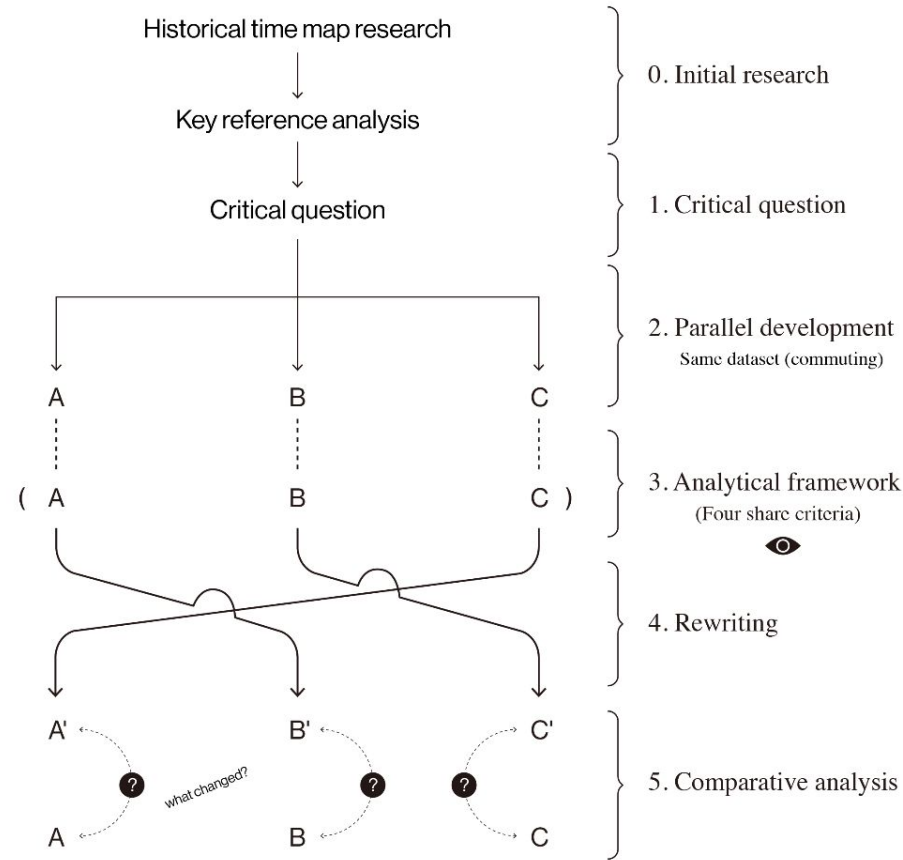


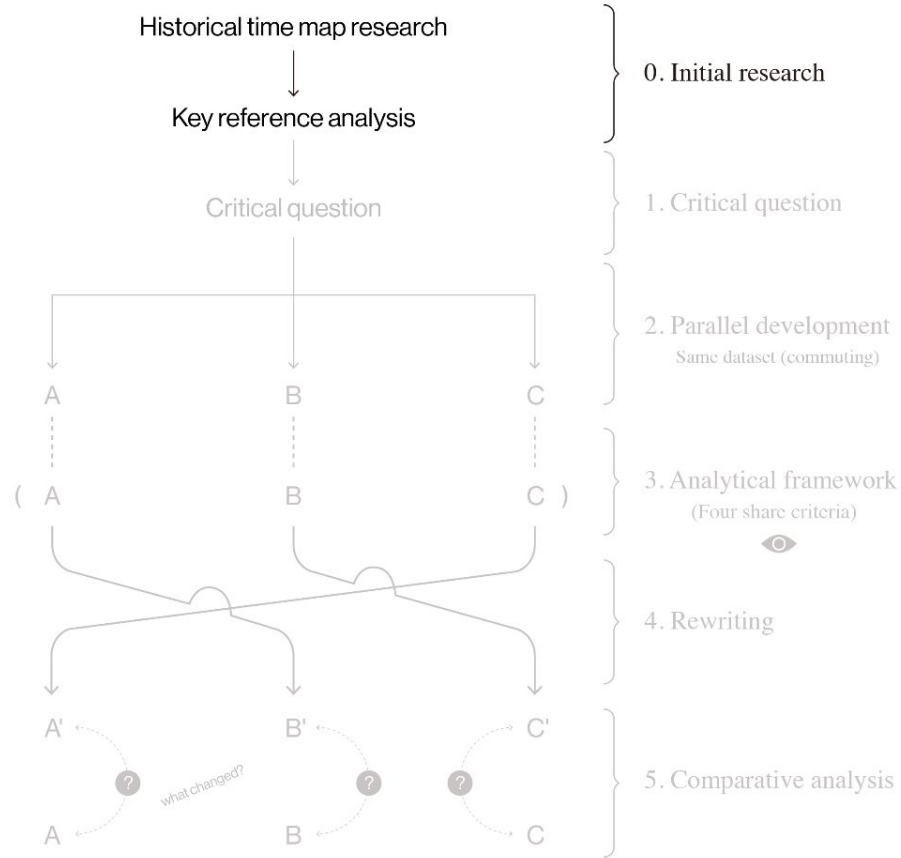
The collage features several distinct data visualization techniques:

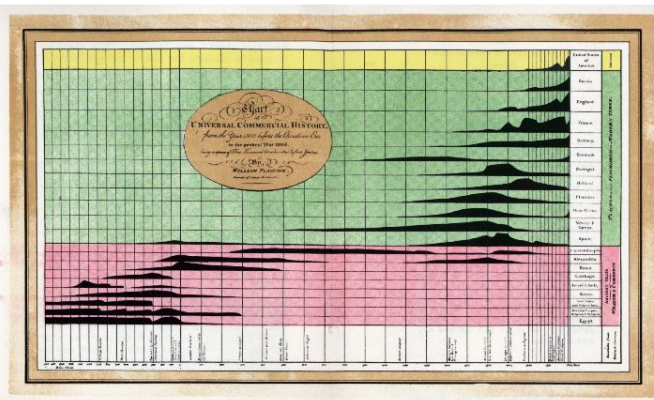
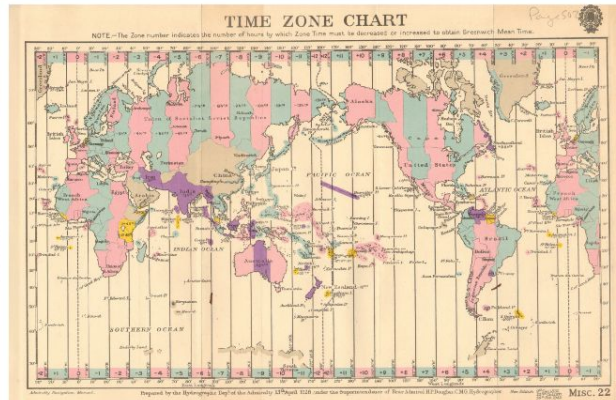
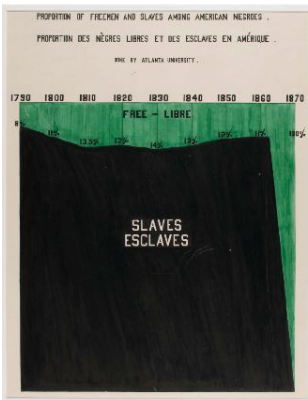
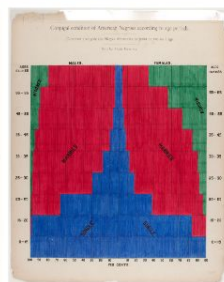
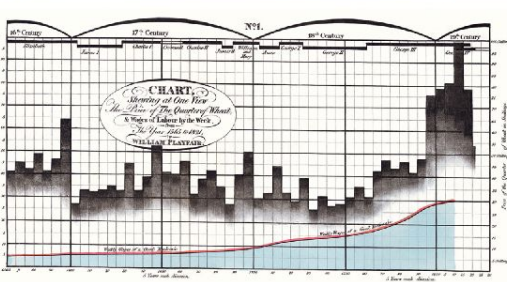
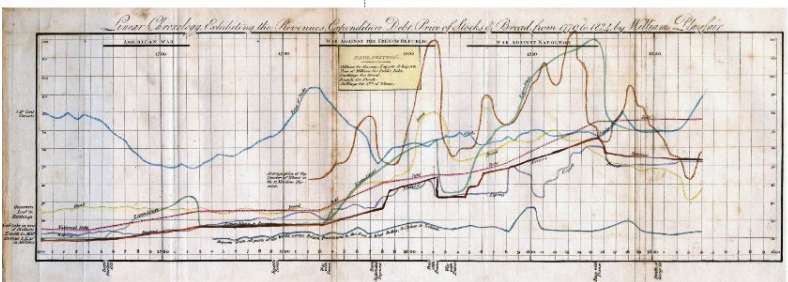
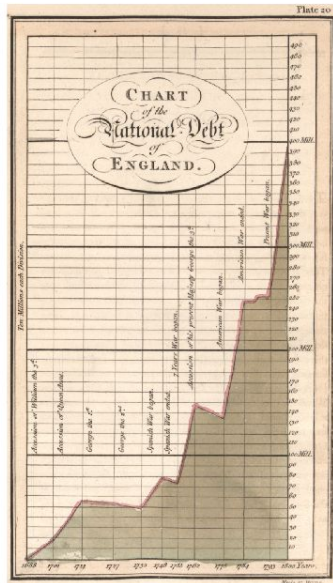
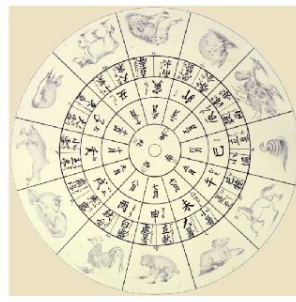
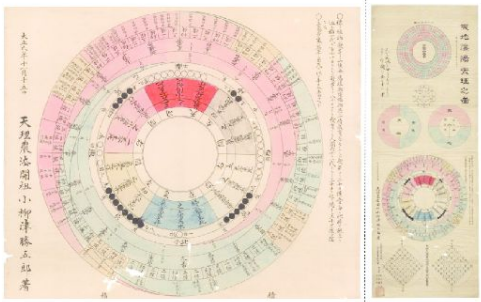
- Top Left:** A grid-based map visualization with vertical bars of varying heights, possibly representing population density or land use.
- Top Center:** A circular diagram titled "Carbon intensity gradient" showing radial lines and concentric circles, likely representing carbon emissions from different locations.
- Top Right:** A bar chart titled "Time and scale" comparing the annual carbon emissions per person for different modes of transport (Light rail and tram, London Underground, Bus, Motorbike, National Rail, Bus outside London, Private vehicle). It includes a secondary y-axis for "How many years does it take for a tree to absorb the total carbon emissions?"
- Center:** A large, bold text overlay reading "Methods of Contextualising".
- Bottom Left:** A diagram showing a cross-section of a city with concentric circles and a shaded area, possibly representing a city's growth or a specific urban area.
- Bottom Center:** A circular diagram with multiple radial lines and concentric circles, similar to the "Carbon intensity gradient" diagram, but with different data points.
- Bottom Right:** A bar chart titled "Anjali Sophia Steven" showing data for three individuals across various categories (Anjali, Sophia, Steven).

Research Structure



0. Initial research





Agricultural Civilization: Cyclical Ecological Time

Embedded temporality

Cyclical ecological time is typically represented in circular calendars or seasonal diagrams. Time is structured by natural rhythms – solstices, harvest cycles, solar terms. The scale is often non-uniform because nature does not move in evenly divisible units. Humans are embedded within environmental cycles. Agency lies primarily with nature. Time here organizes adaptation rather than control.

Key Characteristics

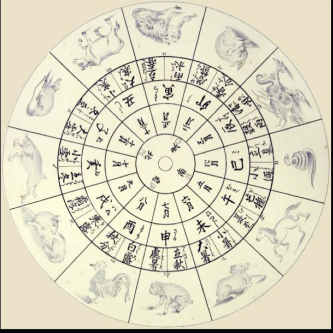
- Circular structure
- Non-uniform seasonal rhythm
- Nature defines temporal units

Visual Claim

The circular structure suggests that time is self-contained, repetitive, and governed by natural cycles. Time appears as something to follow rather than something to control.

Human-Nature Relation

Humans are embedded within ecological rhythms. Agency lies in nature rather than human intervention.



Governance from the Future : Anticipatory Temporality

Anticipatory temporality emerges when the future becomes a governing force over the present. Unlike production-oriented time, which extends growth forward, this structure projects possible outcomes and reorganises action accordingly. Time is no longer merely cumulative; it becomes conditional. Thresholds, tipping points, and remaining budgets define the horizon. Nature is not simply extracted but reappears as systemic constraint. Agency shifts from acceleration to regulation, from expansion to avoidance. The present is increasingly structured by calculated futures.

Key Characteristics

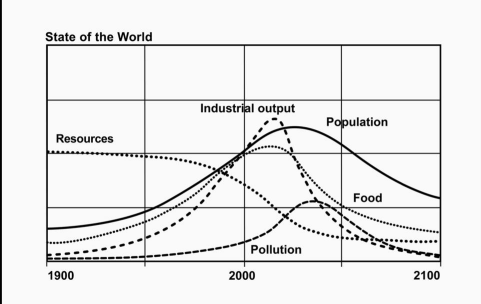
- Linear structure with projected extension
- Presence of thresholds or limits
- Future scenarios shape present decisions
- Nature appears as constraint rather than resource

Visual Claim

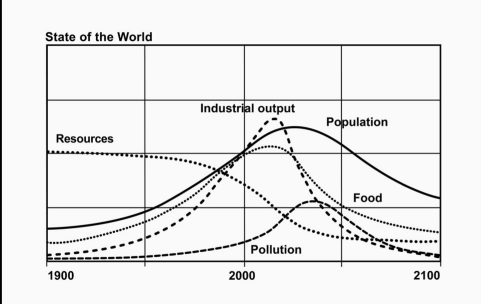
Threshold lines, countdowns, and scenario projections indicate conditional futures. The future becomes a regulating force over the present.

Human-Nature Relation

Nature reappears as systemic constraint. Human action is structured by projected risks.



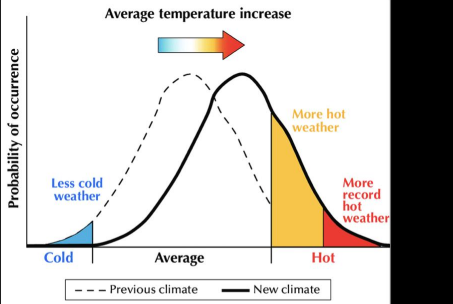
State of the World



Resources, Industrial output, Population, Food, Pollution

1900, 2000, 2100

Average temperature increase



Probability of occurrence

Less cold weather, Cold, Average, Hot, More hot weather, More record hot weather

--- Previous climate, — New climate

Industrial Revolution: Production-oriented time

Dominant Temporality

In production-oriented time, we see linear axes structured by years. Agricultural yield charts or industrial production statistics exemplify this. Time becomes standardized, measurable, and comparable. The environment shifts from cyclical authority to quantifiable resource. Humans define goals and measure improvement. Time becomes a managerial instrument.

Key Characteristics

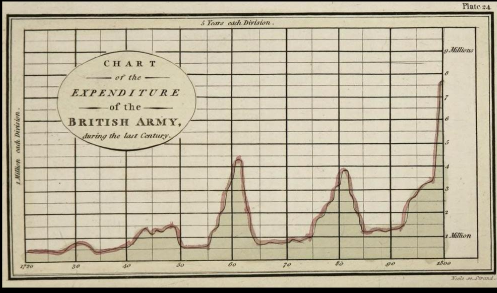
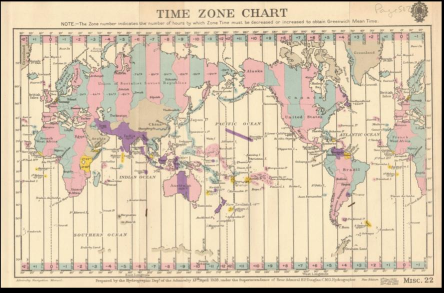
- Linear axis
- Uniform chronological scale
- Productivity as measurable object

Visual Claim

Linear graphs and uniform scales assert measurable growth and forward movement. Time becomes a resource to optimise.

Human-Nature Relation

Nature is framed as extractable material. Humans occupy the centre as productive agents.



TIME ZONE CHART

CHART of the EXPENDITURE of the BRITISH ARMY during the last century

Geological Scale : Decentred Temporality

Decentred temporality situates human activity within geological time. Unlike anticipatory models that project futures from the present, this structure stretches temporality beyond human institutions altogether. Millions of years of sedimentation, fossil formation, and atmospheric transformation become visible as temporal strata. Human history appears as a brief disturbance within far deeper cycles. Nature is no longer a resource or a boundary to manage, but a temporal field that vastly exceeds human intention. Agency becomes relative, and the scale of action is recontextualised within planetary duration.

Key Characteristics

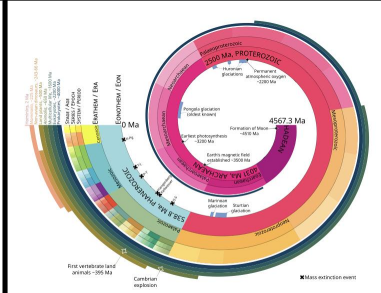
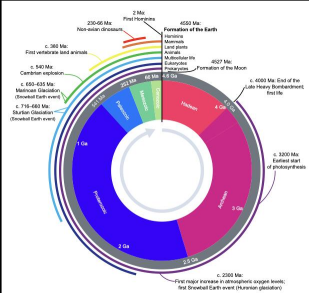
- Multi-layered deep time
- Non-human temporal scales dominate
- Human history becomes a thin surface layer
- Time exceeds political and economic cycles

Visual Claim

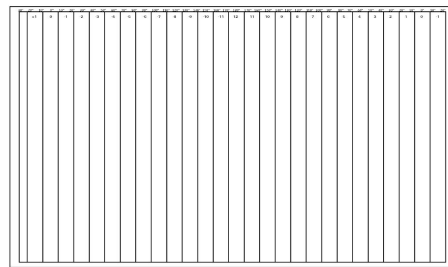
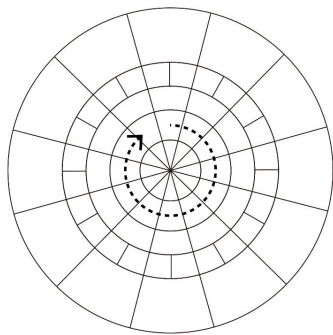
Layered stratigraphy and deep time charts relativise human duration. Human history appears as a thin surface layer.

Human-Nature Relation

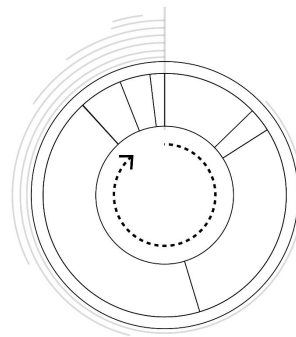
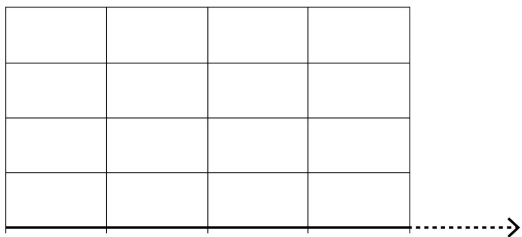
Humans are one geological moment among many. Nature exceeds human agency.



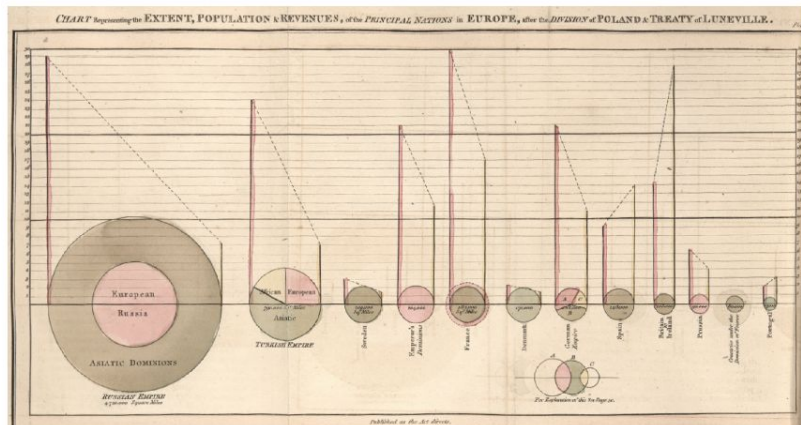
Geological time scale diagram showing eons, eras, and periods, with key events marked.



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Statistical Breviary (1801).



William Playfair's circle diagram in the Statistical Breviary (1801).

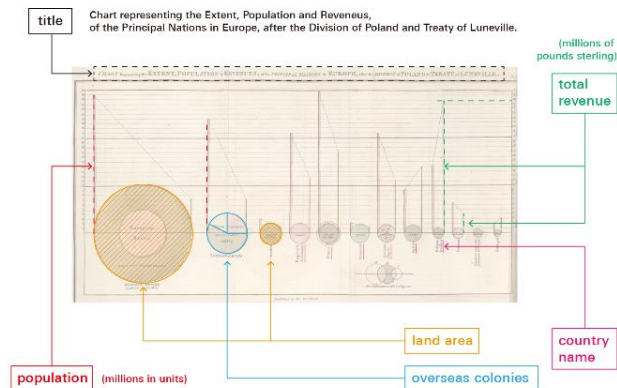
"The circle represents the area of each country; the line on the left, the population in millions read on the vertical scales; the line on the right, the revenue (taxes) collected in millions of pounds sterling read also on the vertical scale; and the 'dotted lines drawn between the population and revenue, are merely intended to connect together the lines belonging to the same country. The ascent of those lines being from right to left, or from left to right, shews whether in proportion to its population the country is burdened with heavy taxes or otherwise'" (Tufte, 2001, pp.44–45).

ref. Tufte, E.R. (2001) The Visual Display of Quantitative Information. 2nd edn. Cheshire, CT: Graphics Press.

structure

The slope itself does not have exact numerical meaning, because it depends on the circle size and the height of the two vertical lines.

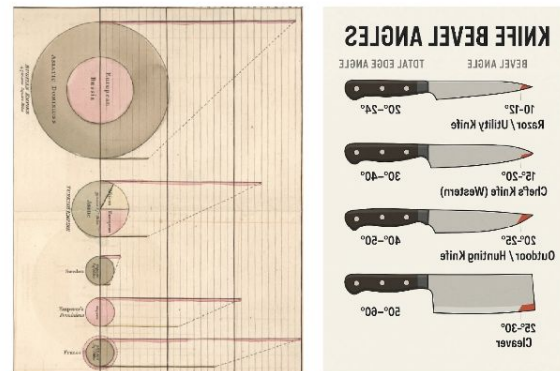
However, the direction of the dotted line matters. If it rises from population to revenue, the tax burden is heavier. If it falls, the tax burden is lighter.



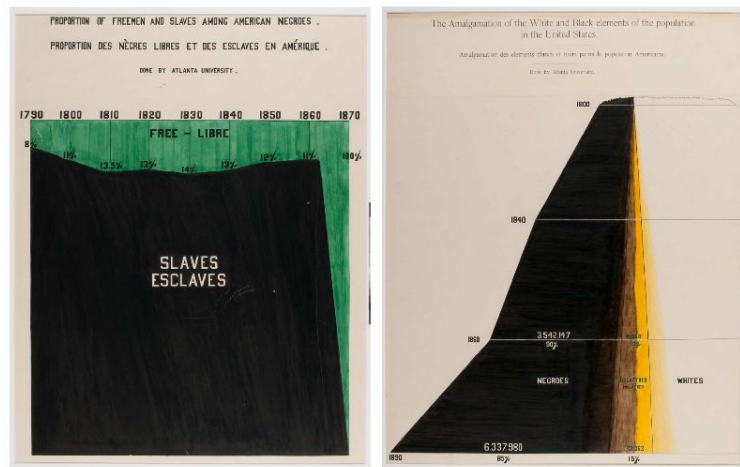
characteristic

Metaphor

From a formal perspective, the sharp angles created by the dotted line and the vertical lines can produce a sense of visual tension. In some cases, the shape may resemble a blade-like form, which can intensify the perception of taxation as a burden or pressure.



The Georgia Negro: A Social Study (1899).



William Edward Burghardt Du Bois (1868–1963), Paris, 1900–1900. Ink and watercolour, 710 x 560 mm. Library of Congress.

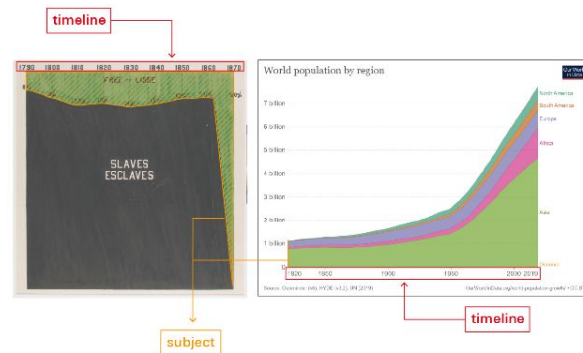
"This area chart uses similar information as Slaves and Free Negroes (plate 12) but renders it on a national level and in a completely different way. The chronology reads left to right, and green and black are used instead of red. The Atlanta group may have been motivated to make different but related visual interpretations by a desire to explore how varied forms might be read by the audience in new ways." (W. E. B. du Bois's Data Portraits: Visualizing Black America, edited by Whitney Battle-Baptiste, and Britt Rusert, Princeton Architectural Press, 2018. ProQuest Ebook Central.).

ref. Battle-Baptiste, W. and Rusert, B. (eds.) (2018) *W.E.B. Du Bois's Data Portraits: Visualizing Black America*.

| structure

comparison

The timeline is placed at the top, reversing conventional chart logic and directing the eye downward. A thin green band shows free people, while a vast black area represents enslaved people. By using large areas instead of lines, the chart turns proportion into visual weight. Slavery dominates the composition, shifting the image's centre of gravity downward.



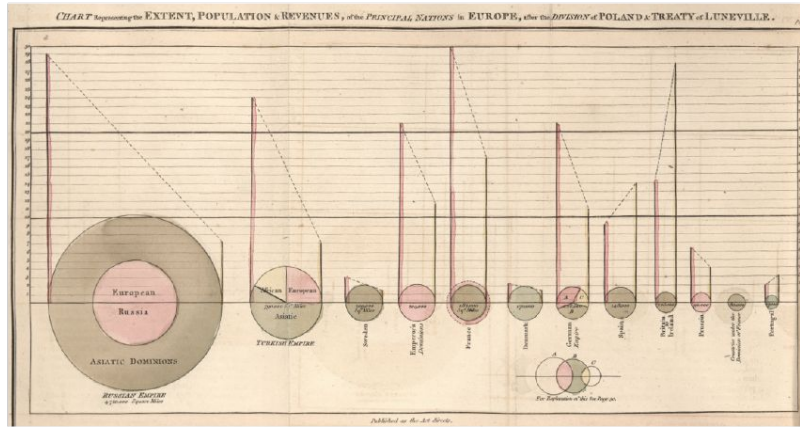
| characteristic

Both charts use strong spatial metaphors to turn data into historical weight. Mountain-like forms and dark depths give the image gravity, transforming statistics into physical mass. Rather than neutral diagrams, they function as visual arguments about slavery and racial structure.

In the second chart, the white area blends into the background, whiteness appears as the default ground, subtly exposing the logic of white centrality.



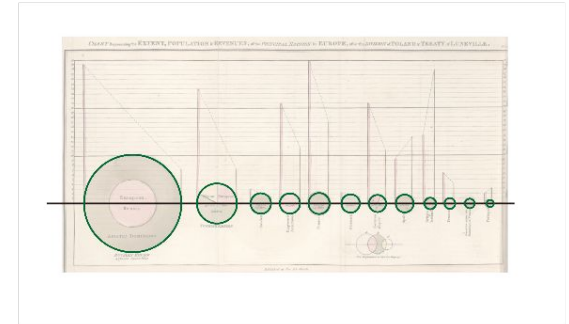
Statistical Breviary (1801).



William Playfair's circle diagram in the Statistical Breviary (1801).

"The circle represents the area of each country; the line on the left, the population in millions read on the vertical scales; the line on the right, the revenue (taxes) collected in millions of pounds sterling read also on the vertical scale; and the 'dotted lines drawn between the population and revenue, are merely intended to connect together the lines belonging to the same country. The ascent of those lines being from right to left, or from left to right, shews whether in proportion to its population the country is burdened with heavy taxes or otherwise'" (Tufte, 2001, pp.44–45).

ref. Tufte, E.R. (2001) The Visual Display of Quantitative Information. 2nd edn. Cheshire, CT: Graphics Press.



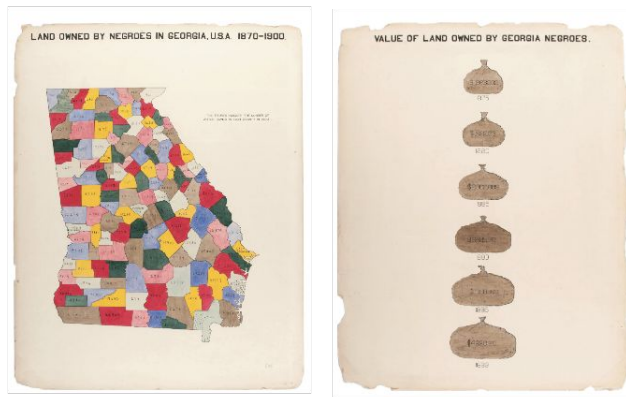
| characteristic

Metaphor

The chart transforms data into circles and lines, giving the data a scrolling visual effect and creating a sense of upward movement. The circles are also positioned on a uniform horizontal line for contrast.



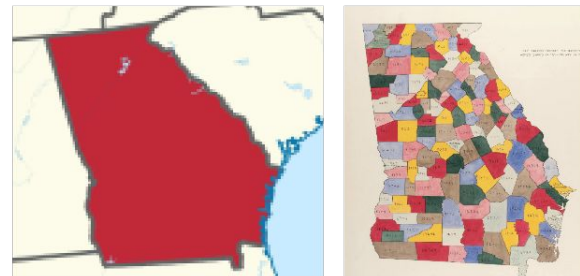
Statistical Breviary (1801).



William Playfair's circle diagram in the Statistical Breviary (1801).

Plate 5 Many of the diagrams are sequenced strategically to build comparisons and new perspectives on the study's datasets by considering relationships over time as well as space. This population index of Georgia by Counties, 1890 precedes the following map (plate6), which shows the populations in 1870 and 1880. The vibrancy and opacity of the colors suggest the use of gouache, a subtype of watercolor that lies down with an opaque finish and bonds with its paper background. This material would later be critical to the flat and graphic visual language taught by the so-called Swiss schools in 1950s and 1960s Europe and spread throughout American graphic design education, especially via Armin Hoffman and his former students from the Basel School of" (Tufte, 2001, pp.38-35).

ref. Tufte, E.R. (2001) The Visual Display of Quantitative Information. 2nd edn. Cheshire, CT: Graphics Press.



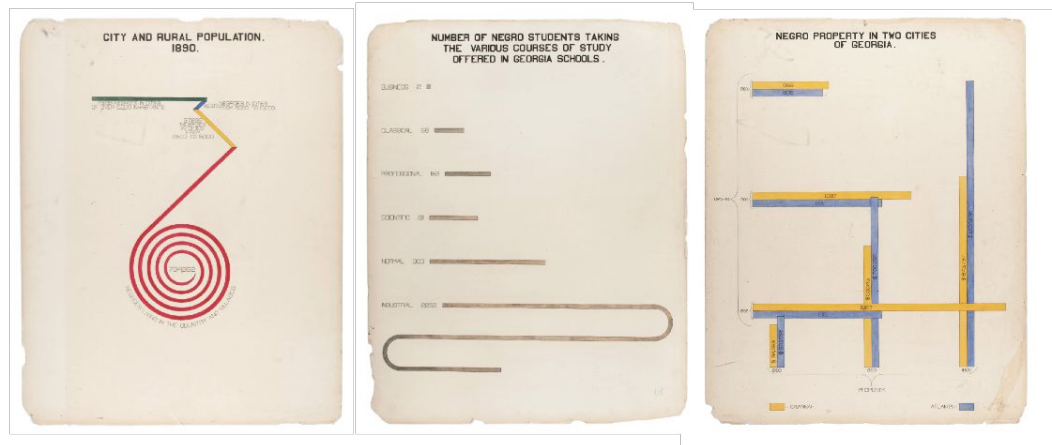
| characteristic

Metaphor

Figure 1 uses a map to represent regional data. Figure 2 transforms the table into an image, and the value into a bag full of coins, using a more metaphorical image that is understandable as a money bag without directly depicting the money. The size of the money bag is used to represent changes in value.



Statistical Breviary (1801).

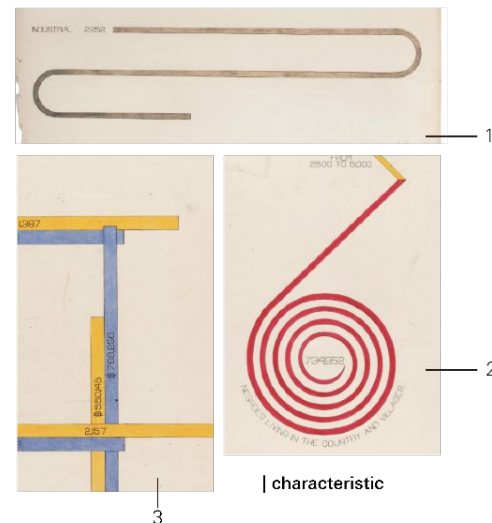


William Playfair's circle diagram in the Statistical Breviary (1801).

Part bar chart, part line chart, and part spiral graph, this visualization defies categorization. The text paired with each segment reads more like a narrative than a typical key. Its tricolor palette and fragmentary construction make for a memorable, and experimental, presentation of data. (Tufte, 2001, pp.40).

A double-curved outlier at the end of a series of straight bars is a more creative way to show the dramatic ratio of Negro students studying industrial arts. The snaking data is a visual focal point on a chart that shows the dominance of industrial education for black Americans in 1900. (Tufte, 2001, pp.41-42).

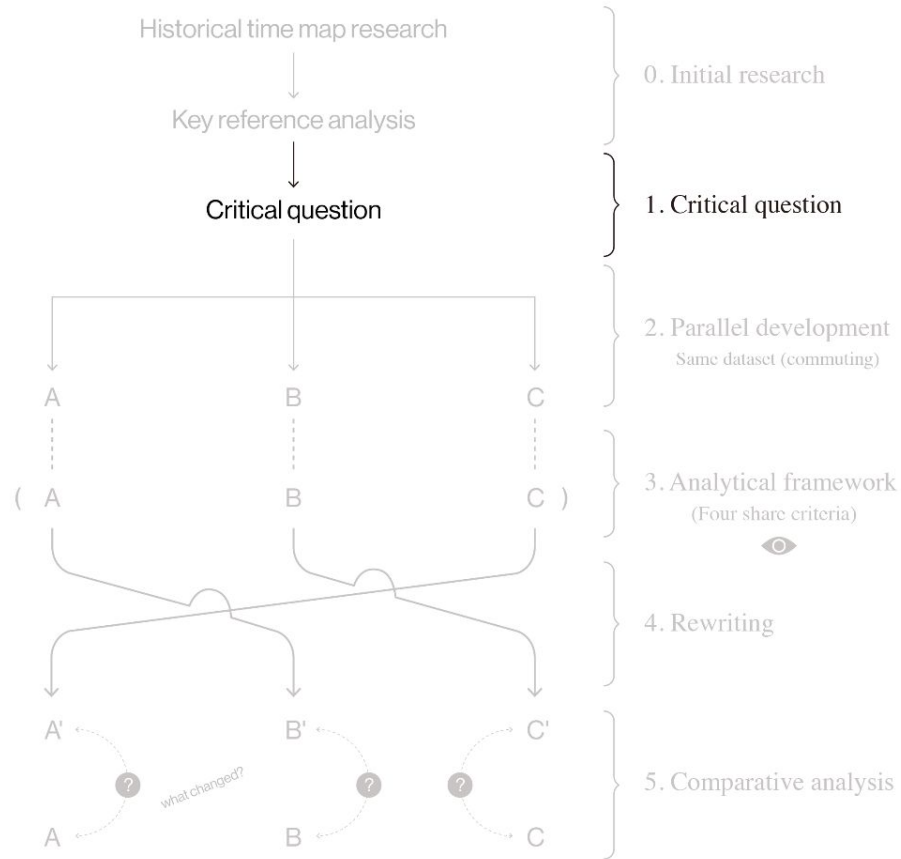
An overlapping matrix of baby blue and yellow bars represents the number of black property owners and land values in two Georgia cities: Atlanta and Savannah. In this carefully woven bar chart, the Du Bois team uses two different data sets to visually reinforce both. As a statistician, Du Bois would be interested in ways to display correlation and even causality in data gathered in different parts of the state in different years. Much like the spiral diagrams before it, this lattice bar chart might be considered its own chart typology: the woven bar chart. (Tufte, 2001, pp.43-44).



Metaphor

Table 1 uses both zigzag and straight lines to represent the data. The contrast between the zigzag curves and straight lines emphasizes the greater number of people in the zigzag section. Table 2 uses different segments of a single line to represent proportions, contrasting straight lines with spirals to highlight the larger number of people in the spiral section. The connecting lines also link the groups of people together, metaphorically representing the migration of people from rural areas to cities. Image 3 places the charts in different directions, creating an interwoven visual effect.

1. Critical question



Initial questions based on Commute data:

How can we show the link between individual choices and total emissions?

How can we show that today's commuting habits affect the climate far into the future?

How can design show that people's choices are limited by things like housing, transport access, and cost?

How can commuting be shown as a routine rather than a single statistic? (Emissions for other activities related to UNI could count as well)

How can a daily commute/waste production be connected to long-term climate damage?

How can I show that some people don't choose longer, higher-impact commutes but time, money and access chooses these for them?

Initial questions based on Personal thoughts:

When does detailed data become confusing instead of helpful?

When does showing too much time make urgency disappear?

When do small daily actions stop feeling small?

When does simplifying time make the future feel too far away?

When does long-term climate/impact data feel too abstract to care about?

When does a chart explain the data but fail to change behavior

What are the ways in which this data can be misinterpreted?

If the dataset remains constant,
how does visual structure reshape our understanding of time?

We tested this by keeping data fixed and varying form.

Original dataset

UAL GHG Emissions: Staff Commute

INPUT			INPUT			INPUT			INPUT		
Mode of Transport	Surveyed Staff	Proportion of staff	Number of FTE staff	Sum of commute distance (miles)	Average commute per journey (miles)	Average commute per day (miles)	Average commute per day (km)	kg CO2e/passenger.km	kg CO2e/day	Average commute days per year	tonnes CO2e/year
Private Vehicle	24	2.87%	0.0	517	21.5	43.1	69.3	0.1116	0.0	129.9	0.0
Diesel - Lower medium	1	0.12%		40	40.0	80.0	128.7	0.14517			
Diesel - Upper medium	1	0.12%		13	13.0	26.0	41.8	0.16194			
Diesel - Dual purpose 4X4	2	0.24%		85	42.5	85.0	136.8	0.19973			
Petrol - Mini	1	0.12%		7	7.0	14.0	22.5	0.13063			
Petrol - Supermini	1	0.12%		5	5.0	10.0	16.1	0.14276			
Petrol - Lower medium	3	0.36%		41	13.5	27.0	43.5	0.16123			
Petrol - Upper medium	2	0.24%		21	10.5	21.0	33.8	0.18535			
Petrol - Unknown	1	0.12%		14	14.3	28.5	45.9	0.16272			
Hybrid - Supermini	3	0.36%		60.86	20.3	40.6	65.3	0.11413			
Hybrid - Lower medium	2	0.24%		54	27.0	54.0	86.9	0.11724			
Hybrid - Executive	1	0.12%		20.7	20.7	41.4	66.6	0.15650			
Hybrid - Unknown	1	0.12%		2.6	2.6	5.2	8.4	0.12825			
Battery Electric - Lower medium	1	0.12%		4.6	4.6	9.2	14.8	0.03849			
Battery Electric - Upper medium	1	0.12%		70	70.0	140.0	225.3	0.04178			
Battery Electric - Executive	1	0.12%		35	35.0	70.0	112.7	0.03702			
Battery Electric - Unknown	2	0.24%		43.5	21.8	43.5	70.0	0.04047			
Plug-in Hybrid - Upper medium	0	0.00%		0	0.0	0.0	0.0	0.09172			
Unknown - Upper medium	0	0.00%		0	0.0	0.0	0.0	0.16752			
Unknown - Unknown	0	0.00%		0	0.0	0.0	0.0	0.16725			
Motorbike	1	0.12%	0.0	5	5.0	10.0	16.1	0.11367	0.0	129.9	0.0
National Rail	311	37.16%	0.0	12956.23	41.7	83.3	134.1	0.03546	0.0	129.9	0.0
London Underground	288	34.41%	0.0	2853.34869	9.9	19.8	31.9	0.0278	0.0	129.9	0.0
Light rail and tram	10	1.19%	0.0	84.22	8.4	16.8	27.1	0.0286	0.0	129.9	0.0
Bus (London)	59	7.05%	0.0	254.33	4.3	8.6	13.9	0.06875	0.0	129.9	0.0
Bus (Outside London)	1	0.12%	0.0	10	10.0	20.0	32.2	0.12525	0.0	129.9	0.0
Coach	0	0.00%	0.0	0	0.0	0.0	0.0	0.02776	0.0	129.9	0.0
Taxi	0	0.00%	0.0	0	0.0	0.0	0.0	0.14861	0.0	129.9	0.0
Cycle	109	13.02%	0.0	610.8	5.6	11.2	18.0	0	0.0	129.9	0.0
Walk	34	4.06%	0.0	71.07	2.1	4.2	6.7	0	0.0	129.9	0.0
Overall	837	100%		17,362	15.0	30.0	48.2		0.0	129.9	0.0

Sophia

Mode of Transport	Surveyed Staff	Average commute per day (km)	kg CO2e/ passenger.km	Average commute days per year	Average kg CO2e/ passenger per km	Avg Annual kg CO2e/ passenger
Private Vehicle	24	69.3	0.1116	129.9	7.73388	1004.631012
Diesel - Lower medium	1	128.7	0.14517		18.683379	0
Diesel - Upper medium	1	41.8	0.16194		6.769092	0
Diesel - Dual purpose	2	136.8	0.19973		27.323064	0
Petrol - Mini	1	22.5	0.13063		2.939175	0
Petrol - Supermini	1	16.1	0.14276		2.298436	0
Petrol - Lower medium	3	43.5	0.16123		7.013505	0
Petrol - Upper medium	2	33.8	0.18535		6.26483	0
Petrol - Unknown	1	45.9	0.16272		7.468848	0
Hybrid - Supermini	3	65.3	0.11413		7.452689	0
Hybrid - Lower medium	2	86.9	0.11724		10.188156	0
Hybrid - Executive	1	66.6	0.1565		10.4229	0
Hybrid - Unknown	1	8.4	0.12825		1.0773	0
Battery Electric - Lower	1	14.8	0.03849		0.569652	0
Battery Electric - Upper	1	225.3	0.04178		9.413034	0
Battery Electric - Executive	1	112.7	0.03702		4.172154	0
Battery Electric - Unknown	2	70	0.04047		2.8329	0
Plug-in Hybrid - Upper	0	0	0.09172		0	0
Unknown - Upper medium	0	0	0.16752		0	0
Unknown - Unknown	0	0	0.16725		0	0
Motorbike	1	16.1	0.11367	129.9	1.830087	237.7283013
National Rail	311	134.1	0.03546	129.9	4.755186	617.6986614
London Underground	288	31.9	0.0278	129.9	0.88682	115.197918
Light rail and tram	10	27.1	0.0286	129.9	0.77506	100.680294
Bus (London)	59	13.9	0.06875	129.9	0.955625	124.1356875
Bus (Outside London)	1	32.2	0.12525	129.9	4.03305	523.893195
Coach	0	0	0.02776	129.9	0	0
Taxi	0	0	0.14861	129.9	0	0
Cycle	109	18	0	129.9	0	0
Walk	34	6.7	0	129.9	0	0
Overall	837	48.2		129.9		0

Anjali

Mode of Transport	Surveyed Staff	Average commute per day (km)	kg CO2e/ passenger.km	Average commute days per year	Average kg CO2e/ passenger per km	Avg Annual kg CO2e/ passenger
Private Vehicle	24	69.3	0.1116	129.9	7.73388	1004.631012
Diesel - Lower medium	1	128.7	0.14517		18.683379	0
Diesel - Upper medium	1	41.8	0.16194		6.769092	0
Diesel - Dual purpose	2	136.8	0.19973		27.323064	0
Petrol - Mini	1	22.5	0.13063		2.939175	0
Petrol - Supermini	1	16.1	0.14276		2.298436	0
Petrol - Lower medium	3	43.5	0.16123		7.013505	0
Petrol - Upper medium	2	33.8	0.18535		6.26483	0
Petrol - Unknown	1	45.9	0.16272		7.468848	0
Hybrid - Supermini	3	65.3	0.11413		7.452689	0
Hybrid - Lower medium	2	86.9	0.11724		10.188156	0
Hybrid - Executive	1	66.6	0.1565		10.4229	0
Hybrid - Unknown	1	8.4	0.12825		1.0773	0
Battery Electric - Lower	1	14.8	0.03849		0.569652	0
Battery Electric - Upper	1	225.3	0.04178		9.413034	0
Battery Electric - Executive	1	112.7	0.03702		4.172154	0
Battery Electric - Unknown	2	70	0.04047		2.8329	0
Plug-in Hybrid - Upper	0	0	0.09172		0	0
Unknown - Upper medium	0	0	0.16752		0	0
Unknown - Unknown	0	0	0.16725		0	0
Motorbike	1	16.1	0.11367	129.9	1.830087	237.7283013
National Rail	311	134.1	0.03546	129.9	4.755186	617.6986614
London Underground	288	31.9	0.0278	129.9	0.88682	115.197918
Light rail and tram	10	27.1	0.0286	129.9	0.77506	100.680294
Bus (London)	59	13.9	0.06875	129.9	0.955625	124.1356875
Bus (Outside London)	1	32.2	0.12525	129.9	4.03305	523.893195
Coach	0	0	0.02776	129.9	0	0
Taxi	0	0	0.14861	129.9	0	0
Cycle	109	18	0	129.9	0	0
Walk	34	6.7	0	129.9	0	0
Overall	837	48.2		129.9		0

