

Lecture 2: When You Need Graphs and Merging

February 4, 2019

Overview

Course Administration

Good, Bad and Ugly

Few, Chapters 3 and 5

Merging

Course Administration

1. Any trouble submitting tutorials? questions?
2. Questions/issues with readings?
3. Make sure you're signed up for Piazza
4. Be sure to check online listing for good/bad/ugly
5. Collect proposals
6. Next week: Kate R. is coming. Pls look at her work and be ready with questions.
7. Anything else?

Next Week's Good Bad and Ugly

Monday by 9 am. Earlier is ok.

- KJ
- KL
- AM

This Week's Good Bad and Ugly

- SS
- JG
- ES

Julia's Example



Elizabeth's Example

Figure 3. Focus Group Responses on Security-related Training Received



Source: OIG analysis of focus group participant responses as of August 2017

Note: Block Training is a bi-annual training program for conductors, engineers, and dispatch staff. The Roadway Worker Protection program is a Federal Railroad Administration program for on-track safety.

Few:

Visual Perception and Graphical Communication

When Should You Use Tables vs. Graphs?

- Tables are for when
 - you care about the **actual numbers**
 - you have **very** few numbers

When Should You Use Tables vs. Graphs?

- Tables are for when
 - you care about the **actual numbers**
 - you have **very** few numbers
- Graphs are for when
 - you care about trends or general tendencies
 - you have more numbers than a table can support
 - the exact values are not critical
 - you wish to highlight a particular relationship

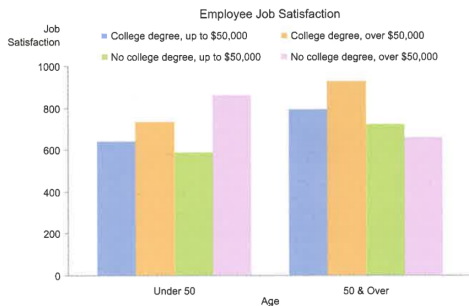
Starting with the Table

Job Satisfaction By Income, Education, and Age

Income	College Degrees		No College Degrees	
	Under 50	50 & over	Under 50	50 & over
Up to \$50,000	643	793	590	724
Over \$50,000	735	928	863	662

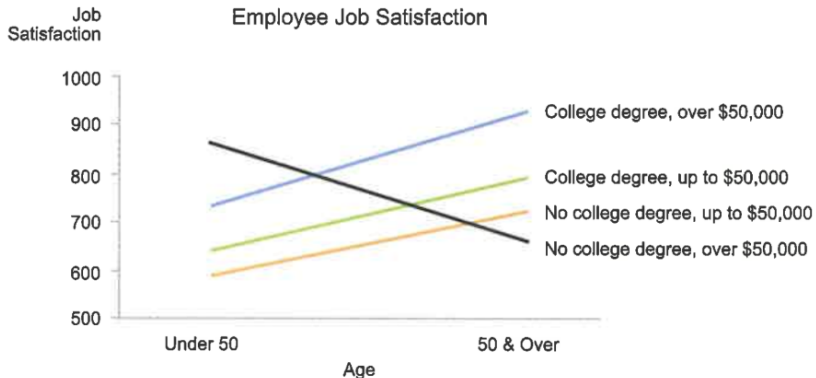
Few, Chapter 3, Figure 3.13

Two Versions of the Same Sets of Numbers



Few, Chapter 3, Figure 3.15

Two Versions of the Same Sets of Numbers



Few, Chapter 3, Figure 3.14

Few Chapter 5: Drawing Attention

1. working memory
2. preattentive processing
3. applying to design
4. gestalt principles of visual perception

Working Memory

We don't have much of it

- people can remember 3 to 4 visual encodings for a chart
- therefore, more than about 4 colors as identification are distracting
- good visuals can stick in long-term memory

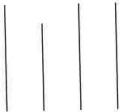
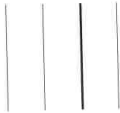
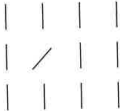
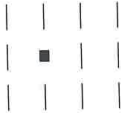

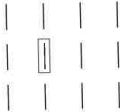
Preattentive Processing

- Form
- Color
- Spatial Position

987349790275647902894728624092406037070570279072
803208029007302501270237008374082078720272007083
247802602703793775709707377970667462097094702780
927979709723097230979592750927279798734972608027

987349790275647902894728624092406037070570279072
803208029007302501270237008374082078720272007083
247802602703793775709707377970667462097094702780
927979709723097230979592750927279798734972608027

Form

Length	Width
	
Orientation	Shape
	
Size	Enclosure
	

But Beware of 2-D Size

- People have a very hard time judging the relative size of 2-D objects
- Changing both length and width is a 2-D change
- Avoid unless you have a specific reason to do this – maybe you're drawing building sizes



Color

1. Hue

- What you think of as “color”
- Blue, Green, etc

2. Intensity

- make it less intense: add a little gray

Color

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Contrasting hues stand out. Intense colors stand out.

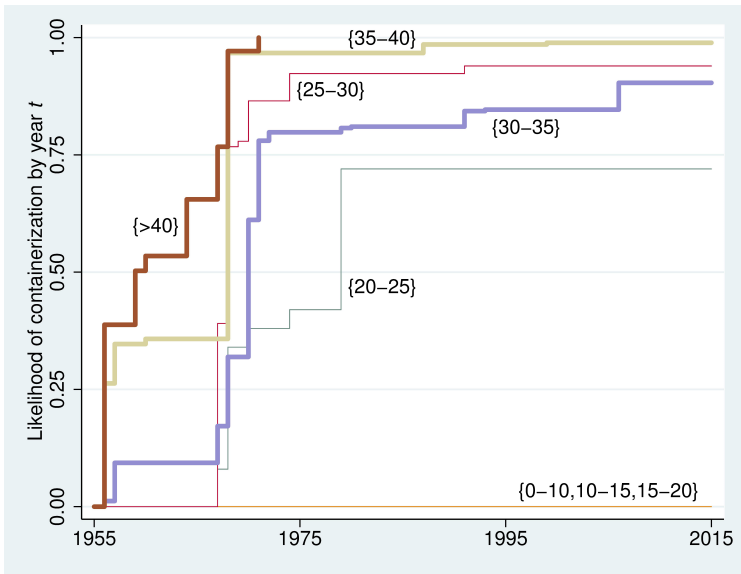
How Do We Perceive Them?

Type	Attribute	Quantitatively Perceived?
Form	Length	Yes
	Width	Yes, but limited
	Orientation	No
	Size	Yes, but limited
	Shape	No
	Enclosure	No
Color	Hue	No
	Intensity	Yes, but limited
Position	2-D Position	Yes

Context Matters



Calling Attention

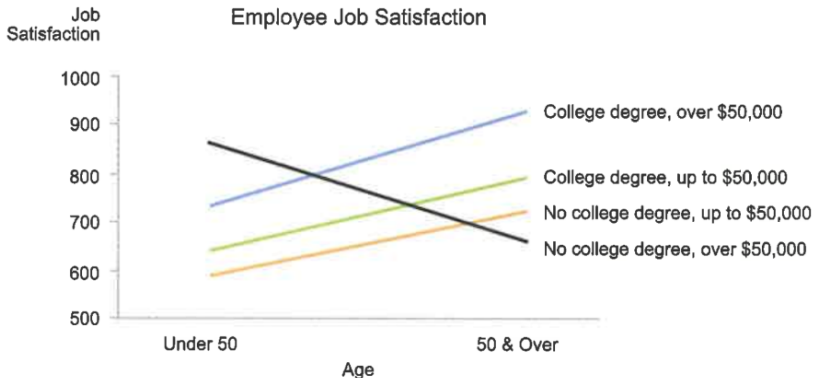


Gestalt Principles of Visual Perception

- Proximity
- Similarity
- Enclosure
- Closure
- Continuity

These all generate meaning, whether you intend it or not!

How Can You Use These Principles to Improve This Chart?



Few, Chapter 3, Figure 3.14

R

Today

- A. What is Merging?
- B. How to Merge 1:1
- C. How to Merge m:1
- D. Cautions with merging

A. Merging

- ▶ suppose you have information in more than one dataframe
- ▶ you want to combine these pieces of information
- ▶ this is an enormous advantage of statistical software

Sample dataframe 1

```
df1 <- data.frame(class = c(1,2,3),  
                  subject = c("basics","basics","graphs"))  
df1
```

```
##   class subject  
## 1     1  basics  
## 2     2  basics  
## 3     3  graphs
```

Sample dataframe 2

```
df2 <- data.frame(class = c(1,2,3),  
                  attendance = c(33,45,26))  
df2
```

```
##   class attendance  
## 1     1         33  
## 2     2         45  
## 3     3         26
```

B. Merge 1:1

```
df3 <- merge(x=df1, y=df2, by="class", all = TRUE)  
df3
```

```
##   class subject attendance  
## 1     1  basics         33  
## 2     2  basics         45  
## 3     3  graphs         26
```

C. Merge m:1

- ▶ this is a merge that has unique values in one dataset
- ▶ and repeat values in another
- ▶ for us, repeat values are in subject

Dataset to merge in

```
df4 <- data.frame(subject = c("basics","graphs"),  
                  difficulty = c("easy","hard"))  
df4
```

```
##   subject difficulty  
## 1  basics         easy  
## 2  graphs         hard
```

Merging in

```
df5 <- merge(x = df3, y = df4, by = "subject", all = TRUE)
df5
```

```
##   subject class attendance difficulty
## 1  basics     1          33         easy
## 2  basics     2          45         easy
## 3  graphs     3          26         hard
```

D. Problems with Merging

- ▶ you want to merge 1:1 but one dataframe has repeat values

D. Problems with Merging

- ▶ you want to merge 1:1 but one dataframe has repeat values
- ▶ you want to merge 1:1 but the merge doesn't work as expected (see tutorial)
- ▶ bad merges cause big problems

Try Today's Tutorial

- Make a .R script for whole tutorial
- Plus questions at end
- Go forth!

Next Lecture

- Turn in PS 2
- Read Few Chapter 6; Chang, Chapter 3
- Visualization on “How America Uses its Land”
- Be ready for Kate