DECONSTRUCT A DATAVIZ.

AGENDA.

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- Introduction
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Activity 4 – Data Aggregation
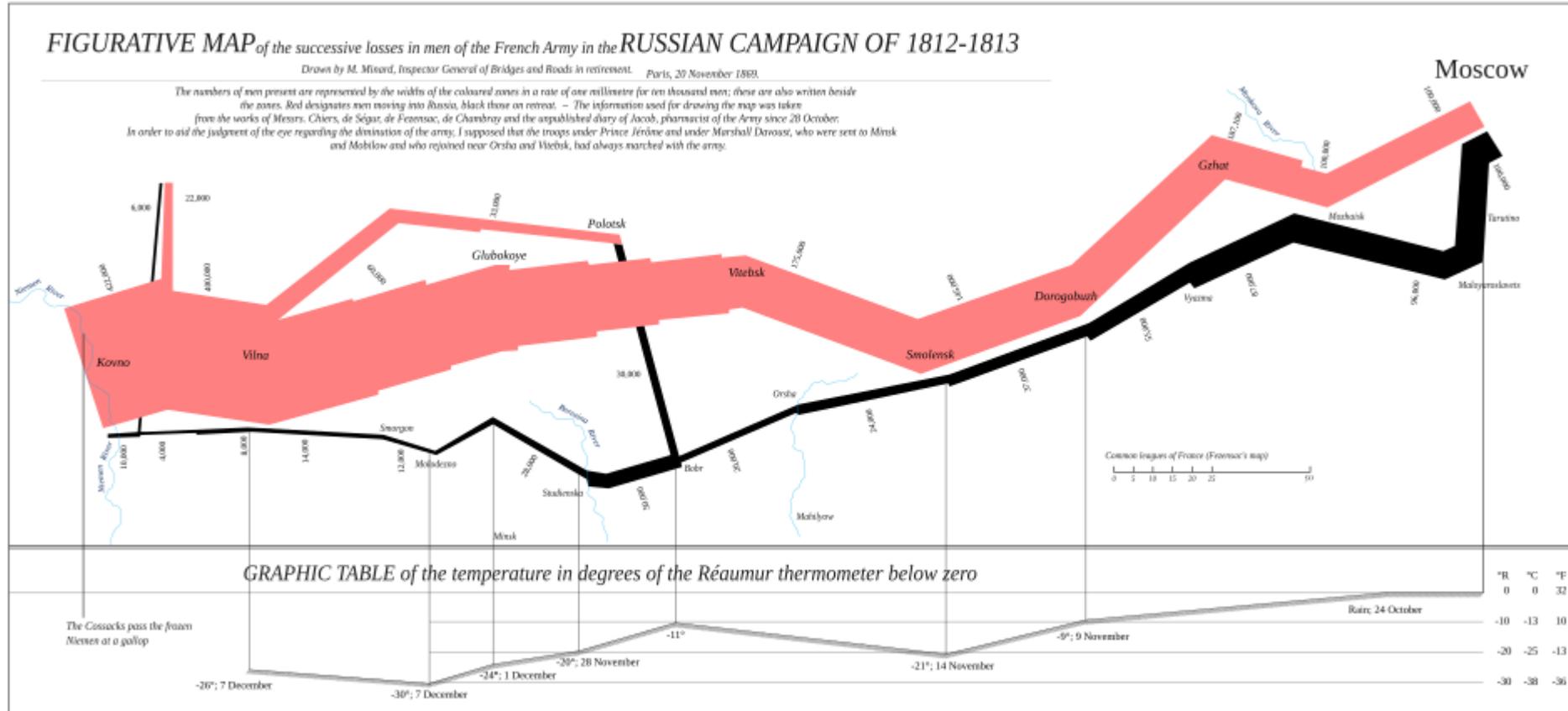
Revisit Your Questions

Group Narrative Playback

A Deviation on Joins

The Complete Narrative

[Charles Joseph Minard - Wikipedia](...)

OVERVIEW.

- We will examine **Napoleon's 1812 Russian Campaign** infographic: the original and the modern redrawing.

- Focus will be on the modern redrawing to understand its **design** and **impact**.

- The full story and power of the infographic will be revealed at the end.

- Created in 1869 by French engineer Charles Minard to **visualize** Napoleon's 1812 campaign.

- **Combines** geography, movement, time, and army scale in a **single** image.

- The wide band on the left shows the French army entering Russia — band thickness represents **troop size**.

- **Colour** indicates **direction** of travel, and the path traces the army's route.

- **Key locations** and dates are marked to show **progression** and **distance**.

- Below the map is a **temperature chart** aligned with the **timeline** of the **march**.

- The **connection** between temperature and the campaign is part of the story to explore together.