Steven

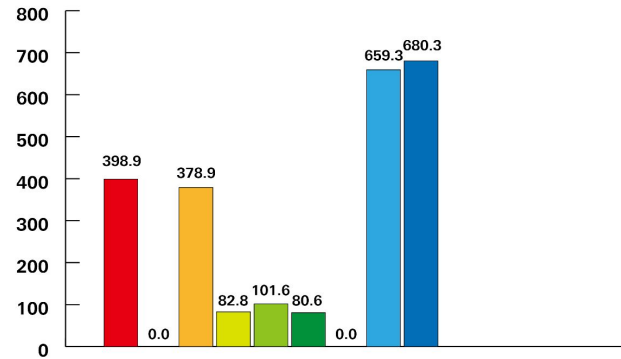
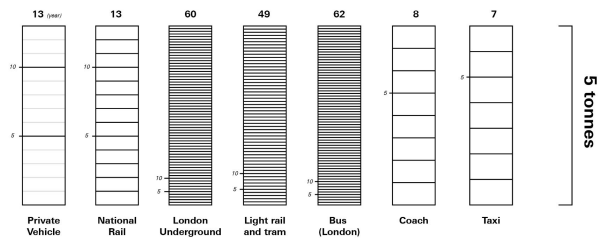
Mode of Transport	Average commute per day (km)	kg CO2e/ passenger.km	kg CO2e/year	Years to reach 5 tonnes CO2e
Private Vehicle	56.3	0.0662	398.9	12.5344697919
Motorbike	0.0	0.11367	0.0	0
National Rail	99.9	0.03546	378.9	13.196099562
London Underground	27.9	0.0278	82.8	60.38647343
Light rail and tram	33.2	0.0286	101.6	49.2125984252
Bus (London)	11.0	0.06875	80.6	62.0347394541
Bus (Outside London)	0.0	0.12525	0.0	0
Coach	222.1	0.02776	659.3	7.583801001
Taxi	42.8	0.14861	680.3	7.34969866235
Cycle	9.8	0	0.0	158.2278
Walk	2.8	0	0.0	282.4858

Steven

to reach 5 tonnes CO₂e

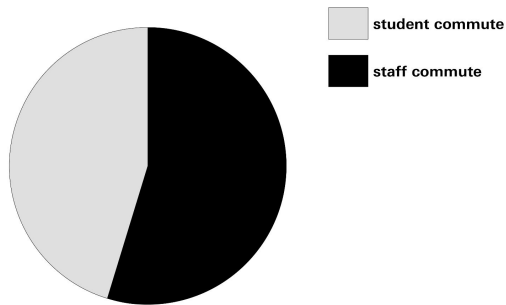
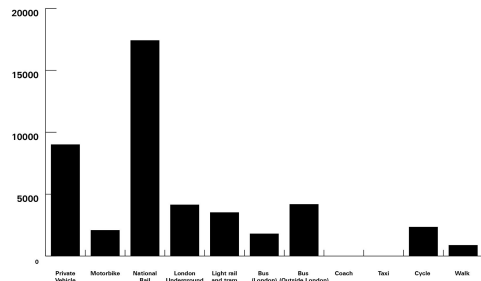
Kg CO₂e/year Per Person

Private Vehicle	12.5344698	= 5000 kg CO ₂ e / 398.9 kg CO ₂ e (year)
National Rail	13.1960939562	= 5000 kg CO ₂ e / 378.9 kg CO ₂ e (year)
London Underground	60.38647343	= 5000 kg CO ₂ e / 82.8 kg CO ₂ e (year)
Light rail and tram	49.2125984252	= 5000 kg CO ₂ e / 101.6 kg CO ₂ e (year)
Bus (London)	62.0347394541	= 5000 kg CO ₂ e / 80.6 kg CO ₂ e (year)
Coach	7.34969866235	= 5000 kg CO ₂ e / 659.3 kg CO ₂ e (year)
Taxi	7.58380100106	= 5000 kg CO ₂ e / 680.3 kg CO ₂ e (year)

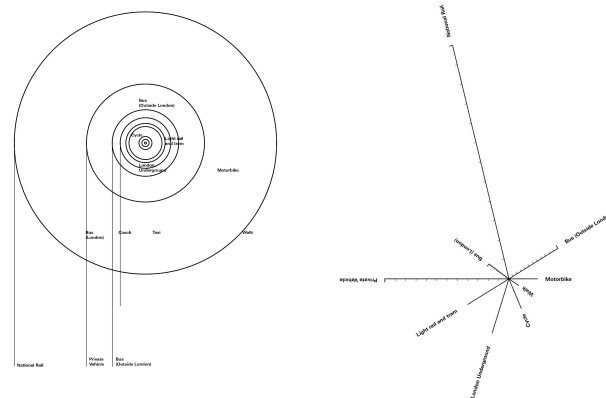


Annual distance Per Person
staff

(Average commute days per year) x
(Average commute per day km)



Average commute days per year



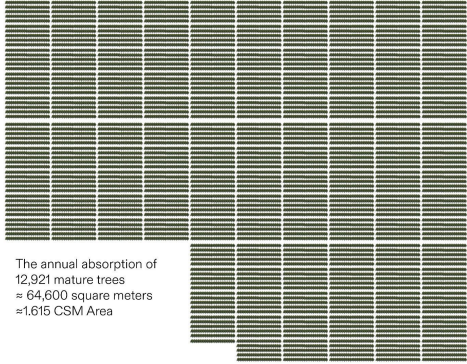
Sophia



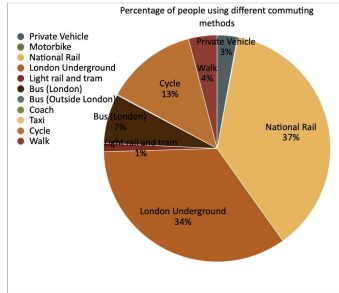
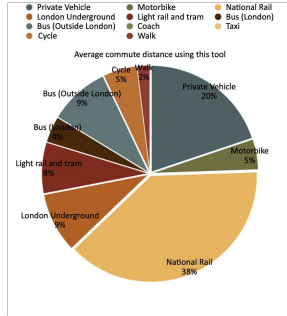
A mature tree absorbs 20 kg of CO₂ per year.
258,419.2 ÷ 20 = 12,920.96

Therefore, we would need approximately 12,920 trees to offset this portion of the emissions.

交通方式 (Mode of Transport)	Increased Staff	Carbon emissions per year based on total population
Private Vehicle	24	482,837.27
Motorbike	1	2,271.5
National Rail	311	182,982.27
London Underground	10	1,000.0
Light rail and tram	10	1,000.0
Bus (London)	10	1,000.0
Bus (Outside London)	10	1,000.0
Cycle	0	0.0
Walk	0	0.0
Motorbike	1	2,271.5
Other	10	1,000.0
Total	337	768,000.0



The annual absorption of 12,921 mature trees
≈ 64,600 square meters
≈ 1.615 CSM Area

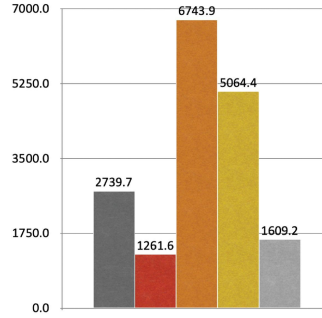


One year
emission

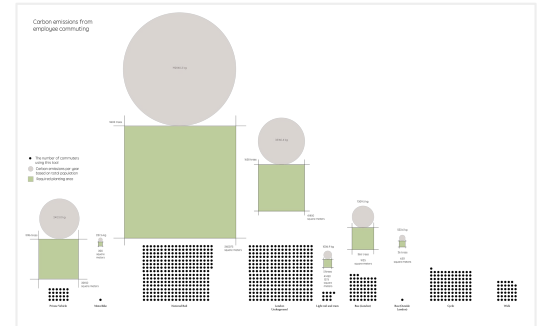
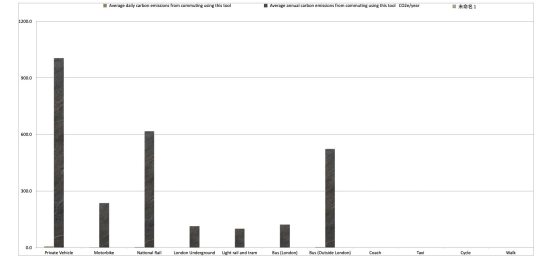
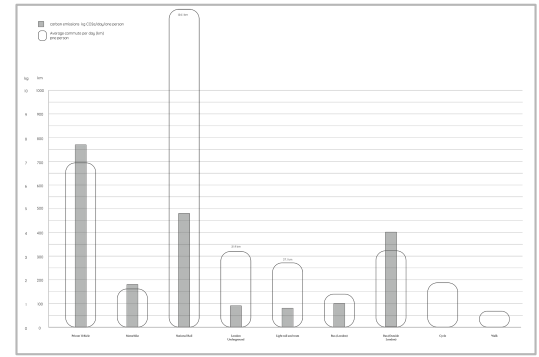
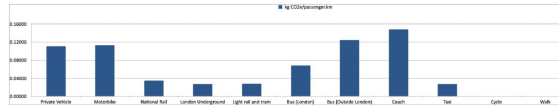


22 years
life for
absorb

Now
Replace them all with the coach
Replace them all with the national rail
Replace them all with the London Underground
Replace them all with the private

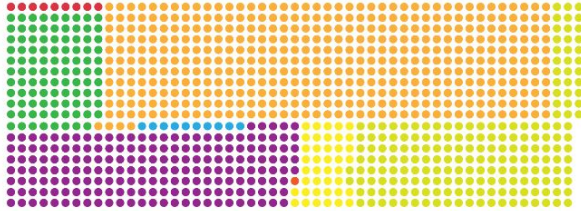


Comparison of carbon emissions from different modes of transportation over a year

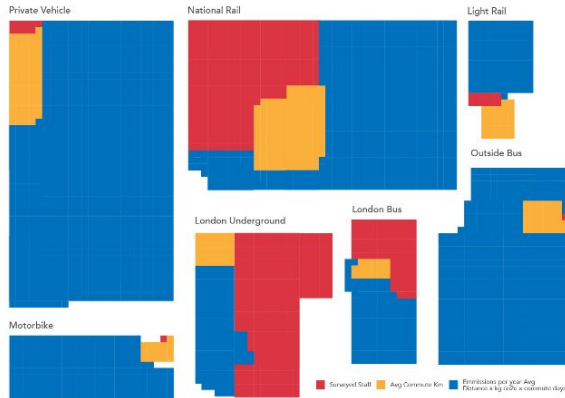


How does the UAL Staff get to work?

- Private Vehicle
- National Rail
- London Underground
- Light rail and Tram
- Bus (London)
- Taxi
- Cycle
- Walk



Visual Representation of Emissions



Visual Representation of Emissions in pt size

Private Vehicle
Average Commute
Per Day (Km)

Annual kg
CO₂e/pas.

National Rail

Surveyed Staff
Average Commute
Per Day (Km)

Annual kg CO₂e /passenger

Bus (Outside London)

Average Commute
Per Day (Km)

Annual kg CO₂e /passenger

Motorbike

Annual kg CO₂e/passenger

London Underground

Surveyed Staff
Annual kg CO₂e /passenger

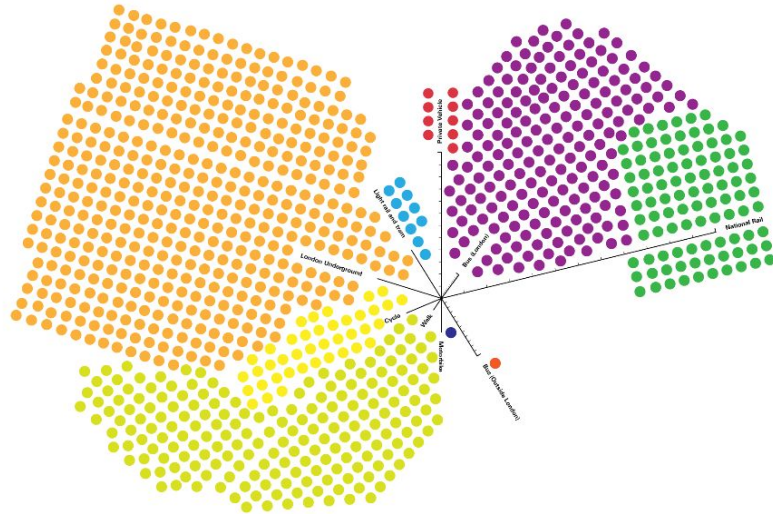
Light rail and tram

Annual kg CO₂e /passenger

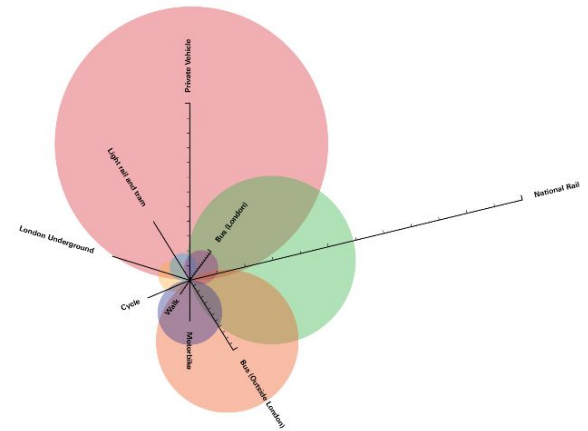
Bus (London)

Surveyed Staff
Annual kg CO₂e /passenger

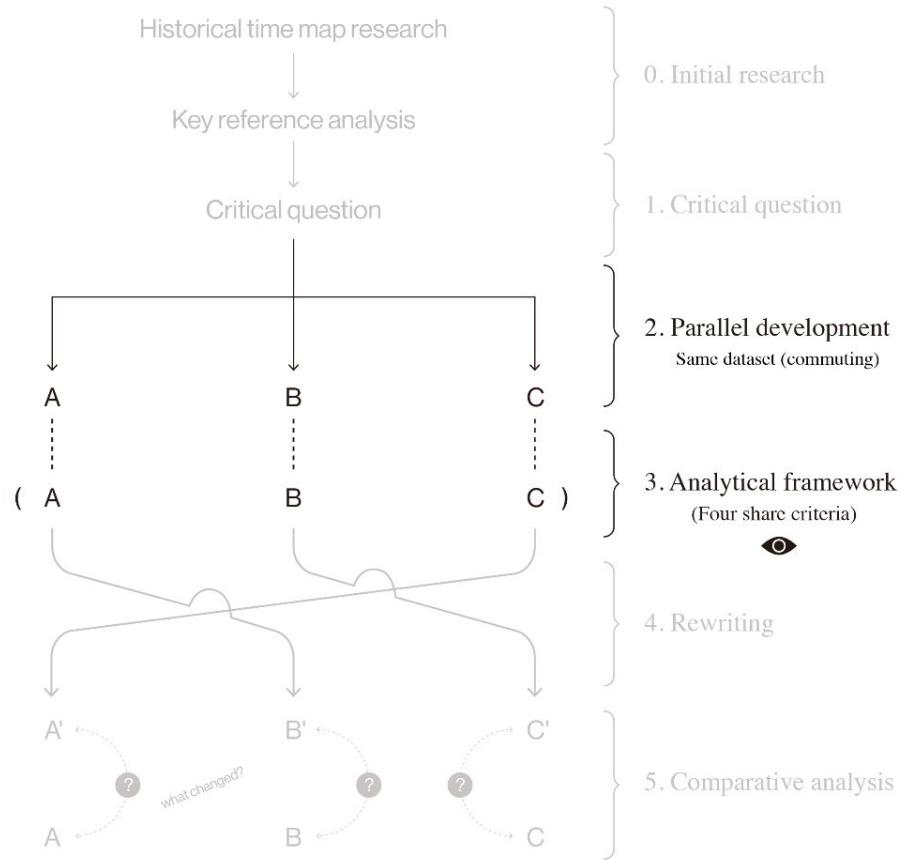
Modes of transport used annually



Average annual kg CO₂ e emissions/ km



Parallel development and Analytical framework



New data generated using existing data

Mode of Transport	Surveyed Staff	Average commute per day (km)	kg CO2e/passenger. km	Average commute days per year
Private Vehicle	24	69.3	0.1116	129.9
Diesel - Lower medium	1	128.7	0.14517	
Diesel - Upper medium	1	41.8	0.16194	
Diesel - Dual purpose 4	2	136.8	0.19973	
Petrol - Mini	1	22.5	0.13061	
Petrol - Supermini	1	16.1	0.14276	
Petrol - Lower medium	3	43.5	0.16123	
Petrol - Upper medium	2	33.8	0.18535	
Petrol - Unknown	1	45.9	0.16272	
Hybrid - Supermini	3	65.3	0.11413	
Hybrid - Lower medium	2	86.9	0.11724	
Hybrid - Executive	1	66.6	0.1565	
Hybrid - Unknown	1	8.4	0.12825	
Battery Electric - Lower	1	14.8	0.03849	
Battery Electric - Upper	1	225.3	0.04178	
Battery Electric - Execu	1	112.7	0.03702	
Battery Electric - Unkn	2	70	0.04047	
Plug-in Hybrid - Upper	0	0	0.09172	
Unknown - Upper med	0	0	0.16752	
Unknown - Unknown	0	0	0.16725	
Motorbike	1	16.1	0.11367	129.9
National Rail	311	134.1	0.03546	129.9
London Underground	288	31.9	0.0278	129.9
Light rail and tram	10	27.1	0.0286	129.9
Bus (London)	59	13.9	0.06875	129.9
Bus (Outside London)	1	32.2	0.12525	129.9
Coach	0	0	0.02776	129.9
Taxi	0	0	0.14861	129.9
Cycle	109	18	0.03	129.9
Walk	34	6.7	0.058	129.9
Overall	837	48.2		129.9



Average kg CO2e/ passenger per km	Avg Annual kg CO2e/ passenger	Walking Emmissions per km/person	Annually, how much would an individual have to walk in a year to reach emmission level of each vehicle
7.73388	1004.631012	0.058	17321.22434
18.683379	0	0.058	0
6.769092	0	0.058	0
27.323064	0	0.058	0
2.939175	0	0.058	0
2.298436	0	0.058	0
7.013505	0	0.058	0
6.26483	0	0.058	0
7.468848	0	0.058	0
7.452689	0	0.058	0
10.188156	0	0.058	0
10.4229	0	0.058	0
1.0773	0	0.058	0
0.569652	0	0.058	0
9.413034	0	0.058	0
4.172154	0	0.058	0
2.8329	0	0.058	0
0	0	0.058	0
0	0	0.058	0
0	0	0.058	0
1.830087	237.7283013	0.058	4098.763816
4.755186	617.696614	0.058	10649.97692
0.88682	115.197918	0.058	1986.171
0.77506	100.680294	0.058	1735.867138
0.955625	124.1356875	0.058	2140.270474
4.03305	523.893195	0.058	9032.641293
0	0	0.058	0
0	0	0.058	0
0.54	70.146	0.058	1209.413793
0.3886	50.47914	0.058	870.33
0	0		
0	0		

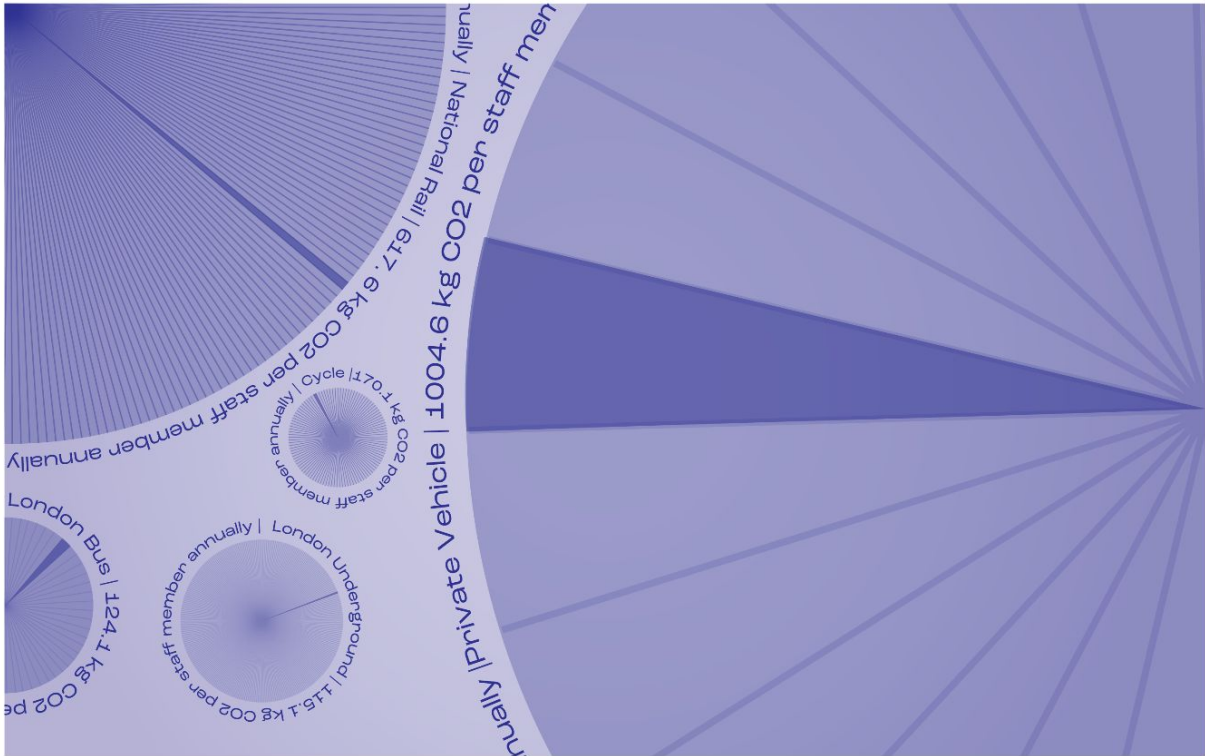
Outcome

This proposal starts with one question:

How can I visualize individual emissions against group emissions annually simultaneously?

Using the data inferred using my calculations, I used the average annual CO2 emissions per passenger as a starting point. Using that number as the radial size, I began dividing each circle into parts using the number of surveyed individual data. The resulting image is a visual depiction of how much each individual contributes to a larger amount of emissions annually. The highlighted parts help visually compare one mode of transport to another

Aesthetic Intensity	Medium. I repeating radial patterns to draw attention.
Readability	Readability is enhanced through the accompanying text. However, the scale of emissions is visually quick to grasp.
Metaphoric	The visual interst created by the highlighted parts draws the viewer to look closely and compare one mode of transport to another and question their choices.
Resulting Understanding	The duration and scale of impact can be on an individual and group lens simultaneously. This helps one question one's own position when making commute related decisions.



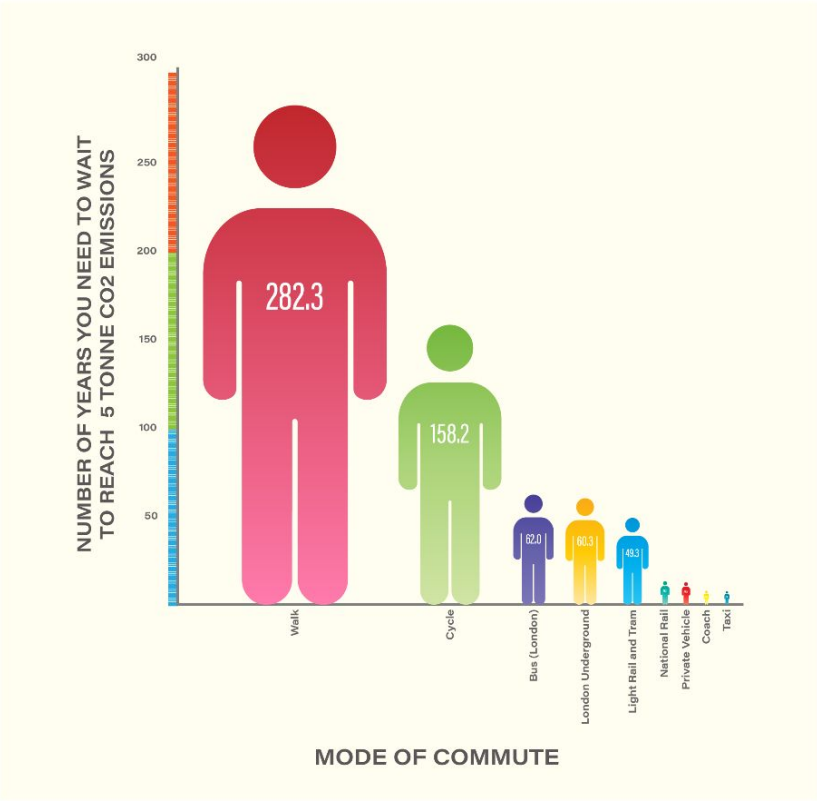
Outcome

This proposal starts with one question:

What is an easy an impactful way to communicate convey the scale of emissions?

I used the data we calculated on 5 tonne emissions and set it against something that is more comprehensible to us humans: age. While it can become difficult to understand the scale of emissions, it becomes easier to read and grasp when set in a format that visually depicts the data in years taken by each mode of transport to emit the same upper limit of emissions.

Aesthetic Intensity	Easy. I use easy graphics and distinct colours to showcase the concept.
Readability	The supporting text helps build context for the graph and makes it easier to grasp the concept quickly.
Metaphoric	Extremely large scales of numbers can sometime become almost impossible to understand. This graph helps the reader positions themselves within the graph and compare themselves with others.
Resulting Understanding	Colour contrast attracts attention. Drastic size differences creates a dramatic effect that draws the reader in to look further. The graph is interactive mentally as one is able to create their own position within its framework.



UAL GHG Emissions: Student Commute

INPUT			INPUT		INPUT		INPUT		INPUT		INPUT		
Mode of Transport	Surveyed Staff	Proportion of staff	Number of FTE student (exclude UAL Online)	Sum of commute distance (miles)	Average commute per journey (miles)	Average commute per day (miles)	Average commute per day (km)	kg CO2e/passenger.km	kg CO2e/day	Average commute days per year	tonnes CO2e/year	Kg CO2e/year	Years to reach 5 tonnes CO2e
Private Vehicle	9	0.30%	1.0	158	17.5	35.0	56.3	0.0662	3.7	106.9	0.4	398.9	12.5344697919
Motorbike	0	0.00%	1.0	0	0.0	0.0	0.0	0.11367	0.0	106.9	0.0	0.0	0
National Rail	98	9.73%	1.0	3042.8	31.0	62.1	99.9	0.03546	3.5	106.9	0.4	378.9	13.196099562
London Underground	455	45.18%	1.0	3939.5	8.7	17.3	27.9	0.0278	0.8	106.9	0.1	82.8	60.38647343
Light rail and tram	10	0.99%	1.0	103.2	10.3	20.6	33.2	0.0286	1.0	106.9	0.1	101.6	48.2135984252
Bus (London)	192	19.07%	1.0	654.38	3.4	6.8	11.0	0.06875	0.8	106.9	0.1	80.6	62.0347394541
Bus (Outside London)	0	0.00%	1.0	0	0.0	0.0	0.0	0.12525	0.0	106.9	0.0	0.0	0
Coach	1	0.10%	1.0	69	69.0	138.0	222.1	0.02776	6.2	106.9	0.7	659.3	7.583801001
Taxi	6	0.60%	1.0	79.8	13.3	26.6	42.8	0.14851	6.4	106.9	0.7	680.3	7.34969866235
Cycle	40	3.97%	1.0	122.4	3.1	6.1	9.8	0	0.0	106.9	0.0	0.0	
Walk	196	19.46%	1.0	173.4955	0.9	1.8	2.8	0	0.0	106.9	0.0	0.0	
Overall	1007	100%		8,342	9.8	19.6	31.6		22.3	106.9	2.4		



Mode of Transport	Surveyed Staff	Proportion of staff	Carbon emissions per year based on total population
Private Vehicle	24	2.87%	24121.0
Motorbike	1	0.12%	237.6
National Rail	311	37.16%	192060.2
London Underground	288	34.41%	33160.4
Light rail and tram	10	1.19%	1006.9
Bus (London)	59	7.05%	7309.5
Bus (Outside London)	1	0.12%	523.6
Coach	0	0.00%	0.0
Taxi	0	0.00%	0.0
Cycle	109	13.02%	0.0
Walk	34	4.06%	0.0
Overall	837	100%	258419.2

Outcome

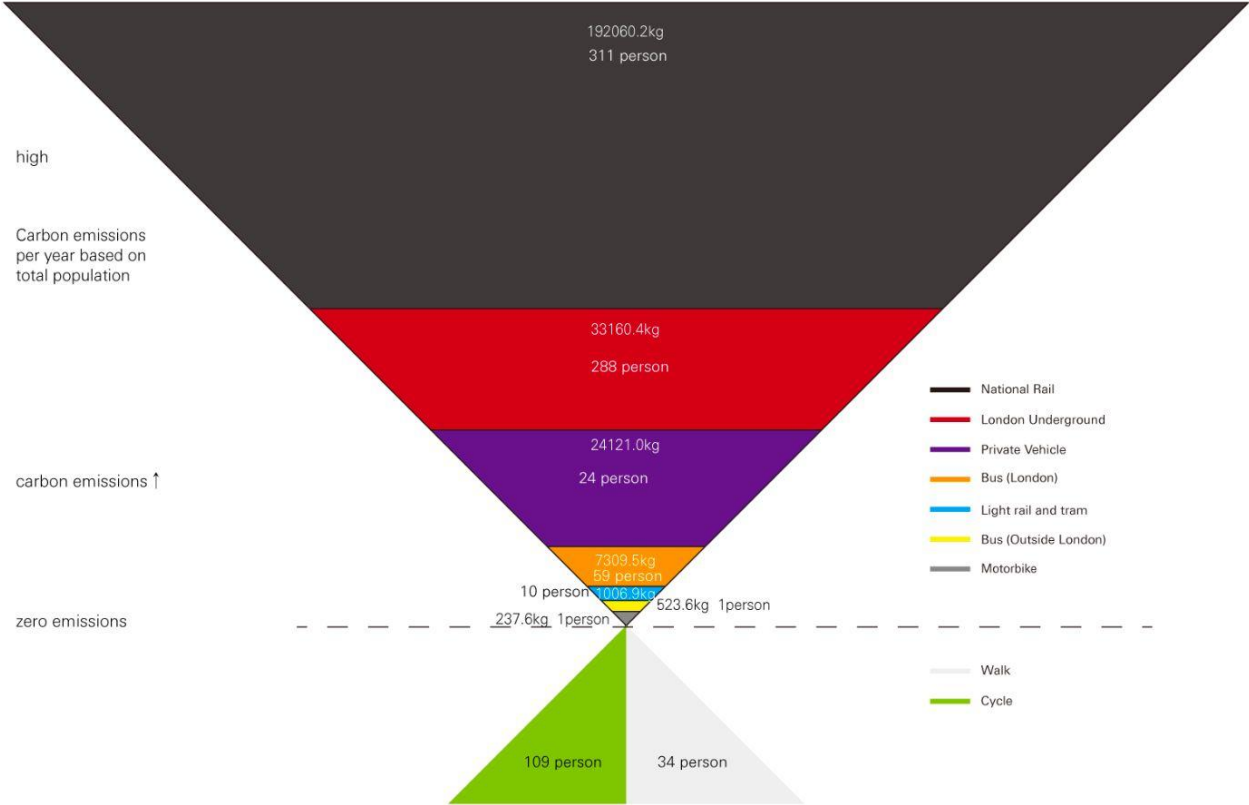
The contrast is created by using two triangles, one above the other. The triangular segments visually represent the amount of carbon emissions. The large black top area directly dominates the viewer's attention, making it almost impossible to ignore the "highest emitting" category.

Aesthetic Intensity The visual hierarchy is very strong. The inverted triangle itself creates a sense of gravity, with the top being heavier than the bottom, metaphorically representing accumulation and pressure.

Readability It clearly shows the contrast between the highest carbon emissions and others. However, it downplays the differences between the middle tiers.

Metaphoric The inverted triangle metaphorically represents the process of carbon emissions and the rise in carbon dioxide levels.

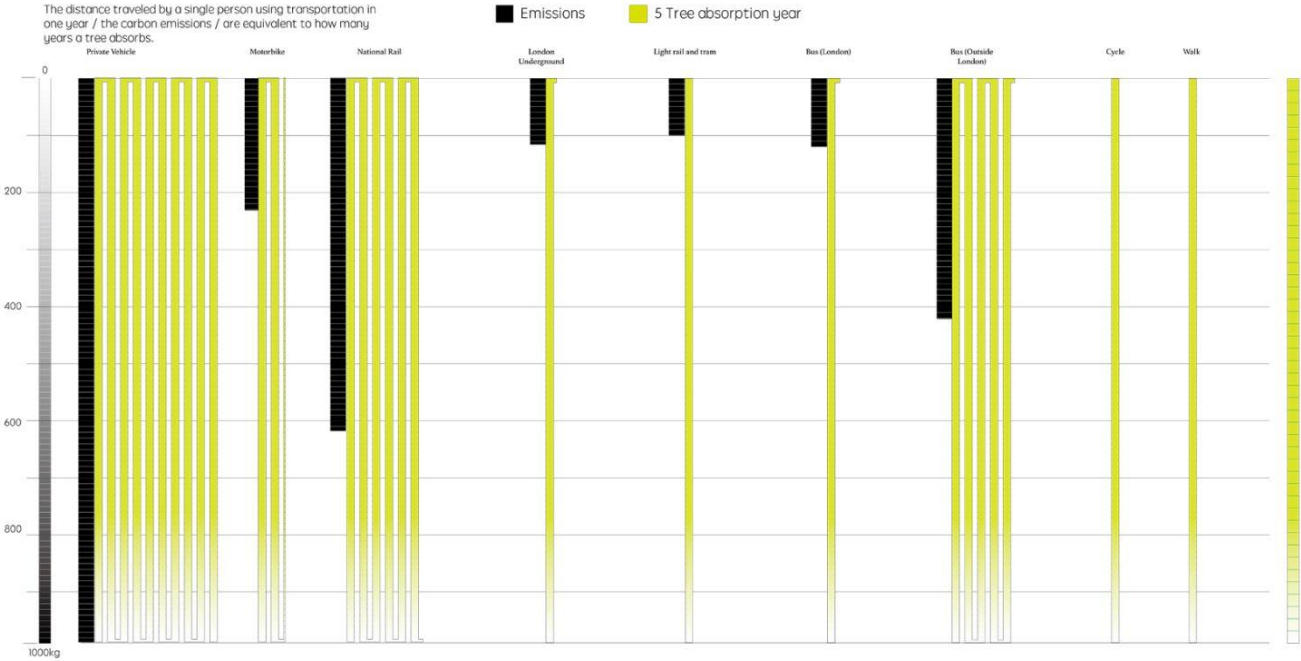
Resulting Understanding It metaphorically represents the pressure brought about by carbon emissions..



Outcome

The table uses two interlacing methods (top and bottom), but this is weak in its representation due to the long age of the trees. A curve is used to fold the tree years to illustrate the significant impact of carbon emissions.

Aesthetic Intensity	The combination of green and gray-black is a visually pleasing color scheme.
Readability	The data is relatively weak; it is not presented directly and requires further transformation to arrive at the answer.
Metaphoric	Lorem ipsum dolor sat amet, consectetur adipiscing elit.
Resulting Understanding	This implies how many years it would take for trees to grow and consume the emissions.



Outcome

The color scheme, ranging from dark to light, represents the amount of carbon emissions, with each small square representing an equal unit of measurement to indicate the number of people.

Aesthetic Intensity

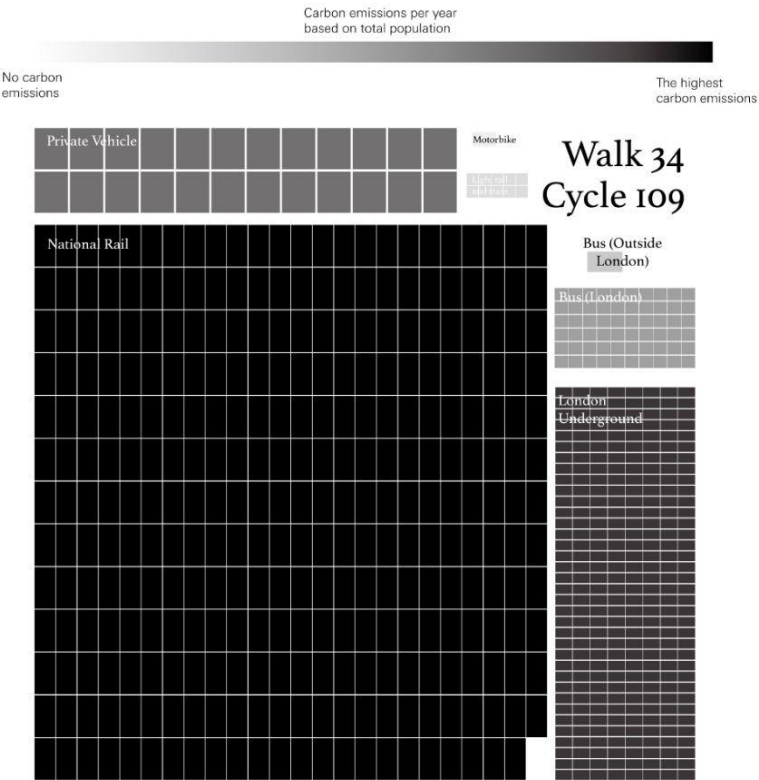
The excessive use of black, white, and gray weakens the information about the "category." Color is only an auxiliary element, with limited distinguishing function.

Readability

When there are too many squares, it becomes a dense grid, making it impossible to quickly count the number of squares. This reduces readability.

Metaphoric

Resulting Understanding



Outcome

This folding and ascending method represents the stacking increase of carbon emissions, using color to distinguish the annual carbon emissions (in kg) of different modes of transportation.

- Aesthetic Intensity**

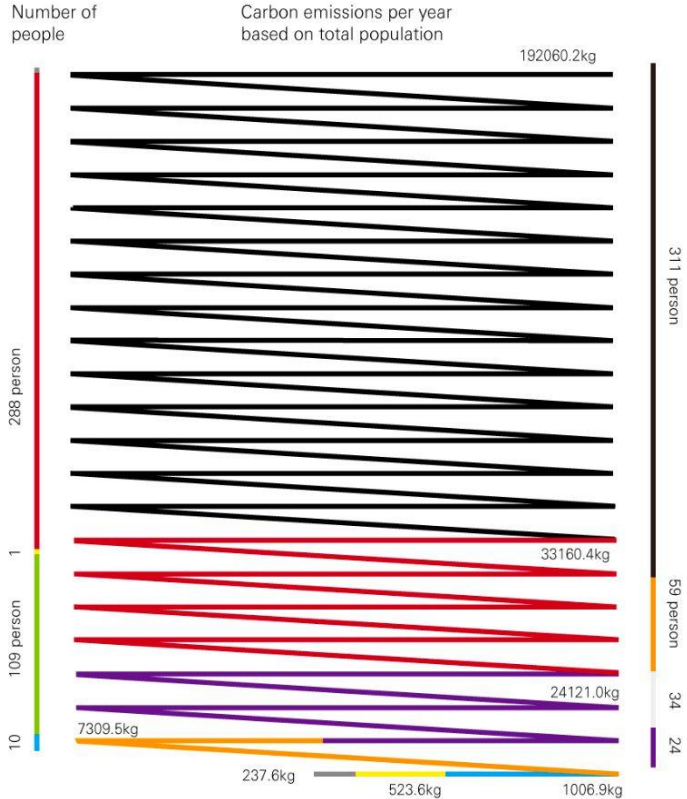
Lines can easily cause visual interference. While the color distinctions are clear, the large black areas create a sense of oppression and can easily obscure smaller data categories.
- Readability**

The difference is directly presented through the length of the line segments.
- Metaphoric**

The table metaphorically represents the accumulation and increase of carbon emissions.
- Resulting Understanding**

It metaphorically represents the pressure brought about by carbon emissions...

- National Rail
- London Underground
- Private Vehicle
- Bus (London)
- Light rail and tram
- Bus (Outside London)
- Motorbike
- Walk
- Cycle



original data

UAL GHG Emissions: Student Commute

INPUT			INPUT		INPUT		INPUT		INPUT		INPUT		INPUT	
Mode of Transport	Surveyed Staff	Proportion of staff	Number of FTE student (exclude UAL Online)	Sum of commute distance (miles)	Average commute per journey (miles)	Average commute per day (miles)	Average commute per day (km)	kg CO2e/passenger.km	kg CO2e/day	Average commute days per year	tonnes CO2e/year	kg CO2e/year	Years to reach 5 tonnes CO2e	
Private Vehicle	9	0.30%	1.0	158	17.5	35.0	56.3	0.0662	3.7	106.9	0.4	398.9	12.5344697919	
Motorbike	0	0.00%	1.0	0	0.0	0.0	0.0	0.11367	0.0	106.9	0.0	0.0	0	
National Rail	98	9.73%	1.0	3042.8	31.0	62.1	99.9	0.03546	3.5	106.9	0.4	378.9	13.196099562	
London Underground	455	45.18%	1.0	3939.5	8.7	17.3	27.9	0.0278	0.8	106.9	0.1	82.8	60.38647343	
Light rail and tram	10	0.99%	1.0	103.2	10.3	20.6	33.2	0.0286	1.0	106.9	0.1	101.6	49.2125984252	
Bus (London)	192	19.07%	1.0	654.38	3.4	6.8	11.0	0.06875	0.8	106.9	0.1	80.6	62.0347394541	
Bus (Outside London)	0	0.00%	1.0	0	0.0	0.0	0.0	0.12525	0.0	106.9	0.0	0.0	0	
Coach	1	0.10%	1.0	69	69.0	138.0	222.1	0.02776	6.2	106.9	0.7	659.3	7.583801001	
Taxi	6	0.60%	1.0	79.8	13.3	26.6	42.8	0.14861	6.4	106.9	0.7	680.3	7.34969866235	
Cycle	40	3.97%	1.0	122.4	3.1	6.1	9.8	0	0.0	106.9	0.0	0.0		
Walk	196	19.46%	1.0	173.4955	0.9	1.8	2.8	0	0.0	106.9	0.0	0.0		
Overall	1007	100%		8,342	9.8	19.6	31.6		22.3	106.9	2.4			



Mode of Transport	Surveyed Staff	Proportion of staff	Carbon emissions per year based on total population	kg CO2e/day	Average commute per day (km)
Private Vehicle	24	2.87%	24121.0	7.7	69.3
Motorbike	1	0.12%	237.6	1.8	16.1
National Rail	311	37.16%	192060.2	4.8	134.1
London Underground	288	34.41%	33160.4	0.9	31.9
Light rail and tram	10	1.19%	1006.9	0.8	27.1
Bus (London)	59	7.05%	7309.5	1.0	13.9
Bus (Outside London)	1	0.12%	523.6	4.0	32.2
Coach	0	0.00%	0.0	0.0	0.0
Taxi	0	0.00%	0.0	0.0	0.0
Cycle	109	13.02%	0.0	0.0	18.0
Walk	34	4.06%	0.0	0.0	6.7
Overall	837	100%	258419.2	145.9	48.9

Outcome

version.01

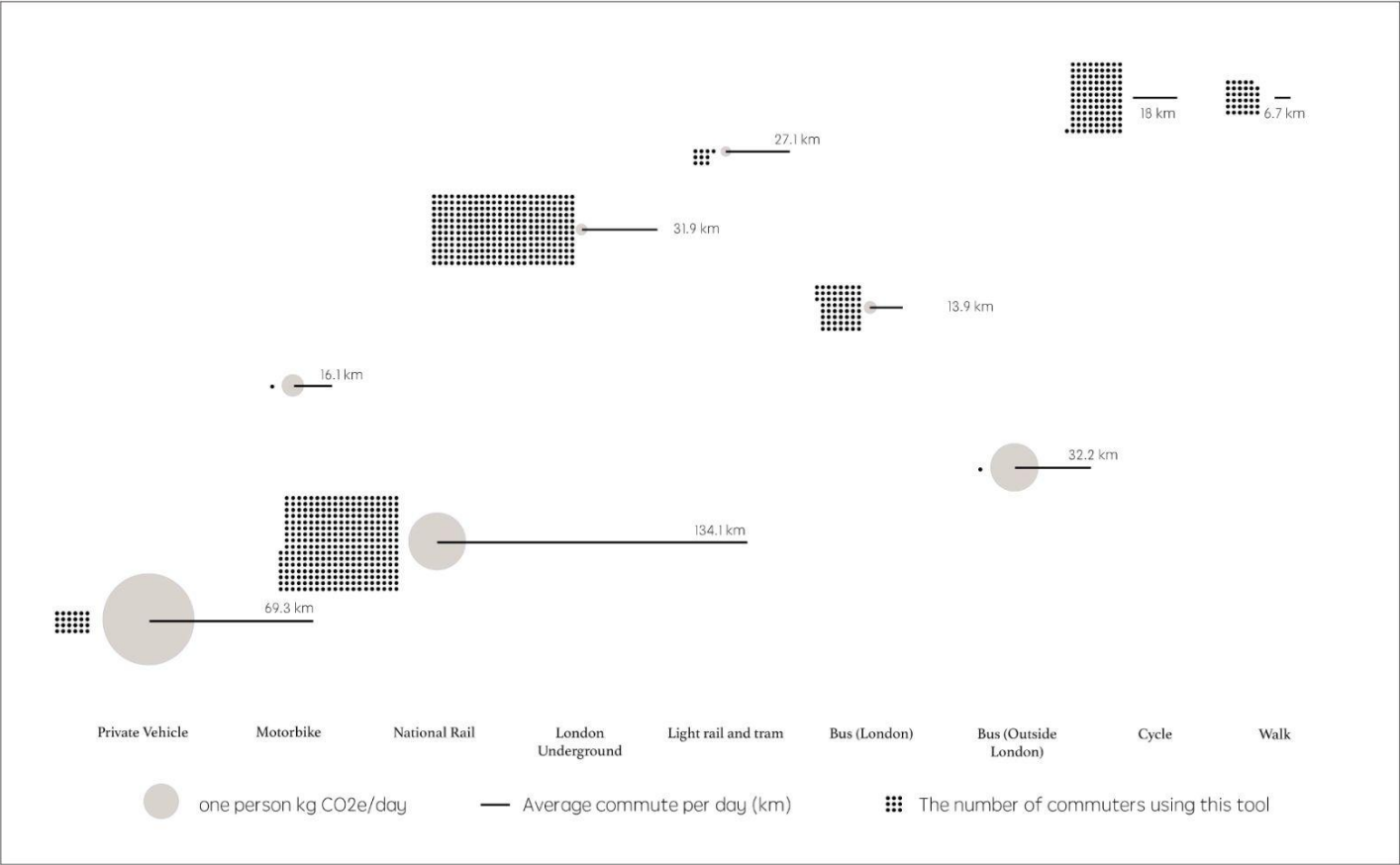
I adjusted the daily carbon emissions per person from highest to lowest. The taller and lighter the ball, the lower the carbon emissions. Similarly, we tried using circles and lines to represent the movement of the table.

aesthetic intensity

readability

metaphoric

resulting understanding



UAL GHG Emissions: Student Commute

INPUT			INPUT			INPUT			INPUT				
Mode of Transport	Surveyed Staff	Proportion of staff	Number of FTE student (exclude UAL Online)	Sum of commute distance (miles)	Average commute per journey (miles)	Average commute per day (miles)	Average commute per day (km)	kg CO2e/ passenger.km	kg CO2e/day	Average commute days per year	tonnes CO2e/year	Kg CO2e/year	Years to reach 5 tonnes CO2e
Private Vehicle	9	0.30%	1.0	158	17.5	35.0	56.3	0.0662	3.7	106.9	0.4	398.9	17.5344697919
Motorbike	0	0.00%	1.0	0	0.0	0.0	0.0	0.11367	0.0	106.9	0.0	0.0	0
National Rail	98	9.73%	1.0	3042.8	31.0	62.1	99.9	0.03546	3.5	106.9	0.4	378.9	13.196099562
London Underground	455	45.18%	1.0	3939.5	8.7	17.3	27.9	0.0278	0.8	106.9	0.1	82.8	60.38647343
Light rail and tram	10	0.99%	1.0	103.2	10.3	20.6	33.2	0.0286	1.0	106.9	0.1	101.6	49.2125984252
Bus (London)	192	19.07%	1.0	654.38	3.4	6.8	11.0	0.06875	0.8	106.9	0.1	80.6	62.0347394541
Bus (Outside London)	0	0.00%	1.0	0	0.0	0.0	0.0	0.12525	0.0	106.9	0.0	0.0	0
Coach	1	0.10%	1.0	69	69.0	138.0	222.1	0.02776	6.2	106.9	0.7	659.3	7.583801001
Taxi	6	0.60%	1.0	79.8	13.3	26.6	42.8	0.14861	6.4	106.9	0.7	680.3	7.34969866235
Cycle	40	3.97%	1.0	122.4	3.1	6.1	9.8	0	0.0	106.9	0.0	0.0	
Walk	196	19.46%	1.0	173.4955	0.9	1.8	2.8	0	0.0	106.9	0.0	0.0	
Overall	1007	100%		8,342	9.8	19.6	31.6		22.3	106.9	2.4		



These two items are new data calculated based on the original dataset.

Mode of Transport	Average commute per day (km)	kg CO2e/ passenger.km	Kg CO2e/year	Years to reach 5 tonnes CO2e
Private Vehicle	56.3	0.0662	398.9	12.5344697919
Motorbike	0.0	0.11367	0.0	0
National Rail	99.9	0.03546	378.9	13.196099562
London Underground	27.9	0.0278	82.8	60.38647343
Light rail and tram	33.2	0.0286	101.6	49.2125984252
Bus (London)	11.0	0.06875	80.6	62.0347394541
Bus (Outside London)	0.0	0.12525	0.0	0
Coach	222.1	0.02776	659.3	7.583801001
Taxi	42.8	0.14861	680.3	7.34969866235
Cycle	9.8	0	0.0	158.2278
Walk	2.8	0	0.0	282.4858

Outcome

This proposal starts with one question:

How long does each transport mode take to reach 5 tonnes of CO₂?

I set 5 tonnes as a reference point. This number is roughly half of the average annual carbon emissions of a person in the UK (about 10–12.7 tonnes). Using this fixed amount, I compare the time each transport mode needs to reach it.

Through this comparison, the relationship between efficiency and carbon emissions becomes visible.

Aesthetic Intensity	Medium. I use gradient colour blocks to create visual attraction.
Readability	Clear numbers support the structure. The position and colour of each transport label also show carbon intensity. Darker colour means higher emissions.
Metaphoric	The original bar chart becomes transparent, layered colour blocks. The bottom-to-top order suggests that carbon emissions accumulate over time.
Resulting Understanding	Colour contrast attracts attention. Different font sizes create two reading distances — from far and from near. Time is no longer abstract; it becomes a visible duration.

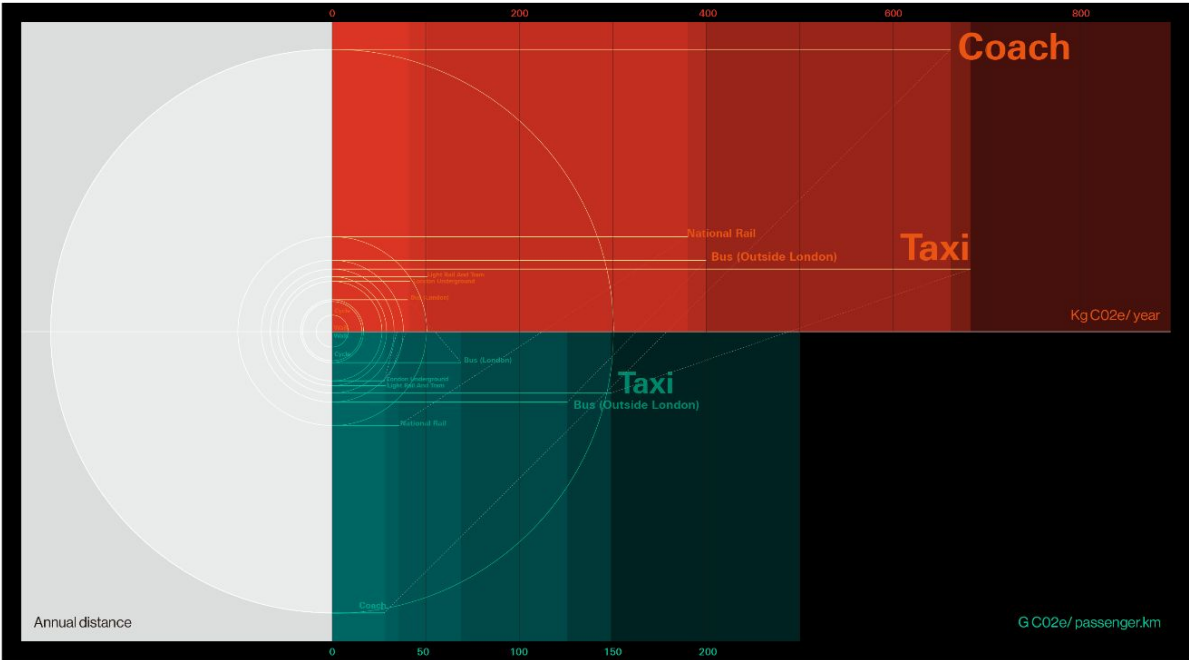


Outcome

This proposal places multiple scales of data in one visual field.

The red area shows the annual carbon emissions of different transport modes.
The blue area shows the average carbon emissions per kilometre.
Across these areas, concentric circles of different sizes represent the average distance to UAL for each transport mode.

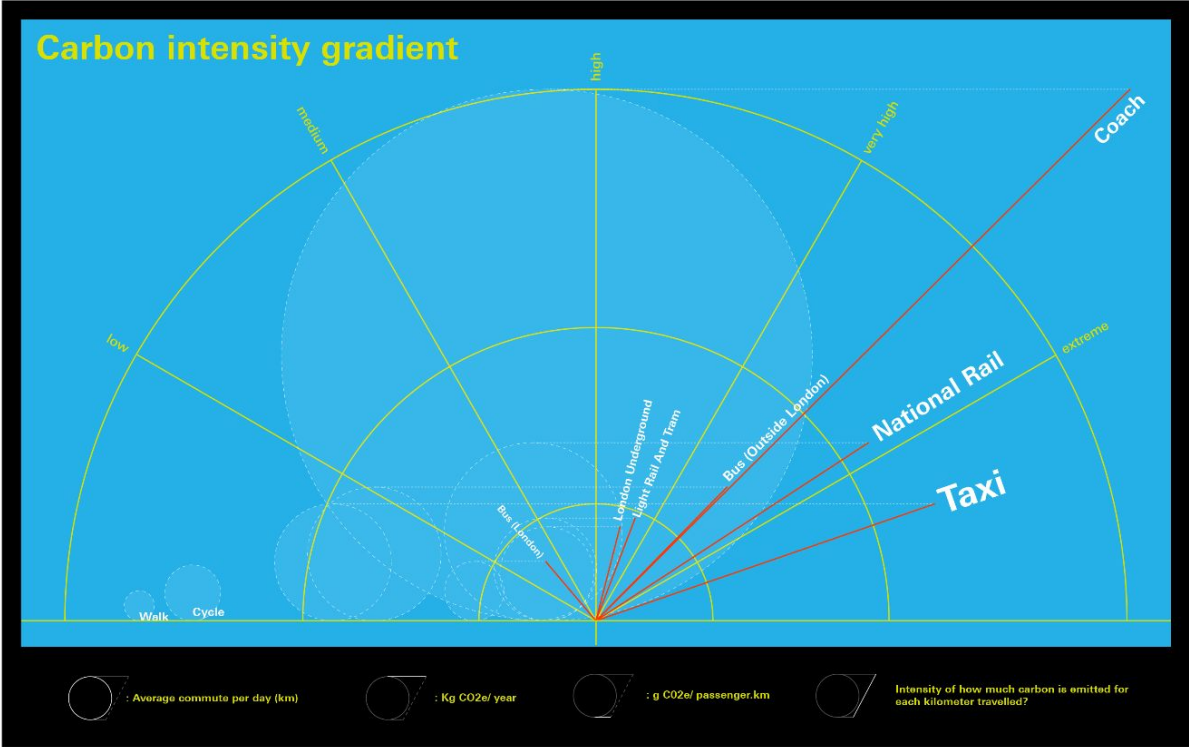
Aesthetic Intensity	Medium. The design uses multiple colour blocks but keeps a clear data structure.
Readability	Clear numbers support the structure. The concentric circles make the distance unit visible and easier to understand.
Metaphoric	The concentric circles place UAL at the centre, suggesting a UAL-centred perspective. Colour is also used metaphorically: Red suggests warning and negative impact. Blue suggests science and technical measurement. White suggests neutrality, without moral judgement.
Resulting Understanding	By putting three datasets together, the viewer can see that efficiency alone does not decide total emissions. The core idea is that carbon emissions are not a single-number issue, they are shaped by distance, efficiency, and time scale together.



Outcome

This proposal visualises the relationship between annual emissions and per-kilometre emissions as angular differences.
The angle becomes a visual measure of carbon intensity.
The semicircle is divided into six bands to suggest graded levels of intensity.

Aesthetic Intensity	High. Strong colour contrast and radial structure create visual impact. The geometric layout gives the image a clear visual order.
Readability	Extreme to low without context. The angular differences are visible, but the exact data relationship requires explanation. The classification bands support comparison.
Metaphoric	The semicircle suggests a measuring field. Angles replace height as a way to represent intensity. The image shifts from linear comparison to directional difference.
Resulting Understanding	This work explores whether changes in angle can be understood as different levels. A gradual variation is divided into fixed sections, turning continuous difference into categories. The viewer compares direction and position, rather than exact numbers. The levels are created by visual structure, not numerical precision.



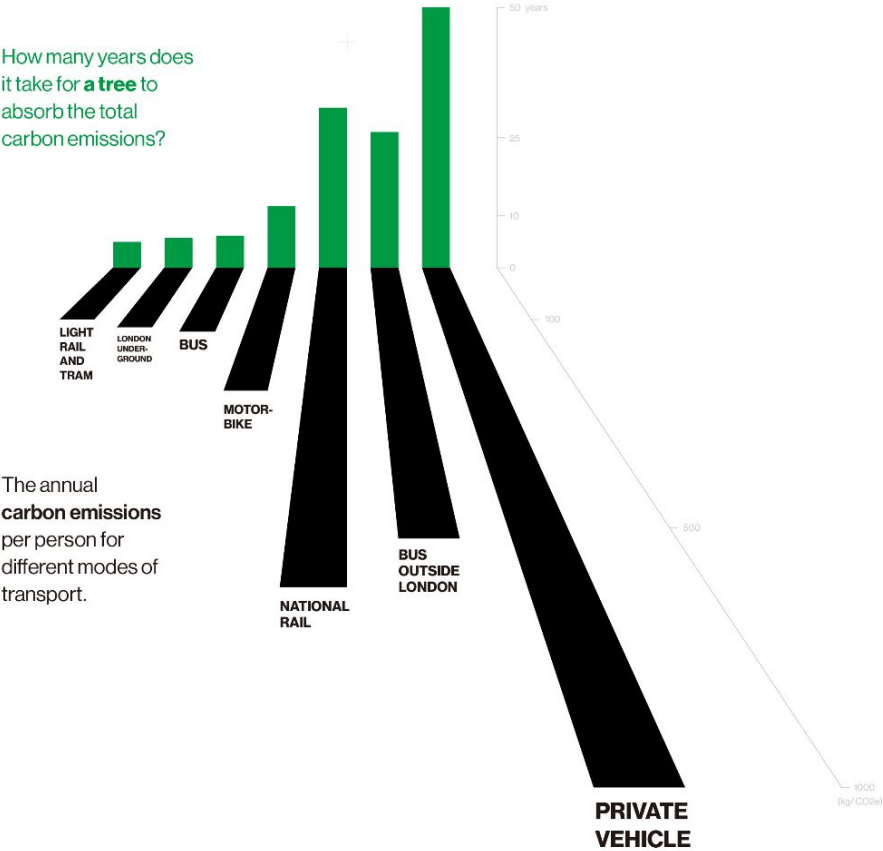
Outcome

This proposal begins with a question:

How many years does it take for a tree to absorb the carbon emissions produced by each transport mode?

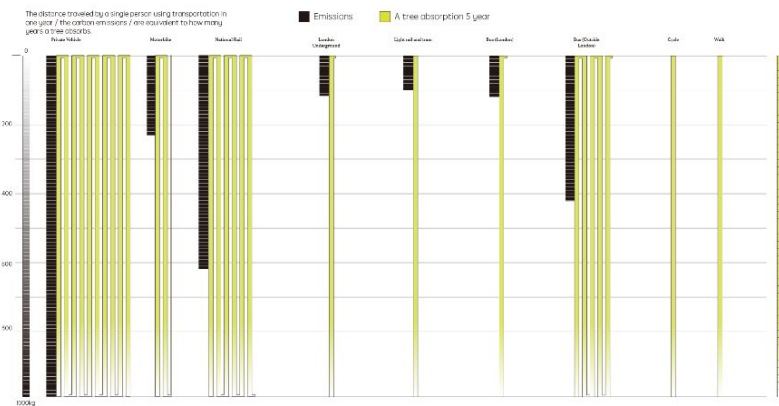
Annual carbon emissions are converted into years.
The chart is based on a bar chart structure and shown in perspective.
The green blocks represent years.
The black extensions represent the tree shadows.

Aesthetic Intensity	High Although the structure follows a bar chart, the strong contrast between black and green creates visual tension. The simplified forms emphasise shape over detail.
Readability	Detailed scales and units are reduced. This increases visual clarity but lowers numerical precision. The viewer understands comparison and scale, but not exact measurement.
Metaphoric	Carbon emissions are translated into the shadow of a tree. The use of perspective and a vanishing point transforms a flat chart into a spatial form. This suggests that carbon emissions are connected to real space and everyday life.
Resulting Understanding	This proposal shifts from numerical reading to spatial thinking. Carbon emissions are presented as objects in space. Perspective changes the chart from a flat diagram into a spatial scene. The image tests how visual form affects understanding.

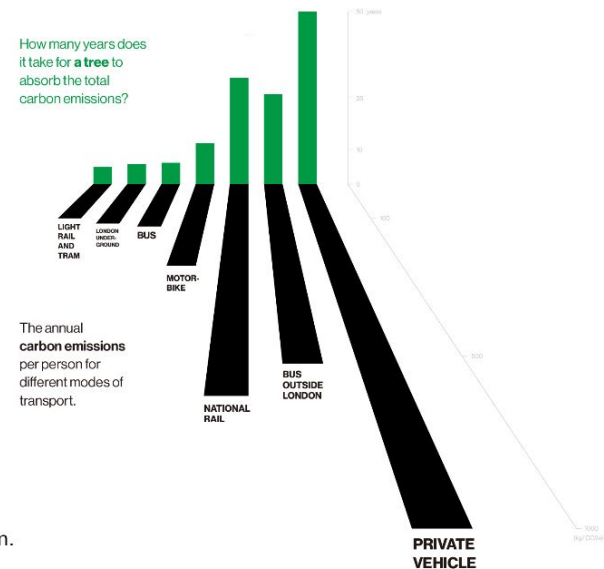


Comparison

original version



rewriting version

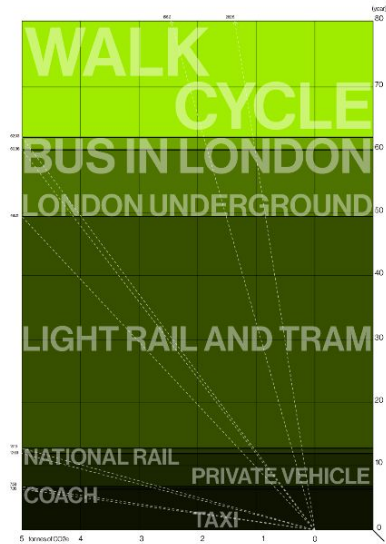


Both images visualise the same data: annual emissions and the years required for a tree to absorb them. While the data remains constant, the formal structure shifts its meaning.

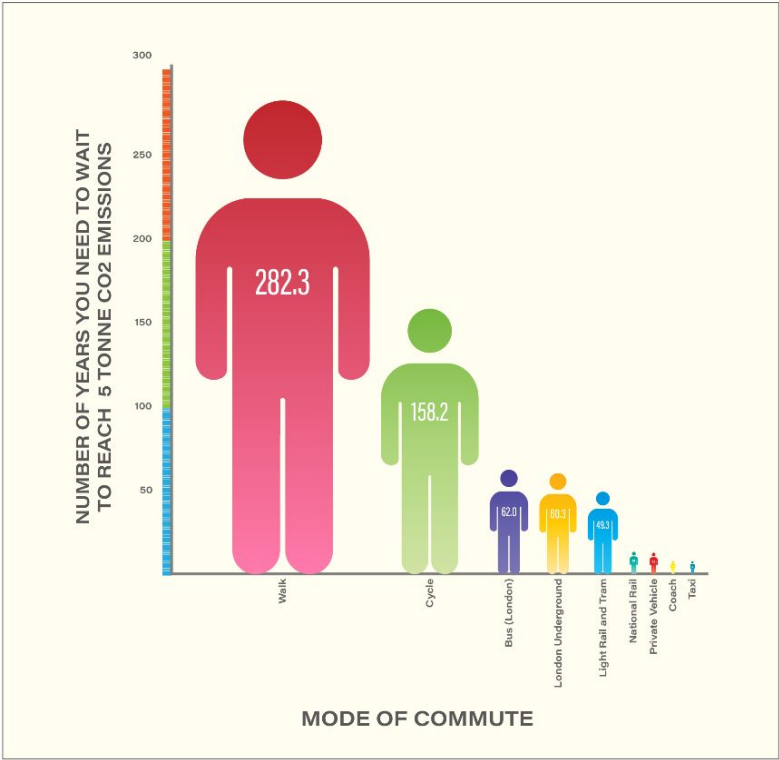
The left encourages comparison. The right produces a sense of weight and temporal debt. Form does not alter information but alters understanding.

Comparison

original version



rewriting version

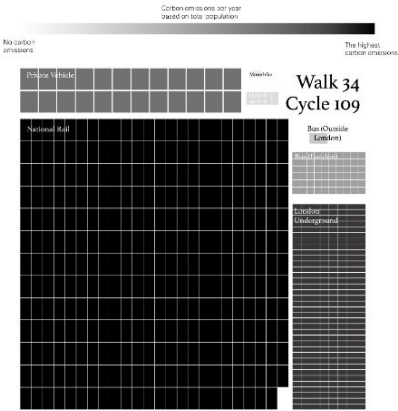


Both graphs visualize the same data: How long will it take to reach 5 tonne CO2 emissions? While the data remains constant the structure shifts its meaning and interpretation.

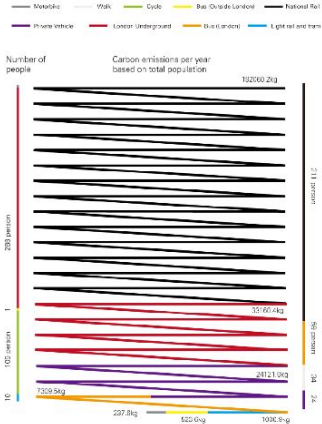
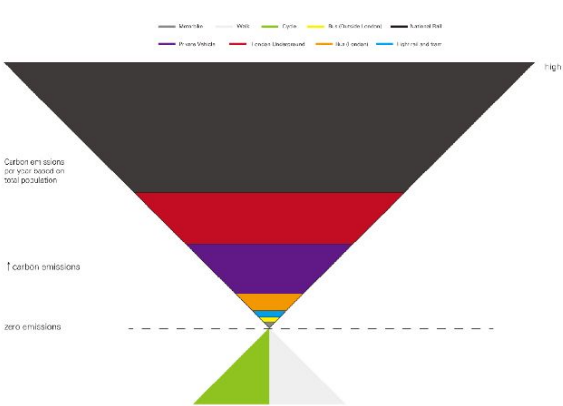
The left encourages one to look at the complexity of the data and comprehend the graph at a slow pace looking at each detail carefully whereas the graph on the right calls for simplicity and quick data interpretation.

Comparison

original version

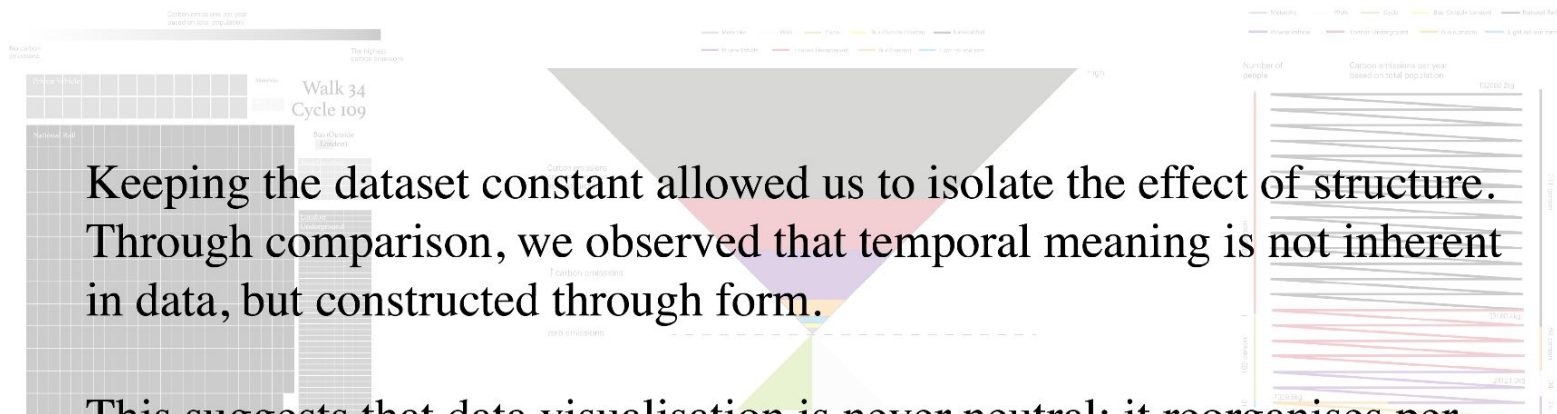


rewriting version



All three visualisations use the same commuting emission data. What changes is not the information, but how time is constructed. The grid-based version compresses time into accumulated quantity, presenting emissions as measurable totals. The inverted structure introduces vertical direction, reframing time as pressure moving toward a limit.

The distributed-line version expands time across population scale, positioning emissions within collective duration. Although the dataset remains constant, each structure reshapes temporal meaning — shifting how urgency, scale, and responsibility are perceived.



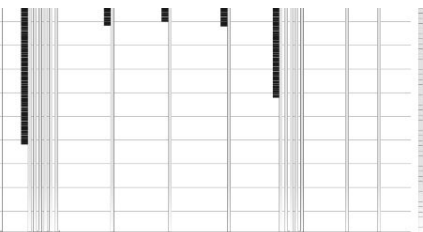
Keeping the dataset constant allowed us to isolate the effect of structure. Through comparison, we observed that temporal meaning is not inherent in data, but constructed through form.

This suggests that data visualisation is never neutral; it reorganises perception and therefore reshapes responsibility.

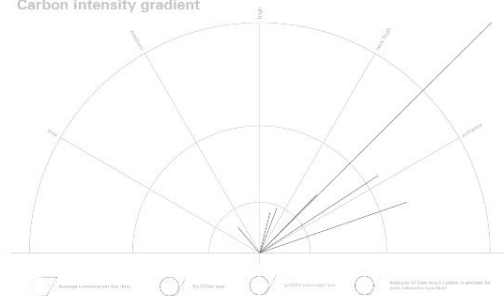
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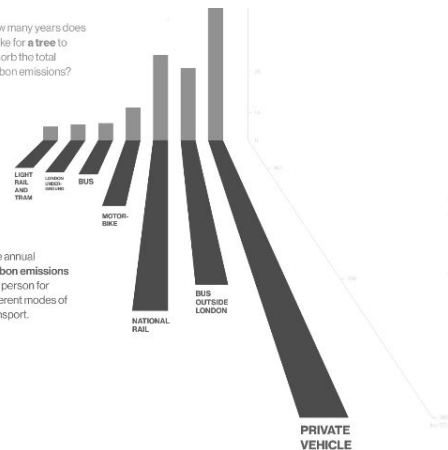
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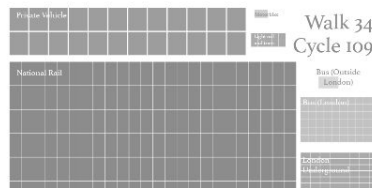
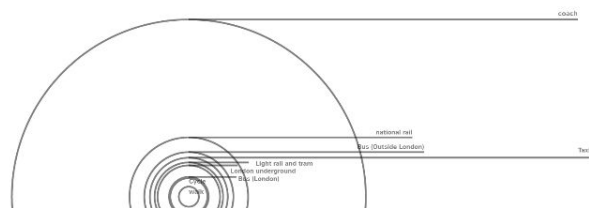
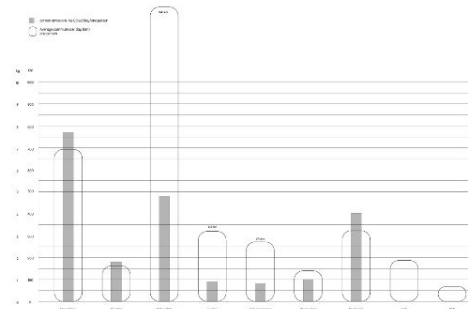
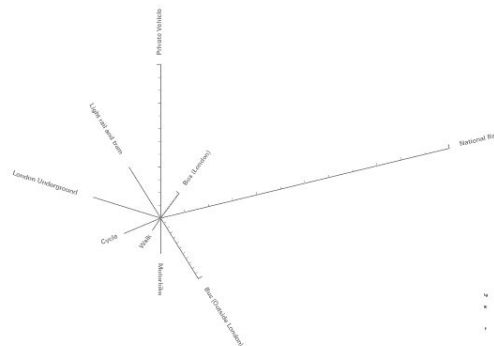
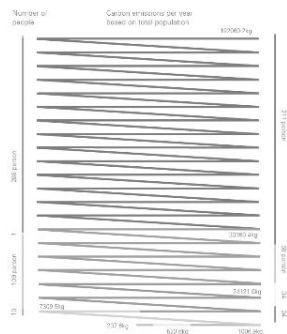
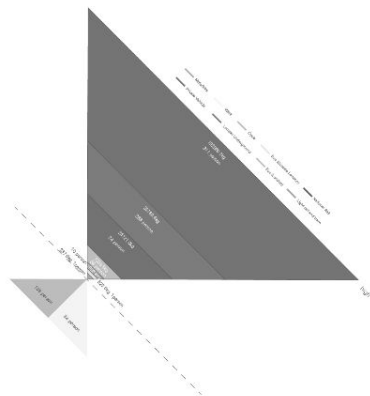
Carbon intensity gradient



How many years does it take for a tree to absorb the total carbon emissions?



The annual carbon emissions per person for different modes of transport.



Reference

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