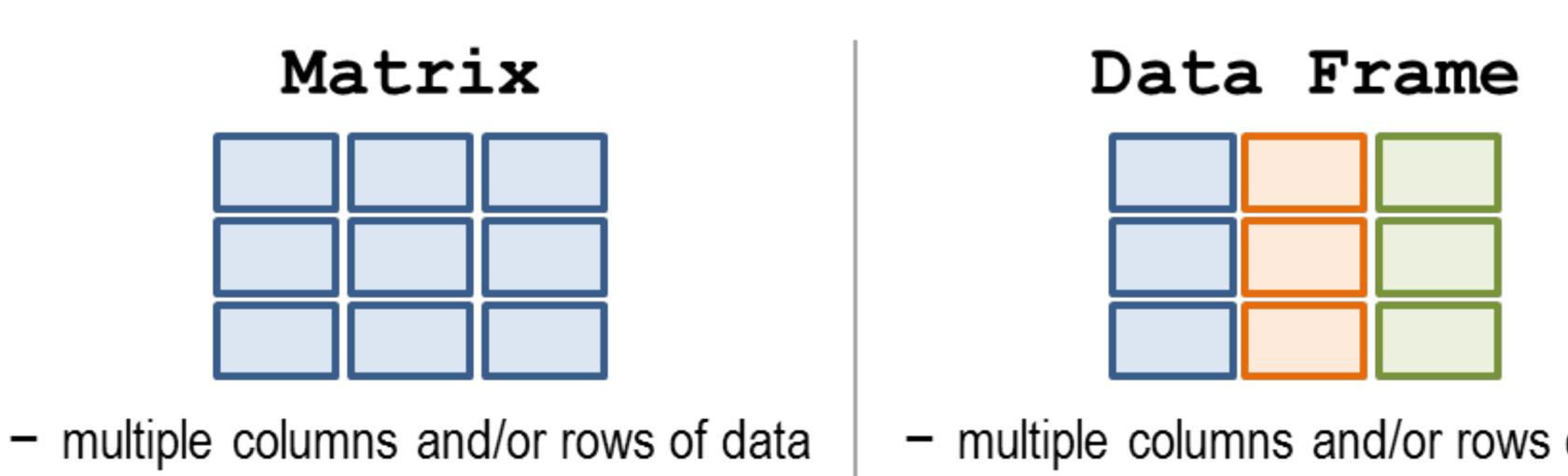
	A	В	С	D	E	F	G	н	1 T	J
1	geoid	state	Designated	county	Туре	dec_score	SE_Flag	Population	medhhincome2014_tract	PovertyRate
2	01001020200	Alabama	1010	Autauga	Low-Income Community	4		2,196	\$ 41,107	24.0%
3	01001020300	Alabama		Autauga	Non-LIC Contiguous	6		3,136	\$ 51,250	10.7%
4	01001020700	Alabama	1	Autauga	Low-Income Community	9		3,047	\$ 45,234	19.0%
5	01001020802	Alabama		Autauga	Non-LIC Contiguous	10		10,743	\$ 61,242	15.3%
6	01001021000	Alabama		Autauga	Non-LIC Contiguous	5		2,899	\$ 49,567	15.1%
7	01001021100	Alabama		Autauga	Low-Income Community	6		3,247	\$ 40,801	19.4%
8	01003010100	Alabama		Baldwin	Non-LIC Contiguous	6		4,013	\$ 45,667	14.0%
9	01003010200	Alabama	1	Baldwin	Low-Income Community	9		3,067	\$ 33,333	27.2%
10	01003010300	Alabama		Baldwin	Non-LIC Contiguous	10		8,079	\$ 47,443	6.8%
11	01003010400	Alabama	1	Baldwin	Non-LIC Contiguous	9		4,578	\$ 46,696	14.8%
12	01003010500	Alabama	1	Baldwin	Low-Income Community	8		5,115	\$ 45,825	16.8%
13	01003010600	Alabama	1	Baldwin	Low-Income Community	9		3,503	\$ 28,219	28.2%
14	01003010904	Alabama		Baldwin	Non-LIC Contiguous	10		6,523	\$ 48,521	16.3%
15	01003010906	Alabama		Baldwin	Non-LIC Contiguous	10		5,272	\$ 42,120	11.5%
16	01003011000	Alabama		Baldwin	Low-Income Community	10		3,885	\$ 34,883	21.8%
17	01003011401	Alabama		Baldwin	Non-LIC Contiguous	10		10,021	\$ 44,886	11.9%
18	01003011406	Alabama		Baldwin	Low-Income Community	10		3,810	\$ 41,867	19.0%
19	01003011407	Alabama		Baldwin	Low-Income Community	10		4,970	\$ 41,840	20.8%
20	01003011501	Alabama	1	Baldwin	Non-LIC Contiguous	9		5,947	\$ 48,191	17.9%
21	01003011502	Alabama	1	Baldwin	Low-Income Community	10		11,575	\$ 39,563	20.3%
22	01003011601	Alabama		Baldwin	Low-Income Community	10		6,640	\$ 39,586	24.3%
23	01005950100	Alabama	1	Barbour	Low-Income Community	6		3,477	\$ 38,571	33.2%
24	01005950200	Alabama		Barbour	Low-Income Community	1		4,404	\$ 32,742	27.2%
25	01005950300	Alabama		Barbour	Low-Income Community	1		1,657	\$ 29,911	36.1%
26	01005950400	Alabama		Barbour	Non-LIC Contiguous	1		3,693	\$ 33,241	19.6%
27	01005950500	Alabama		Barbour	Low-Income Community	8		3,438	\$ 38,859	19.1%
28	01005950600	Alabama		Barbour	Low-Income Community	4		2,003	\$ 27,708	31.0%
29	01005950700	Alabama		Barbour	Low-Income Community	6		1,959	\$ 28,409	31.3%
30	01005950800	Alabama		Barbour	Non-LIC Contiguous	5		2,195		14.2%
31	01005950900	Alabama		Barbour	Low-Income Community	4		3,788	\$ 27,027	28.5%
32	01007010001	Alabama	· T	Bibb Cou	Low-Income Community	7	8	2,783		9.6%

What's a vector?



- 1 column or row of data
- 1 type (numeric or text)





- 1 type (numeric or text)
- A vector is a collection of observations that have the same format and are describing the same thing.
- A data frame is a collection of vectors.

- multiple types

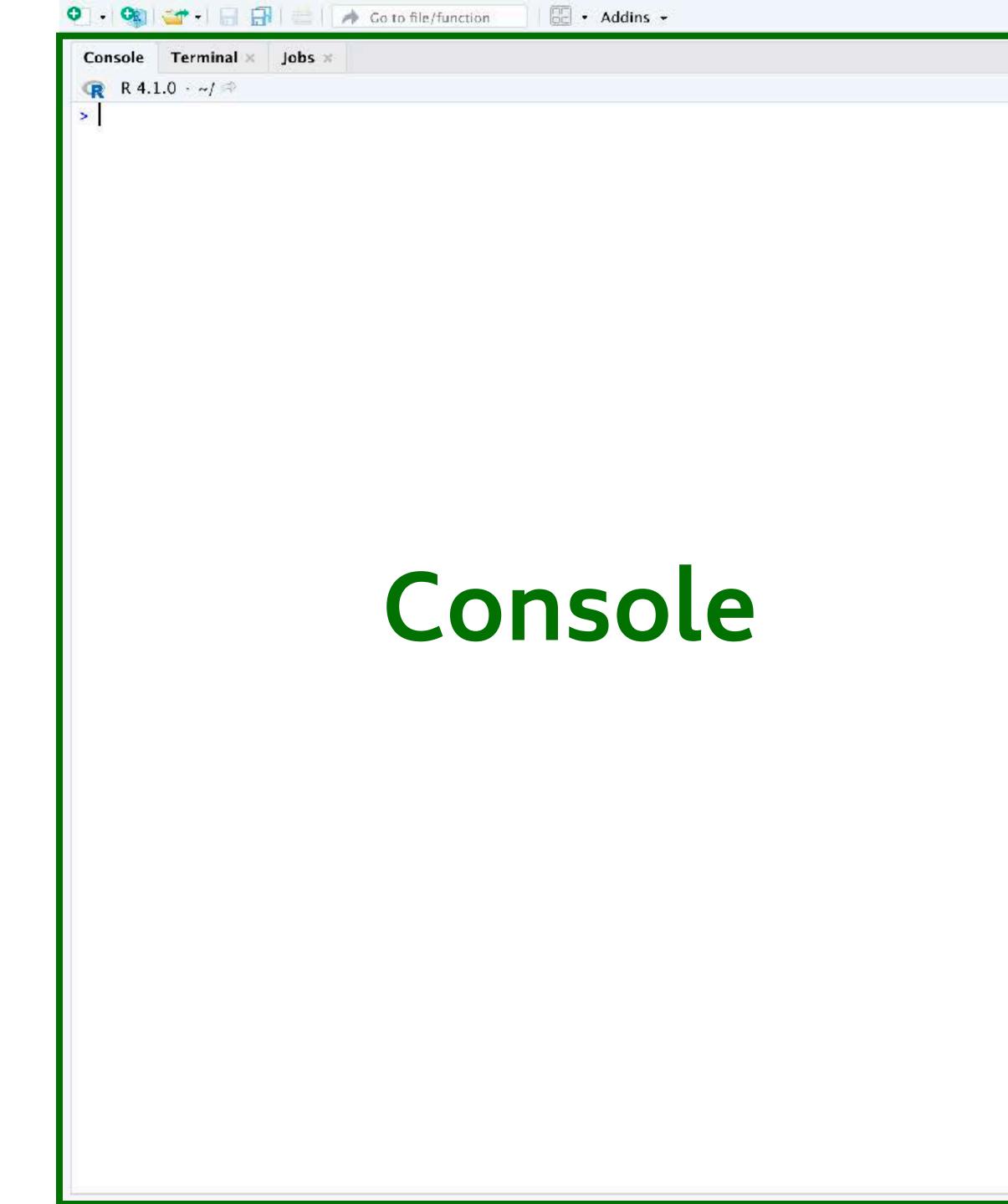


		Go to file/function	n 🔜 🕂 🕶 Addins 👻	
Console	Terminal ×	Jobs ×		
😱 R 4.	1.0 · ~/ 🕫			
GR R 4. ∙	1.0 · ~/ 🕫			

R 👻 🎒 Global Environment 👻		Q,
Environment	is empty	
Files Plots Packages Help Viewer		
💁 New Folder 🛛 🤒 Delete 📑 Rename 🗌 🌼 More 👻		
Home		Macateria
▲ Name ▲ Name .Rhistory	Size	Modified
	0 B	Aug 8, 2021, 7:46
Creative Cloud Files		
Desktop		
Documents		
Downloads		
Library		
D D Movies		
Music		
🔲 🧰 old_Box		
Pictures		
D Public		

