The Ever-Evolving Tube Map:
A Case Study of the London Underground Mapping System Over Time

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Overview

The London Underground, more commonly known as "the Tube," is one of the most intricate public transport systems today—with 11 lines covering 402km and serving 272 stations. Despite the sheer size of this transit system, it is thought to be one of the most effective public transit systems in the world. This is, in part, due to the Tube's mapping system. The iconic map of the Tube (pictured in Figure 1)—which includes sleek, colorful lines all running horizontally, vertically, or diagonally—is thanks to Harry Beck, a technical draftsman in England. His design effectively organizes stations in a way that is simple and easy to understand by its users. In fact, his model was such a success that many other big cities employed a similar design tactic to fit their transit system—the BART being one example.

Figure 1: Harry Beck's Original London Underground Map (1933)

Since Beck's original design, the Underground system has grown immensely, and nowadays, the modern tube map (pictured in Figure 2) contains much more granular (and perhaps too much) information about each station. This, in a way, undermines Beck's simplistic way of organizing stations, instead opting to squeeze as much information as possible into a small space rather than adhering to the map's original purpose—to navigate effectively from one station to another. In

this case study, I will evaluate the organizing principle utilized in the Tube map and analyze how it has evolved over time.

Figure 2: *Modern London Underground Map (2022)*

What is being organized?

Representations are a fundamental way humans make sense of the world around them, as discussed by David Kirsh in his paper, "Interaction, External Representation and Sense Making." Once a representation is constructed, it can be rearranged and reformulated to reshape the way the audience views the system behind the representation.

Maps are an example of these representations, which orient users to the physical landscape they seek to explore. Particularly for public transportation maps—such as the London Underground Map—the user is retrieving information about how to get from one station to another. For the Tube, the map needs to communicate information about each of its stations effectively, and the representations of these stations in this mapping system are the resources being organized.

However, different iterations of the Tube map have various takes on how they organize these station representations, each creating a slightly altered view of London for the users. Three primary principles remain consistent with each iteration: the station name, which train line the station is on, and (if applicable) which additional lines are at the station. Fundamentally, this is the only information required to navigate from the starting to the ending station. However, having a map that only communicates these three elements would not produce a very efficient

system, so each iteration of the Tube map includes additional information for each station. What, specifically, that information is depends on the objectives of the Tube map at the time of publishing.

Why is it being organized?
To better understand the organizing principles at play behind this map, it is crucial first to understand a bit of the history behind the development of the London Underground system.

In 1863, London's established its first underground railway line (the Metropolitan Railway), serving only six stations at the time. Following the success of the Metropolitan Railway, more train lines open in the years to follow. However, each of these train lines was operated by different companies—each with their own maps (as shown in Figure 3) highlighting their lines in big and bold coloring and showing their competitor's lines in less prominent ways (if at all). This made it hard for passengers to navigate efficiently between lines. Not only was there no effective representation of all possible routes, but passengers also had to purchase a different ticket for each route they took.
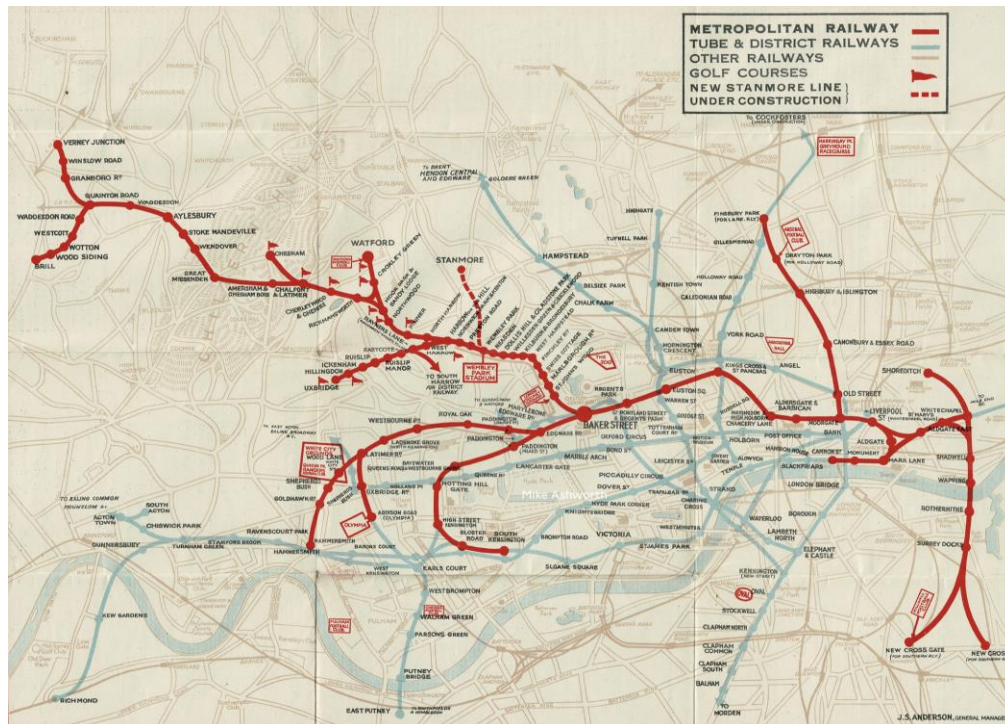