- The infographic is remarkable for **conveying complex data** without text explanations.

- It **functions simultaneously** as a map, timeline, flow diagram, and dataset.

- Widely regarded as one of the **greatest infographics** due to its elegant integration of elements.

INTRODUCTION – 2 MINUTES

- Today, we're going to explore one of the most famous **infographics** in history — Charles Minard's visualization of Napoleon's 1812 Russian campaign.

  - We'll be working in **groups of four**, with each group focusing on different parts of the data behind this infographic.
  - Your task will be to analyse your dataset, **uncover insights**, and develop a **narrative** based on what you discover.
  - At the end, we'll bring all the pieces together to reveal the full story and truly appreciate the **power** of Minard's design.

ACTIVITY 1 – FIRST IMPRESSIONS – 10 MINUTES.

▪ In your teams, and using the whiteboards, answer these questions:

- **What's** the first thing your eye goes to?

- **What** emotions does this evoke?

- **What** feels surprising or intriguing?

ACTIVITY 2 – IDENTIFY THE CLAIMS – 10 MINUTES.

Visual Element	What It Appears to Claim	Questions It Raises
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Agile Hitman

ACTIVITY 3 – REVEAL THE DATA SOURCES – 30 MINUTES.

Date	Event	Notes
June 24, 1812	Army crosses into Russia at Kowno	
July 1, 1812	Reach Wilna (Vilnius)	
July 15, 1812	Arrive at Minsk	
August 16, 1812	Battle of Smolensk	
August 20, 1812	Movement towards Orsha	Ambiguous timing
September 7, 1812	Battle of Borodino	
September 14, 1812	Enter Moscow	
October 19, 1812	Retreat from Moscow begins	
November 26, 1812	Crossing of the Berezina River	
December 5, 1812	Return to Minsk	Data on troop count ambiguous
December 14, 1812	Reach Russian border	

Location	Date	Troop Count
Kowno (Kaunas)	June 24, 1812	422000
Wilna (Vilnius)	July 1, 1812	400000
Minsk	July 15, 1812	350000
Smolensk	August 16, 1812	104000
Orsha	August 20, 1812	[No Data]
Vitebsk	August 30, 1812	90000
Borodino	September 7,1812	80000
Moscow	September 14,1812	100000
Maloyaroslavets	October 12, 1812	50000
Vyazma	October 20, 1812	35000
Smolensk (Return)	November 5, 1812	30000
Berezina River	November 26, 1812	27000
Minsk (Return)	December 5, 1812	[Ambiguous]
Russian Border	December 14, 1812	10000

Waypoint	Latitude	Longitude	Segment Start Date	Segment End Date	Notes
Kowno (Kaunas)	54.9	23.9	June 24, 1812	July 1, 1812	
Wilna (Vilnius)	54.7	25.3	July 2, 1812	July 15, 1812	
Minsk	53.9	27.6	July 16, 1812	August 16, 1812	
Smolensk	54.8	32	August 17, 1812	August 30, 1812	
Orsha	54.5	30.4	August 31, 1812	September 7, 1812	[No Data on Route]
Borodino	55.5	35.8	September 8, 1812	September 14, 1812	
Moscow	55.8	37.6	September 15, 1812	October 19, 1812	
Maloyaroslavets	55	36.5	October 20, 1812	October 25, 1812	Retreat
Vyazma	55.2	34.3	October 26, 1812	November 5, 1812	
Berezina River	54.3	28.3	November 25, 1812	November 26, 1812	
Russian Border	54.7	24	December 13, 1812	December 14, 1812	

Date	Temperature (°C)	Notes
November 10, 1812	[No Data]	No recorded reading
November 14, 1812	-10	
November 18, 1812	-12	
November 21, 1812	-15	
November 23, 1812	[Ambiguous]	Conflicting historical sources
November 25, 1812	-20	
November 26, 1812	-25	The crossing of the Berezina River
December 1, 1812	-30	
December 5, 1812	[No Data]	Missing temperature data
December 10, 1812	-28	
December 14, 1812	-22	

INTRODUCTION.

- For this activity, each group will look at a data source **in isolation** from any other data source.
  - You can still use the infographic, but only for confirming your data points.
  - Each group will have a set of questions, but these are only **guides**, - when thinking about the data think about '**what**' the data **is telling you** and '**what**' **it isn't** – we can see this on the next slide.

- After 15 minutes, the facilitator will give you a selection of possible answers, so that you can **compare** your findings.

- At the end, **each group** should prepare a **narrative** on what they have discovered about their data.

INTRODUCTION.

- **What** does this data tell you about how the army moved, how big it was, the timing, or the conditions they faced?

- **What** important info do you think might be missing that could change how you see what happened?