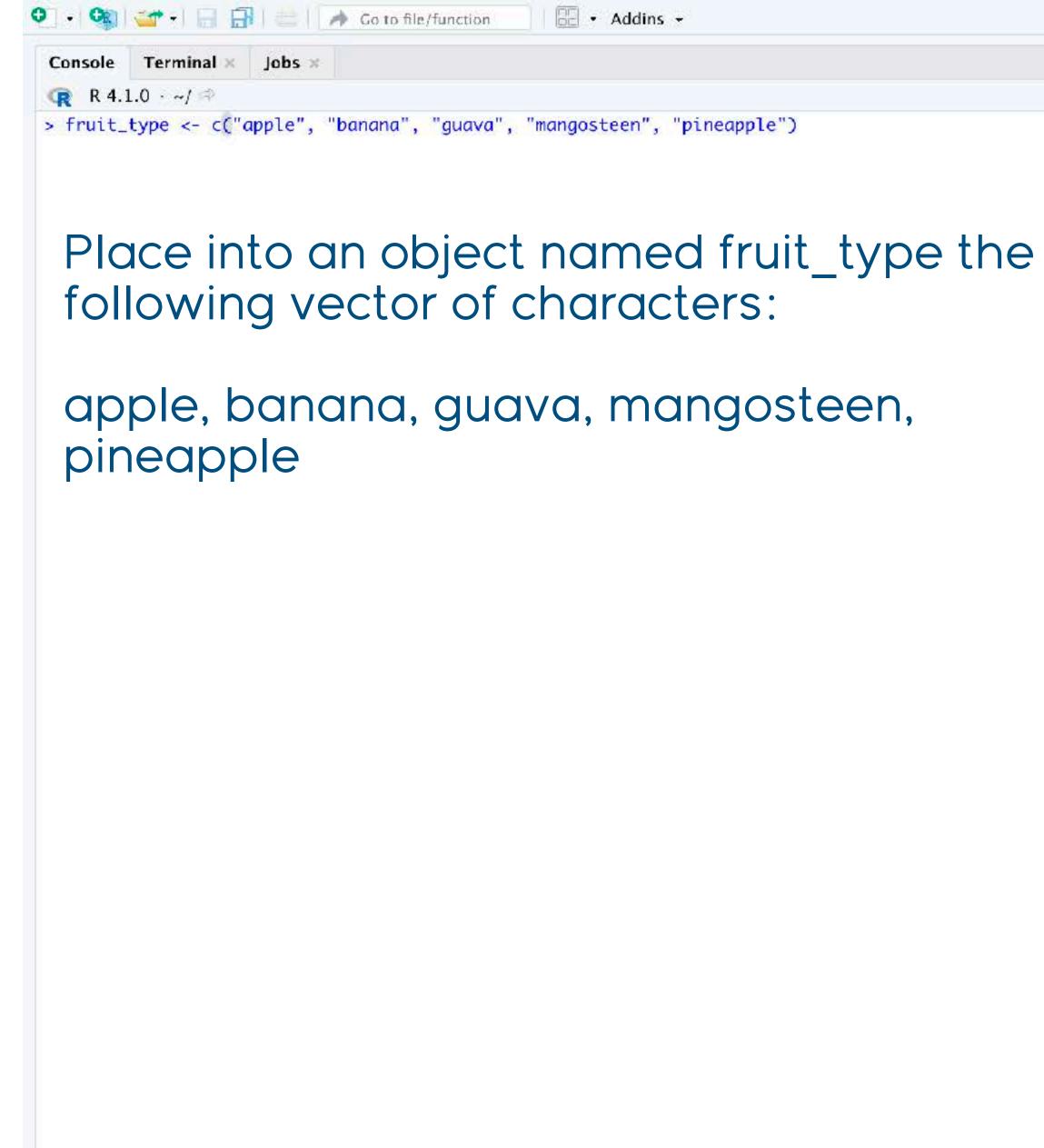
• • •

1



Environment is e	mpty	
Enviror	nme	ant
Files Plots Packages Help Viewer		3
💁 New Folder 🛛 🝳 Delete 🌛 Rename 🛛 🎡 More 🛩		
C 🏠 Home		
A Name	Size	Modified
Rhistory	0 B	Aug 8, 2021, 7:46 P
Box		
Creative Cloud Files		
Desktop		
Documents		
Downloads		
🗌 🧰 Library		
D Movies		
D Music		
🔲 🧰 old_Box		
Pictures		
D Public		
	lar	
Διινί		
Auxil		

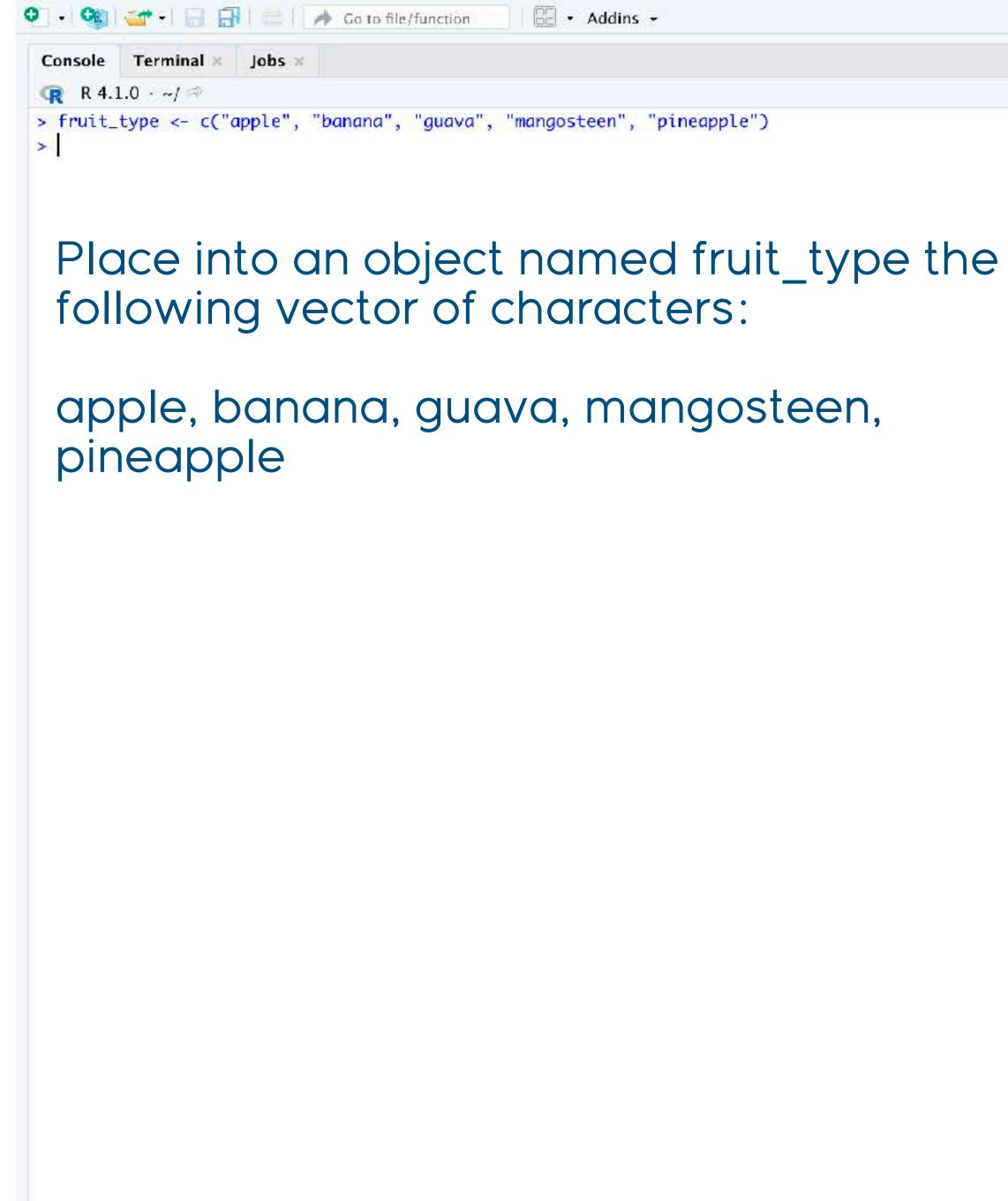




6	Environment History Connections Tutorial			
4	🗇 😅 🚍 🖙 Import Dataset 🦂 🔮 527 MiB 🖌 🔏	🗮 List 🗸 🛛		
	R 🗸 🍈 Global Environment 🚽	Q,		