Figure 3: Original Metropolitan Railway Map

It was not until 1900—when American financier Charles Yerkes bought out several of these privately owned train lines and established the Underground Electric Railways Company of London (UERL)—that London's cohesive public transit came into existence. While this new system made the transit system easier to navigate, UERL needed a way to communicate this new

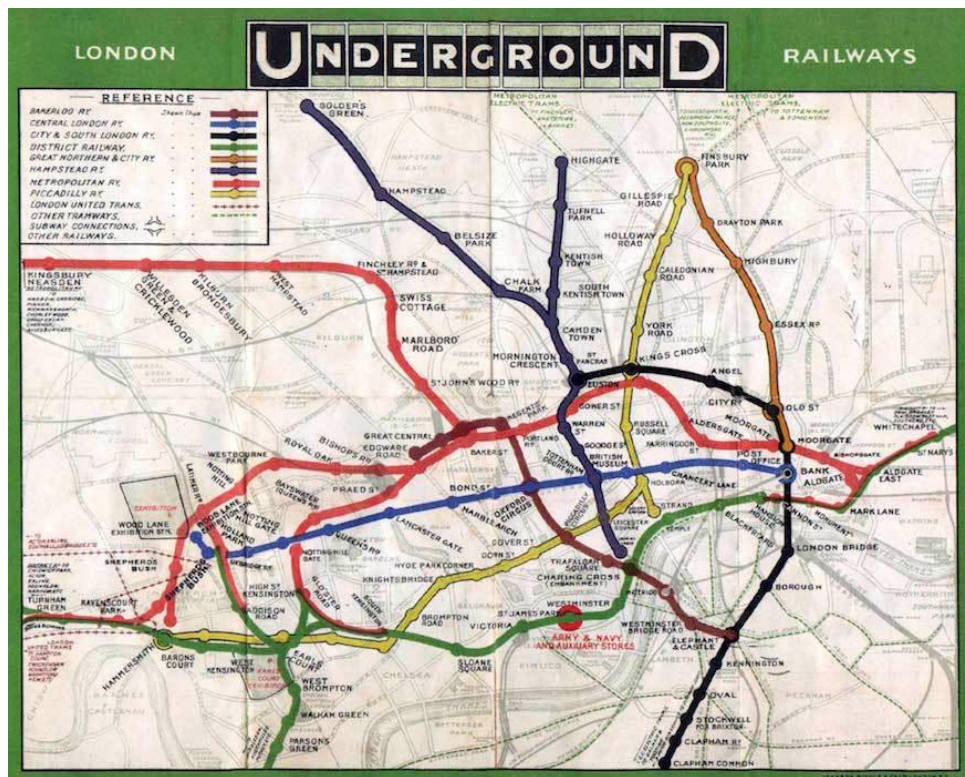streamlined process to its users—hence the creation of the first UERL map in 1908 (pictured in Figure 4).

Figure 4: First London Underground Map (1908)

In addition to the three primary principles necessary on all transit maps (as described in the previous section), this first iteration of the Tube map primarily communicates the station's geographical location and its proximity to neighboring streets and landmarks.

However, as new train lines and stations opened, this map became quickly cluttered. This is because this map was created more out of necessity rather than intentionally designed to organize and communicate information effectively. So in 1933, Harry Beck redesigned the map, which is more similar to the modern-day Tube map.

How is it being organized?
While the first iteration of the Tube map focuses its external representation of the stations around the geographical location, the biggest change Beck made was organizing station representations based on relative proximity to one another. He did this by removing landmarks and streets from the map and making all stations on a line appear equidistant, allowing him to represent all train lines using only horizontal, vertical, or 45-degree straight lines—a much sleeker and easier-to-read design. This new map, along with diamond-shaped callouts for stations where transfers are

possible, made it much easier for passengers to visualize how to navigate from one station to another.

In addition to being a lot more efficient, this map revolutionized how the Tube was used. Because all of these stations are spaced equidistantly, it makes some stations—such as Bayswater and Queen's Road (which by foot are a 30-second walk apart, but would require a passenger to transfer train lines)—seem further apart than others—such as Stepney Green and Mile End (which by foot are a 30-minute walk apart, but are subsequent stations on the Central line). As a result, this map nudges people traveling across London to opt to take the Tube rather than walking, making them believe the Tube is faster.

This map also changed the boundaries of London itself. Because all the stations are represented to be in close proximity to each other, this allowed realtors who are trying to sell houses in the suburbs of London to promote these areas as "Only 10 stops from Central London!" when in reality, those 10 stops would likely take over an hour, as the map is designed in a way that disregards geographical accuracy. Nonetheless, these promotional tactics did work, causing a significant proportion of the population to move out of Central London.

Since Beck's original design, the Underground system has grown immensely, and nowadays, the modern tube map (pictured in Figure 2) contains much more granular information about each station—including (but not limited to) fare zone, accessibility, and proximity to IKEA (who are a big donor to the Underground). While this utilizes Beck's fundamental design, it adds new information as an afterthought rather than redesigning based on Beck's organizing principles.

Additional Considerations
The maps interspersed throughout my case study in combination are my artifact, as they provide the best visual representation of how the organization of the stations has evolved over time to reflect the priorities and goals of the Tube maps over time.