- Are there any gaps or unclear parts in the data?

  - **How** do you think that might affect what you conclude?

- Based on just this data, **what** story or insights can you come up with about the challenges Napoleon's army went through?

- **What** smart guesses or assumptions can you make to fill in the blanks and create a likely story?

- **What** else would you want to know to see the full picture of the campaign?

GROUP 1 – TIMELINE DATA.

- **What** are the key milestones and turning points in the campaign?

- **How** does the timing of events relate to each other?

- Are there any notable **gaps** or **ambiguities** in the timeline?

- **How** might the order and timing of events have influenced the campaign's outcome?

- **What** story does this timeline tell about the advance and retreat phases?

GROUP 2 – TROOP COUNTS.

- **How** did the number of troops change throughout the campaign?

- At which points were the biggest losses observed, and **what** might have caused them?

- **How** do troop count correlate with key events or locations / can you tell?

- Are there any **surprising** increases or decreases?

- **What** does the troop data reveal about the campaign's difficulties and challenges?

GROUP 3 – GEOGRAPHIC ROUTE.

- **What** was the route taken by Napoleon's army during advance and retreat?

- **What** geographic challenges (rivers, distances, terrain) might have affected the army?

- **How** could geography help explain delays, losses, or strategic decisions?

- Are there any areas with **missing** or **ambiguous** route data?

- **How** could the geographic path add context to the timeline and troop data?

- I have included a link to Google Maps – to show the journey – use this how you want.

GROUP 4 – TEMPERATURE RETREAT.

- **What** patterns or extremes are evident in the temperature data?

- **How** might temperature fluctuations have affected troop morale and survival?

- At **what** points did the coldest temperatures occur relative to troop movements / can you tell?

- Are there **inconsistencies** or **gaps** in the temperature data?

  - **How** might these affect interpretation?

- **How** could the temperature data help explain the challenges during the retreat?

GROUP NARRATIVE PLAYBACK.

- Group 1 – Timeline
- Group 2 – Troops
- Group 3 – Geographical Route
- Group 4 – Temperature (Retreat)

NARRATIVE SUMMARY.

- **Summary - Timeline**

  - Using only the Timeline data, we can reconstruct a chronological framework of the campaign, highlighting its major phases, battles, and movements.

  - However, without troop counts, geographic details, or weather data, the narrative lacks depth on scale, environment, and spatial challenges.

- **Summary - Troops**

  - Using only troop count data, the narrative focuses on the dramatic decline in army size throughout the campaign, indicating severe losses likely due to battles and other hardships.

  - However, without timeline or geographic context, it's difficult to pinpoint causes or correlate losses with specific events or locations.

NARRATIVE SUMMARY.

- **Summary - Geography**

  - Using only the Geographic Route data, the narrative focuses on the physical journey of Napoleon's army, emphasizing the vast distances travelled, natural obstacles encountered, and the strategic implications of geography on movement and campaign progression.

  - Without troop counts or timeline data, it lacks detail on timing and scale but provides essential spatial context.

- **Summary - Temperature**

  - Using only temperature data, the narrative centers on the severe and rapidly worsening weather conditions faced by Napoleon's army during the retreat.

  - The dataset reveals a harsh winter with temperatures plunging well below freezing, critical for understanding the environmental context of the campaign's failure.

  - However, without timeline, troop, or geographic data, the analysis is limited to climate impact alone.

ACTIVITY 4 – DATA AGGREGATION – 20 MINUTES

Date	Event	Troop Count	Latitude	Longitude	Temperature (°C)	Notes
June 24, 1812	Army crosses into Russia at Kowno	422,000	54.9	23.9	[No Data]	Starting strength
July 1, 1812	Reach Wilna (Vilnius)	400,000	54.7	25.3	[No Data]	
July 15, 1812	Arrive at Minsk	350,000	53.9	27.6	[No Data]	
August 16, 1812	Battle of Smolensk	104,000	54.8	32	[No Data]	Significant losses
August 20, 1812	Movement towards Orsha	[No Data]	54.5	30.4	[No Data]	Troop count unclear
August 30, 1812	[No Event]	90,000	55	30.5	[No Data]	Troop count only
September 7, 1812	Battle of Borodino	80,000	55.5	35.8	[No Data]	Heavy casualties
September 14, 1812	Enter Moscow	100,000	55.8	37.6	[No Data]	Some reinforcements arrived
October 12, 1812	[No Event]	50,000	[No Data]	[No Data]	[No Data]	Troop count only
October 19, 1812	Retreat from Moscow begins	[No Data]	[No Data]	[No Data]	[No Data]	Troop count not recorded
November 14, 1812	[No Event]	[No Data]	[No Data]	[No Data]	-10	Temperature reading only
November 18, 1812	[No Event]	[No Data]	[No Data]	[No Data]	-12	Temperature reading only
November 21, 1812	[No Event]	[No Data]	[No Data]	[No Data]	-15	Temperature reading only
November 23, 1812	[No Event]	[No Data]	[No Data]	[No Data]	[Ambiguous]	Conflicting temperature data
November 25, 1812	[No Event]	[No Data]	[No Data]	[No Data]	-20	Temperature reading only
November 26, 1812	Crossing of the Berezina River	27,000	54.3	28.3	-25	Drastic reduction & cold weather
December 1, 1812	[No Event]	[No Data]	[No Data]	[No Data]	-30	Temperature reading only
December 5, 1812	Return to Minsk	[Ambiguous]	53.9	27.6	[No Data]	Conflicting reports
December 10, 1812	[No Event]	[No Data]	[No Data]	[No Data]	-28	Temperature reading only
December 14, 1812	Reach Russian border	10,000	54.7	24	-22	Survivors only