Environment is empty

Files	Plots	Packages	Help	Viewer			-
🔁 Nev	w Folder	😳 Delete	🍺 Ren	ame 🛛 🧯	훩 More 👻		
	Home						
	🔺 Nar					Size	Modified
] (9	Rhist	ory				0 B	Aug 8, 2021, 7:46 PM
	Box						
	Creati	ve Cloud Fil	es				
	Deskt	ор					
	Docur	nents					
	Down	loads					
1 6	🔋 Librar	У					
1	Movie	s					
1 🖬	Music						
	old_B						
	Pictur						
	Public						



			et 🔹 🔮 527 M	1iB + 🛛 🗶			≣ List +
R -	🐴 Glob	al Environme	ent -				Q
Values	8		1				
fru	it_typ€		chr [1:	5] "apple"	" "banana"	"guava" "mar	ngosteen" "pineapple"
Files	Plots	L ANY CONTRACTOR	Help Vie	In the second second			
Sev Nev		😳 Delet	e ඁ Rename	💱 More	•		
	Home	2.5.27				6 1	Manager and
0.6	▲ Na Rhist	10.40 ⁻²				Size O B	Modified Aug 8, 2021, 7:46 P
	Box	uly.				0.8	Aug 8, 2021, 7.40 P
n e	100	ive Cloud F	ilas				
	Deskt		iics				
	1313	ments					
	A PROPERTY AND	loads					
	Libra						
OF) Movie						
	Music						
	l old_B	ox					
	Pictur	res					
	Public	c					
	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1						

Terminal × Jobs ×	
.0 - ~/ 🖘	
ype <- c("apple", "banana", "guava", "mangosteen", "pineapple ype e" "banana" "guava" "mangosteen" "pineapple"	")
ce into an object named fru owing vector of characters:	
ole, banana, guava, mango eapple	steen,
e then call up fruit_type to se	ee our results
	<pre>/*/* pe <- c("apple", "banana", "guava", "mangosteen", "pineapple " "banana" "guava" "mangosteen" "pineapple" Ce into an object named fru owing vector of characters: ole, banana, guava, mango eapple</pre>

R - Global Environment - Q /alues fruit_type chr [1:5] "apple" "banana" "guava" "mangosteen" "pineappl			History							=	List
/alues fruit_type chr [1:5] "apple" "banana" "guava" "mangosteen" "pineappl Files Plots Packages Help Viewer Plots Packages Help Viewer New Folder Delete Rename Nore ~ Nome Name Size Modified O B Aug 8, 2021, 7:4 Box Creative Cloud Files Desktop Desktop Documents Documents Downloads Library Movies Movies Music Movies Pictures					550 1115						
fruit_type chr [1:5] "apple" "banana" "guava" "mangosteen" "pineappl Files Plots Packages Help Viewer Viewer New Folder Delete New Folder Delete Name Size Modified O B Aug 8, 2021, 7:4 Box Creative Cloud Files Desktop Desktop Documents Documents Documents Movies Music Music Music Pictures	100 mg	172									
Files Plots Packages Help Viewer New Folder Delete Rename More ~ Mame Size Modified Mame Size Size Mame Size Size Mame Size Size Marc Size Size Maxic Size Size Maxic Size Size Maxic Size Size Maxic Size Size Size Size Size	Sector Sector Sector	×.	l.	ch	r [1:5]	"apple"	"banana"	"guava"	"mangoste	en" "pine	apple
New Folder O Delete Rename More ~ Mame Size Modified Rhistory 0 B Box Creative Cloud Files Dosktop Documents Downloads Library Movies Movies Movies Movies Pictures											
New Folder O Delete Rename More ~ Mame Size Modified Rhistory 0 B Box Creative Cloud Files Dosktop Documents Downloads Library Movies Movies Movies Movies Pictures											
New Folder O Delete Rename More ~ Mame Size Modified Rhistory 0 B Box Creative Cloud Files Dosktop Documents Downloads Library Movies Movies Movies Movies Pictures											
New Folder O Delete Rename More ~ Mame Size Modified Rhistory 0 B Box Creative Cloud Files Dosktop Documents Downloads Library Movies Movies Movies Movies Pictures											
New Folder O Delete Rename More ~ Mame Size Modified Rhistory 0 B Box Creative Cloud Files Dosktop Documents Downloads Library Movies Movies Movies Movies Pictures											
Image: Name Image: Name </td <td>Files</td> <td>Plots</td> <td>Packages</td> <td>Help</td> <td>Viewe</td> <td>e l</td> <td></td> <td></td> <td></td> <td></td> <td></td>	Files	Plots	Packages	Help	Viewe	e l					
Name Size Modified Maine Size Modified Maine O B Aug 8, 2021, 7:4 Sox Sox Sox Creative Cloud Files Sox Desktop Sox Downloads Sox Downloads Sox Movies Movies Music Sox Image: Solution of the	💁 Nev	v Folder	😳 Delet	e 🌛 Re	name	🏟 More 🤸	•				
© Rhistory 0 B Aug 8, 2021, 7:4 Box Example Creative Cloud Files Image: Creative Cloud Files Image: Creative Cloud Files Image: Desktop Image: Creative Cloud Files		and a loss of									
 Box Creative Cloud Files Desktop Documents Downloads Library Movies Music old_Box Pictures 		115- 35382/	NINGC					110000	e	1022011110045	
 Creative Cloud Files Desktop Documents Downloads Library Movies Music old_Box Pictures 		and the second se	ory					0 E	I A	ug 8, 2021	, 7:40
 Desktop Documents Downloads Library Movies Music old_Box Pictures 		100									
 Documents Downloads Library Movies Music old_Box Pictures 		Creat	ive Cloud F	iles							
 Downloads Library Movies Music old_Box Pictures 		Deskt	ор								
 Library Movies Music old_Box Pictures 		Docu	ments								
 Movies Music old_Box Pictures 		Down	loads								
 Music old_Box Pictures 		Librar	у								
 old_Box Pictures 		1 Movie	s								
Pictures		Music									
		l old_B	ox								
D Public		Pictur	es								
	0 6	Public	2								



