Agenda:

# Introduction:

**“This is a dataset.”**  
*(Show a big table of numbers – maybe your RGB spreadsheet or x/y grid.)*  
**What do you see?**  
Probably nothing—because raw numbers aren’t built for human insight. But the second we *see* the structure visually, everything changes.

This talk is about that moment—when data becomes visible, when patterns emerge, and when insight clicks. We’ll look at how to design visualizations that don’t just decorate analysis—they *drive* it.”

# Part 1: Some data is meant to be consumed visually.

That spreadsheet you just saw—it only made sense once it became an image. Our brains aren’t wired to pull meaning from grids of numbers. But the moment we can *see* the structure, we understand it intuitively.

Now let’s take it a step further.

What happens when the stakes are higher—not just recognizing a pattern, but making a decision based on it?

“Here’s another dataset. Just a table of numbers.

It’s actually a 50x50 grid of elevation values. Technically, all the information is right here.

But what insight can you get from this? What decision could you confidently make based on this?”  
*(Pause, let the audience feel the overwhelm.)*

“Let’s add some color. Even with just shading, structure starts to emerge. You begin to get a sense of ‘higher’ and ‘lower’ ground.

Still—can you plan a route through this? Not really. Something’s still missing.”  
*(Optional: skip this step if you want a quicker build-up)*

“Now let’s visualize it properly.

Same data. Same grid. But this time, you can clearly see the hills, valleys, and slopes.

In fact, if I told you to pick a safe and efficient path across this terrain—you could do it right now. Not because the data changed. But because you can *see* the shape of the problem.”  
*(Maybe gesture at the screen or animate a suggested path.)*

“This is what I mean when I say that visualization isn’t just about aesthetics—it’s about cognition.

The numbers didn’t give us insight. The *visual structure* did.

And that’s the heart of Part 1: some data is simply meant to be seen. Without visual encoding, you’re not just missing clarity—you’re missing the *entire meaning* of the data.”

## Translating visuals to action:

Visual: A dataset that contains a x,y grid with values. Upon converting the data into a visualization with elevation bands, viewers understand that this a Topographic map. Furthermore, armed with this information and tasked with plotting a path to navigate the map, viewers can easily pick the best path, but only because they can see the data visually.

## Beyond the numbers with Anscombe Quartet

Visual: This one is famous. I am sure you have heard of it. The lesson to portray to the audience is that measures of central tendency can obscure the underlying patterns of the data and hide otherwise obvious insights.

# Part 2: The Grammar of Graphics

Encoding: Converting something from one system of communication to another. How numbers and information are converted for visual consumption.

Data observations:

Transformations: How do we need to manipulate our data for analysis?

Granular/Aggregated?

Group by/Calculations/Standardizations?

Scaffolding: Plot area. Canvas.

Axis, Scale, Orientation

Encode data as objects in space

Objects:

Categoric: Shape, Color, Label

Continuous: Shade, Size

Spatial:

Categoric: Series, Facets, order(time)

Continuous: Position, proximity, density, size

# Part 3: Put it into practice

Pro Tip: Attempt to describe the top of exploration in plain English.

## Exercise 1:

Compare two means with a p val of 99%

So really I am comparing two distributions that have been found to likely be dis-similar. Ok easy, we should be able to see this visually.

Visual creation process.

Data Transformation:

1. Binning - Group by
2. KDE – Standardize for compatibility
3. Plot
4. Evaluate

## Exercise 2:

Wolves: