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Charles Joseph Minard, Mapping Napoleon's March, 1861. *CSISS Classics*

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Charles Joseph Minard: Mapping Napoleon's March, 1861

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Background

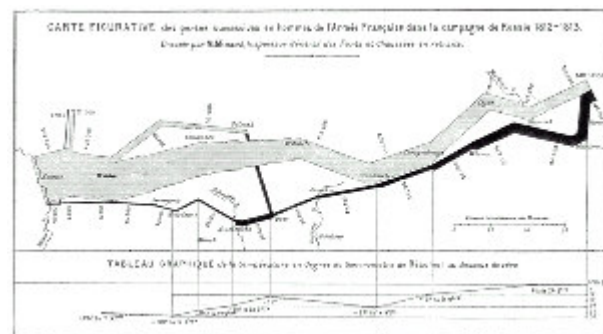
"It may well be the best statistical graphic ever drawn." Charles Joseph Minard's 1861 thematic map of Napoleon's ill-fated march on Moscow was thus described by Edward Tufte in his acclaimed 1983 book, *The Visual Display of Quantitative Information*.

Of all the attempts to convey the futility of Napoleon's attempt to invade Russia and the utter destruction of his Grande Armée in the last months of 1812, no written work or painting presents such a compelling picture as does Minard's graphic.

Charles Joseph Minard's Napoleon map, along with several dozen others that he published during his lifetime, set the standard for excellence in graphically depicting flows of people and goods in space, yet his role in the development of modern thematic mapping techniques is all too often overlooked.

Minard was born in Dijon in 1781, and quickly gained a reputation as one of the leading French canal and harbor engineers of his time. In 1810, he was one of the first engineers to empty water trapped by cofferdams using relatively new steam-powered technology. In 1830 Minard began a long association with the prestigious *École des Ponts et Chaussées*, first as superintendent, and later as a professor and inspector. His studies and activities, much as they always did, centered around the construction of canals, ports and, later, railroads when they were in their infancy.

Minard first began to publish *cartes figuratives* (figurative maps) during the



mid-1840s, when he was nearly sixty-five years old. Most of his early maps dealt with flows of goods and passengers along railroad, river and oceangoing routes of commerce. Minard's maps became renowned around France not so much for their statistical or cartographic merits (Minard was known to fudge geographic features to make a graphic point), but for the style he used in visualizing the numerical and relational aspects of flows. Whether he used innovative techniques in pie charts, flow maps, or choropleth maps, he always employed some form of proportional sizing of his symbols to express relationships. As Minard himself conceded, "The aim of my carte figurative is less to express statistical results, better done by numbers, than to convey promptly to the eye the relation not given quickly by numbers requiring mental calculation."

Innovation Although Minard's thematic map of Napoleon's march is perhaps the single best-known statistical graphic of the nineteenth century, hailed today by statisticians, geographers, historians and the like, it started out relatively obscure. Unlike prominent social scientists or cartographers of his day, Minard was an engineer by trade with little or no formal training in map-making techniques, and was not affiliated with any of the major academic bodies or journals that followed cartographic innovations. As was noted above, Minard's work has frequently been criticized for its indifference to cartographic accuracy, which occasionally bordered on stylized or symbolic depictions of landmasses and waterways. Virtually all of his maps were published privately, and made their way into the public domain haphazardly.

As Minard's map output grew, his topics began to change. By the early 1860s, when he was approaching eighty years old, his interests began to turn from economic phenomena to historical subjects that could be documented in space in a similar graphical style. Minard's two most famous works from this period both deal with the movements of famous armies, which readily lent themselves to his established technique. The first was a map showing the fate of the army of the famous Carthaginian general Hannibal, as he made his way into the Italian Peninsula during the Second Punic War. Minard represented Hannibal's army in two ways at the same time. First, he traced the general route of Hannibal and his men as they worked their way from the Mediterranean coastline of Spain, over the Alps and toward the ultimate destination of archenemy Rome. Second, he used the decreasing thickness of the line to indicate the dwindling numbers of troops left in Hannibal's campaign. The line narrows markedly as it makes its way over the summit of the Alps, where even a pack of elephants couldn't help many of his men make it through the cold and unforgiving mountain passes. By the time it reaches Turin, the trace of Hannibal's vaunted army looks more like a delicate and vulnerable thread than a thick line. As Minard's map make painfully obvious, Hannibal was not able to reach Rome with what little troops remained.

The second dealt with an event closer to his heart, the devastating loss of Napoleon's army in the fields of Russia during the winter of 1812–1813, when Minard was thirty-one. Here he uses the same proportional line to track Napoleon's Grand Armée as it made its way across the Russian plains toward Moscow. We see a fraction of the troops splitting off from the main group and pausing at Polotzk (known in English as Polotsk in the modern country of Belarus). Although the thickness of Napoleon's army diminished somewhat by the time it arrived at Moscow, it was still formidable. Unfortunately for Napoleon and his troops, Czar Alexander I and the residents of Moscow had fled and burned the city, leaving little for Napoleon to conquer. Up to this point, Minard's map bears many of the same qualities as the Hannibal map. But an additional, tragic chapter of the campaign enabled Minard to add even more depth to his already incredible map.

Like a scorned groom whose bride never showed up at the altar, a frustrated Napoleon had little choice but to return back to the part of Europe he controlled for food, shelter, and supplies. Minard now traces the remnants of the Grande Armée as it makes its way back toward the Neiman River. In doing so, the parallel tracks of the advancing and retreating army are set next to one another, making the continuing deterioration of the army all the more visible and heart wrenching. As the army slowly made its way across barren earth (the Russians had burned food along this path while blocking other escape paths), one of the worst winters in recent memory set in. Minard tracks the plummeting temperature against this trek on a horizontal axis at the bottom of the page, even more profoundly capturing the dire straits that the retreating army found itself in. Not surprisingly, the pitiful band of troops that returned from Russia marked the onset of the collapse of Napoleon's Continental Empire.

Edward Tufte, in his praise of Minard's map, identified six separate variables that were captured within it. First, the line width continuously marked the size of the army. Second and third, the line itself showed the latitude and longitude of the army as it moved. Fourth, the lines themselves showed the direction that the army was traveling, both in advance and retreat. Fifth, the location of the army with respect to certain dates was marked. Finally, the temperature along the path of retreat was displayed. Few, if any, maps before or since have been able to coherently and so compellingly weave so many variables into a captivating whole. (See Edward Tufte's 1983 work, [*The Visual Display of Quantitative Information*](#).)

Publications

Carte Figurative des pertes successives en hommes de l'Armée Française dans la campagne de Russie 1812–1813. (Paris: Regnier et Dourdet, 1869).

Carte Figurative des pertes successives en hommes de l'armée qu'Annibal conduisit d'Espagne en Italie en traversant les Gaules (selon Polybe). Paris: Regnier et Dourdet, 1869.

Carte figurative de l'exortation de la houille anglaise en 1850. Paris: Regnier et Dourdet, 1854?

Carte figurative et approximative des Quantités de Vin Français exportés par mer en 1864. No publisher known, 1860s?

Related Works

Robinson, Arthur H. The thematic maps of Charles Joseph Minard. *Imago Mundi*, 21: 95–108 (1967).

Tufte, Edward R. *The Visual Display of Quantitative Information*. Cheshire, CT: Graphics Press, 1983.

Links [The Graphic Works of Charles Joseph Minard](#)
[Re-visions of Minard \(lots of neat graphics!\)](#)
[What has ITC done with Minard's map?](#)

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