Place into an object named fruit_shape the following vector of characters:

round, oblong, oval, round, oblong

5	Environment Hist	ory Connections	Tutorial		-		
1	📑 📄 🖙 Import	Dataset 🖌 🍼 530 M	Лів + 🛛 🎻		List + 🌀		
	R 🗸 📫 Global Env	ironment -	nt -				
	Values						
	fruit_shape	chr [1:	:5] "round" "oblong	" "oval" "round" "oblong"			
	fruit_type	chr [1:	:5] "apple" "banana	" "guava" "mangosteen" "pinea	apple"		

] <u>°</u> ≞ ,I] <mark>⊟</mark> B		te 🌛 Renam	e 🏟 More 🕶	Size O B	Modified
	▲ Name Rhistory			Lucestra.	1 2022/2020 00/2020
) <u>°</u> , I	Rhistory			Lucestra.	1 2022/2020 00/2020
В 🗐 В				0 B	A
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Box			12540508	Aug 8, 2021, 7:46 PM
] 🗐 🕻					
	Creative Cloud I	Files			
	Desktop				
🗆 🗖 c	Documents				
) 🗀 c	Downloads				
1 🗖 L	ibrary				
) 📫 N	Movies				
	Music				
0 📫 0	old_Box				
	Pictures				
	Public				



Place into an object named fruits a data frame consisting of the fruit_type and fruit_shape vectors

Construction Construction	"round" "oblong" "apple" "banana"	and character hard shows	d" "oblong" gosteen" "pineapple
- Construction - Construction	source water many and source and the second	and character hard shows	
Files Plots Packages Help Viewer			
💁 New Folder 🛛 🧐 Delete 📑 Rename 🛛 🧯	훩 More 👻		
C 🏠 Home			
A Name		Size	Modified
Rhistory		0 B	Aug 8, 2021, 7:46
Box			
Creative Cloud Files			
Desktop			
Documents			
Downloads			
Library			
Movies			
Music			
dld_Box			
Pictures			
Public			

```
🔍 - 👒 🤐 - 📄 🚮 📄 🧼 Go to file/function
                                              🖶 🔹 Addins 👻
 Console Terminal × Jobs ×
 😱 R 4.1.0 · ~/ 🕾
> fruit_type <- c("apple", "banana", "guava", "mangosteen", "pineapple")</pre>
> fruit_type
[1] "apple"
                 "banana"
                                         "mangosteen" "pineapple"
                             "guava"
> fruit_shape <- c("round", "oblong", "oval", "round", "oblong")</pre>
> fruits<-data.frame(fruit_type, fruit_shape)</pre>
> fruits
  fruit_type fruit_shape
       apple
                  round
 1
                  oblong
      banana
 2
                   oval
 3
       guava
 4 mangosteen
                  round
5 pineapple
                 oblong
 >
                                     What's happening here?
```