REVISIT YOUR QUESTIONS.

- With the new **aggregated** data set, revisit your questions and **confirm** or **explore** any new narratives.
  - Did any of your guesses or assumptions work?

- After 10 minutes, the facilitator will give you a selection of possible answers, so that you can **compare** your findings.

- At then end, **each group** should prepare a **narrative** on what they have discovered about their data.

GROUP NARRATIVE PLAYBACK.

- Group 1 – Timeline
- Group 2 – Troops
- Group 3 – Geographical Route
- Group 4 – Temperature (Retreat)

A DEVIATION ON JOINS – 5 MINUTES.

- Using the **full union query**, we see a **compelling** and **interconnected** story.
  - Napoleon's army started strong, suffered heavy losses in battles marked on the timeline, faced severe geographic challenges during their advance and retreat, and ultimately was devastated by the harsh winter cold illustrated in the temperature data.
  - **Missing data points** highlight historical uncertainties but do not obscure the clear pattern of decline.

- But what if you only wanted to focus on a **specific dataset** (such as timeline) and only **augment** that data with data from other sources – such as troop count, geographic route and temperature.
  - For this application we can use another type of join – **the left join**.
  - For example, a **left join** of Timeline with Troop Counts highlights Troop changes specifically related to known events, making it **clearer** to **interpret causality**.
  - **Join** tables reduce noise by showing only **relevant** matched records, helping users **concentrate** on linked data points.

THE COMPLETE NARRATIVE – 5 MINUTES.

- **Russian Campaign of 1812-1813**
  - Now that we've explored the data behind the graphic, let's walk through the **story** it tells — from left to right, beginning to end.
  - On the far left, we see a thick beige band.
    - This represents Napoleon's Grand Armée — 422,000 soldiers — crossing into Russian territory in June 1812.
    - The thickness of the band is proportional to the size of the army.
    - At this point, the force is enormous, confident, and advancing eastward.
  - As the beige band moves toward Moscow, it steadily thins.
    - This thinning isn't explained directly in the graphic, but it represents the losses the army suffered long before reaching any major battle: disease, hunger, exhaustion, desertion, and the sheer difficulty of marching such a large force across vast distances.
    - The line bends and shifts as it follows the geography of the campaign, passing through Wilna, Witebsk, and Smolensk.

THE COMPLETE NARRATIVE.

- By the time the army reaches Moscow, the band has shrunk dramatically.
- Only about 100,000 soldiers remain.
  - Moscow itself is abandoned and burning — the Russians have evacuated and set fire to the city.
  - There is no surrender, no supplies, and no shelter. Napoleon has no choice but to retreat.
- At this point, the colour of the band changes from beige to black.
  - This marks the turning point — the beginning of the retreat westward.
  - As the black band moves back across the same landscape, it collapses at a terrifying rate.
  - By Smolensk, only 24,000 soldiers remain.
  - The line twists and splits at the Berezina River, showing the chaos of the crossing, where thousands more were lost.
- Below the map, Minard includes a temperature chart aligned with the retreat.
  - Here we see the brutal cold of the Russian winter: –21°C, –24°C, –30°C.
  - These temperatures correspond to specific dates and locations on the retreat path.
  - As the temperature drops, the black band shrinks even faster.

THE COMPLETE NARRATIVE.

- By the time the army reaches the point where it began — Kowno — only 10,000 soldiers remain.

- Minard's graphic tells this entire story without a single sentence of prose.
  It combines geography, time, temperature, direction, and troop strength into one coherent, devastating narrative.

- It is widely considered one of the greatest infographics ever made because it shows not just data, but the human cost of a military disaster — all through the careful merging and visual encoding of multiple datasets."