Session 8: Layers & Aesthetics — Pen-and-Paper Pair Exercise

PSY 410 | Data Science for Psychology

Name: _____ **Date:** _____

No laptop today? No problem. This handout lets you practice the same skills on paper. Work with a partner who has a laptop and compare your work at the end.

The data: `reaction_data`

This dataset has reaction time (RT) data from a psychology experiment with 40 participants in two conditions. Here are 8 representative rows:

participant	condition	rt	accuracy
1	Control	542.3	1
1	Treatment	468.1	1
5	Control	499.7	0
5	Treatment	512.4	1
12	Control	580.2	1
12	Treatment	445.9	1
20	Control	475.6	1
20	Treatment	501.8	0

Key: `rt` = reaction time in milliseconds, `accuracy` = 1 (correct) or 0 (incorrect)

The task (same as the slide exercise)

1. Create a **bar chart with error bars** showing mean RT by condition
2. Add **individual data points** (jittered) behind the bars
3. Color the bars by condition
4. Add a caption noting that error bars show the 95% CI

Your pen-and-paper version

Step 1: Compute summary statistics by hand. Using the 8 rows above, calculate the mean RT for each condition:

Condition	RT values	Mean RT
Control		
Treatment		

Step 2: Sketch the plot. Draw a bar chart on the grid below. Label the x-axis with the two conditions and the y-axis with RT in milliseconds. Draw bars at the mean heights. Scatter the individual data points next to each bar (jittered).

```
rt (ms)
600 |
    |
550 |
    |
500 |
    |
450 |
    |
400 |_________________________________
      Control       Treatment
```

Step 3: Plan the layers. A ggplot is built in layers. List the layers you'd need, in order:

1. `geom_________()` — for the individual points (with jitter)
2. `stat_________()` — for the bar (using `fun = mean`)
3. `stat_________()` — for the error bars (using `fun.data = mean_cl_normal`)

Why does order matter? Which layer should be drawn first so it appears *behind* the bars?

Your answer: _____

Step 4: Write the code. Fill in the blanks:

```
reaction_data |>
  ggplot(aes(x = _________, y = _____, fill = _________)) +
  geom_jitter(width = 0.15, alpha = 0.4) +
  stat_summary(fun = _____, geom = "_____", alpha = 0.6, width = 0.5) +
  stat_summary(fun.data = ____________, geom = "________", width = 0.2) +
```

```
  labs(
    title = "_________________________________",
    x = "____________",
    y = "____________",
    caption = "_________________________________"
  ) +
  theme_minimal() +
  theme(legend.position = "none")
```

Check your work

Compare your sketch and code with your partner's screen. Do your mean RT calculations and layer order match?