6	Environment	History	Connections	Tutorial						
\$	📑 🔒 🖶 I	mport Data:	set 🖌 📑 583 M	1iB - 🛛 🍝		🗏 List + 🗌				
	R 🚽 🎒 Glob	al Environm	ient -					Q,		
	Data									
	🚺 fruits		5 obs.	of 2 varia	bles					
	alues									
	fruit_sha	pe	chr [1:	5] "round	"oblong"	"oval"	"round" "oblo	ong"		
	fruit_typ	e	chr [1:	5] "apple	' "banana"	"guava"	"mangosteen'	' "pineapple	. ⁰	

 New Folder Delete Rename More ~ Mame Size Modified Size Modified Size Modified Size Modified O B Aug 8, Box Creative Cloud Files Creative Cloud Files Desktop Documents Documents Downloads Library Movies Music 	
Name Size Modified Size Modified Size Name Size O B Box Sox Creative Cloud Files Sox Desktop Documents Downloads Library Movies	(
OB Aug 8, Box Creative Cloud Files Desktop Documents Downloads Library Movies	
 Box Creative Cloud Files Desktop Documents Downloads Library Movies 	ł
 Creative Cloud Files Desktop Documents Downloads Library Movies 	2021, 7:46 PM
 Desktop Documents Downloads Library Movies 	
 Documents Downloads Library Movies 	
 Downloads Library Movies 	
Library Movies	
Library Movies	
Movies	
old_Box	
Pictures	
Di Public	

```
🔍 • 🔍 ざ • 🔚 🚮 📄 🧼 Go to file/function
                                                   - Addins -
 Console Terminal × Jobs ×
 ( R 4.1.0 · ~/ 🗇
> fruit_type <- c("apple", "banana", "guava", "mangosteen", "pineapple")</pre>
> fruit_type
 [1] "apple"
                  "banana"
                                             "mangosteen" "pineapple"
                                "guava"
 > fruit_shape <- c("round", "oblong", "oval", "round", "oblong")</pre>
 > fruits<-data.frame(fruit_type, fruit_shape)</pre>
 > fruits
   fruit_type fruit_shape
        apple
                    round
 2
       banana
                   oblong
 3
                     oval
        guava
 4 mangosteen
                    round
 5 pineapple
                   oblong
 > weight<-c(85, 120, 55, 82, 905)
 > fruits<-data.frame(fruit_type, fruit_shape, weight)</pre>
 > fruits
   fruit_type fruit_shape weight
                              85
        apple
                    round
                             120
       banana
                   oblong
                              55
 3
        guava
                     oval
                              82
 4 mangosteen
                    round
 5 pineapple
                             905
                   oblong
 >
```

Place into an object named weight the following vector of numbers:

85, 120, 55, 82, 905

Place into an object named fruits a data frame consisting of the fruit type, fruit shape, and weight vectors.

Note that this overwrites the existing fruits object

Dete	171						Q,		
Data Data	+e		5 obs c	of 3 vari	ables				
Values	1757-1869 		5 005. (ubles				
	, it_shape		chr [1-9	J "round	" "oblona"	"oval" "roun	d" "oblona"		
	it_type						gosteen" "pineapple'		
weig				num [1:5] 85 120 55 82 905					
Files	NUMBER OF STREET		Help View	NAME OF A DESCRIPTION OF					
Sev Nev	v Folder 🛛 🗳	Delete _	🏟 Rename	虊 More	-				
	Home					61 -5	NA CONTRACTOR		
0.0	A Name					Size	Modified		
						0 B	Aug 8, 2021, 7:46		
	Box								
	Creative (LIOUD FILES							
	Desktop								
	Documen								
	Download	ls							
Marian State	Movies								
	Music								
	old_Box								
	Pictures								
	Public								
NAME AND ADDRESS									

```
🔍 • 🔍 ざ • 🔚 🚮 📄 🧼 Go to file/function
                                                  🚟 🔹 Addins 👻
 Console Terminal × Jobs ×
 ( R 4.1.0 · ~/ 🗇
> fruit_type <- c("apple", "banana", "guava", "mangosteen", "pineapple")</pre>
> fruit_type
 [1] "apple"
                                            "mangosteen" "pineapple"
                  "banana"
                               "guava"
 > fruit_shape <- c("round", "oblong", "oval", "round", "oblong")</pre>
> fruits<-data.frame(fruit_type, fruit_shape)</pre>
> fruits
  fruit_type fruit_shape
        apple
                    round
 2
       banana
                   oblong
 3
        guava
                     oval
 4 mangosteen
                    round
 5 pineapple
                   oblong
 > weight<-c(85, 120, 55, 82, 905)
 > fruits<-data.frame(fruit_type, fruit_shape, weight)</pre>
 > fruits
  fruit_type fruit_shape weight
        apple
                              85
                    round
 1
                             120
 2
       banana
                   oblong
 3
                              55
                     oval
        guava
                              82
 4 mangosteen
                    round
 5 pineapple
                   oblong
                             905
 > str(fruits)
 'data.frame': 5 obs. of 3 variables:
  $ fruit_type : chr "apple" "banana" "guava" "mangosteen" ...
  $ fruit_shape: chr "round" "oblong" "oval" "round" ...
  $ weight
             : num 85 120 55 82 905
 >
```

Tell me about the structure of the object fruits.

R tells us about the number of observations (rows) and number of columns. It also tells us about the type of data in each column and shows us the first few values. 📳 Project: (None) 🚽

				les sf	7			
0 fru	2000-52-2422		50	05. OT	3 variabl	es		
Value	s it_shap	10	chr	F1-57	"round" "	oblona"	"oval" "round	d" "oblona"
	it_type							gosteen" "pineapple
	.ght	52			85 120 55			
Files	Plots	Packages	Help	Viewer				
	NUMBER OF STREET	© Delete		11	More +			
	Home	NT PERCE						
_	🔺 Nar	me					Size	Modified
	Rhist	ory					0 B	Aug 8, 2021, 7:46
	Box							
	Creati	ive Cloud File	2S					
	🗍 Deskt	ор						
	🗐 Docur	ments						
	Down	loads						
	🗐 Librar	У						
	Movie	s						
	🗍 Music							
	🗐 old_B	ox						
	Pictur	es						
	🗊 Public	z)						

•

•

Reading in data

- existing data which we can then work with.
- or structures.
- read_csv() for instance, is designed to read comma separated value files

geoid, state, county, Designated, Type, dec_score, Population, PovertyRate, medhhincome2014_tract, medvalue, medrent, pctown, vacancyrate, pctwhitealone, pctblackalone, pctHispan ic,pctAAPIalone,HSorlower,BAorhigher,Metro,Micro,NoCBSAType 01001020200, Alabama, Autauga County, NA, Low-Income Community, 4, 2196, 24, 41107, 95300, 743, 62.8, 5.8, 43.9, 51.9, 1.3, 1.1, 58.1, 16.2, 1, NA, NA 01001020300, Alabama, Autauga County, NA, Non-LIC Contiguous, 6, 3136, 10.7, 51250, 113800, 817, 70.3, 14, 67.1, 20.5, 7.3, 1.1, 46.4, 21.9, 1, NA, NA 01001020700, Alabama, Autauga County, 1, Low-Income Community, 9, 3047, 19, 45234, 93500, 695, 71.1, 6.2, 83.3, 9.2, 3.4, 0, 54.4, 11.3, 1, NA, NA 01001020802, Alabama, Autauga County, NA, Non-LIC Contiguous, 10, 10743, 15.3, 61242, 160400, 1018, 82.3, 6.1, 81.4, 15.7, 1.4, 1, 45, 22.9, 1, NA, NA 01001021000, Alabama, Autauga County, NA, Non-LIC Contiguous, 5, 2899, 15.1, 49567, 102900, 546, 83, 21.8, 72.6, 24.6, 0.4, 0, 62.1, 13.6, 1, NA, NA 01001021100, Alabama, Autauga County, NA, Low-Income Community, 6, 3247, 19.4, 40801, 71000, 630, 81.9, 16.9, 44, 55.4, 0.5, 0, 61.3, 12.1, 1, NA, NA 01003010100, Alabama, Baldwin County, NA, Non-LIC Contiguous, 6, 4013, 14, 45667, 86300, 685, 91.4, 35.1, 79.2, 16.1, 0.2, 0, 63.8, 14.5, 1, NA, NA 01003010200, Alabama, Baldwin County, 1, Low-Income Community, 9, 3067, 27.2, 33333, 136000, 640, 77.1, 10.5, 83.9, 12, 0.9, 0, 60.7, 7.9, 1, NA, NA 01003010300, Alabama, Baldwin County, NA, Non-LIC Contiguous, 10, 8079, 6.8, 47443, 185300, 850, 81.8, 14.7, 80.8, 15.1, 2.3, 0, 48.3, 21.4, 1, NA, NA 01003010400, Alabama, Baldwin County, 1, Non-LIC Contiguous, 9, 4578, 14.8, 46696, 135600, 808, 82.6, 19.8, 88.9, 4.2, 5.8, 0.5, 53.2, 16.3, 1, NA, NA 01003010500, Alabama, Baldwin County, 1, Low-Income Community, 8, 5115, 16.8, 45825, 129400, 636, 66.2, 14.4, 83.4, 12.8, 1.2, 0.6, 44.4, 20.3, 1, NA, NA 01003010600, Alabama, Baldwin County, 1, Low-Income Community, 9, 3503, 28.2, 28219, 88900, 552, 55.7, 21.1, 30.2, 69.3, 0.5, 0, 60.1, 9.7, 1, NA, NA

• Most of the time, we will not create data frames manually, but will import

• There are different functions that read external data with particular formats



Your Lab

- Review the basic structure of vectors and data frames
- Importing external data
- Describing the structure of data
- Indexing or referencing specific data components





Questions

