Diagrammatic Maps of the New York Subway: an Historical Perspective

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Abstract. Vignelli's 1972 diagrammatic subway map is hailed as a design classic, but was dropped by the Metropolitan Transportation Authority (MTA) after just seven years' usage. Following an absence of a generation, a diagrammatic map of the New York City subway system has been reintroduced into the MTA's information provision. A digital version came back in 2011 and continues in use with weekly updates on the MTA Weekender website; print editions were issued in 2012, 2014, 2015, and 2017 for special occasions and from 2017 onwards for travel advisory notices. To see this in context, we need to understand why New York City adopted a diagrammatic map (Salomon map, 1958), route colour-coded it (D'Adamo map, 1967), stylized it (Vignelli map, 1972), replaced it with a geographic map (Tauranac map, 1979), and re-imagined it for the digital era (Waterhouse-Cifuentes map, 2011). Using primary sources, we characterise the birth, death, and rebirth of the diagrammatic map of the New York City subway.

Keywords: Metro Maps, New York City Subway, Salomon, Vignelli, MTA.

1 Introduction

The two most famous metro maps are probably the London Underground map by Henry C. Beck (1933, with derived versions continuing today), and the New York City subway map by Massimo Vignelli (1972 to 1978). The brevity of the Vignelli map in contrast with the longevity of the Beck map begs explanation, as does the reimagining of the Vignelli map thirty-two years later by Waterhouse and Cifuentes (Lloyd, 2012). Against a worldwide trend for metro maps to be diagrammatic (Ovenden, 2015), the adoption of a geographic design as the official subway map of the MTA (Metropolitan Transportation Authority) for more than three decades stands out as an anomaly. In this paper, we address the question of why it underwent these several transitions. This paper is based on information collected from primary sources during the period 2003 to 2018: acquisition of publicly issued maps; face-to-face interviews with surviving individuals involved in the main transitions of the official subway map; inspection of contemporary manuscript and typescript documents, and contemporary news reports.

Designation of the maps. Since the New York Transit Authority (TA)'s first in-house map, in 1958, the official subway map has been anonymous—except for 1998 to 2009,

when Michael Hertz put his design firm's name on it. Before the Salomon map of 1958, the municipal authority anonymized its map, while private firms indicated individual authorship: the IRT printed the initials of its map's designers ("HLS" and "JWG"); the BMT printed the name of its map's designer ("G. V. Plachy"), the Hagstrom maps—which were adopted by the Board of Transportation (BoT) and the TA—had the cartographic firm's name ("Hagstrom Map Co."), and the Voorhies map adopted by the TA had "Stephen Voorhies". Formally, the TA and from 1972 its parent the MTA was 'the designer' of the subway map. For the purposes of this paper, however, official designs of the subway map will be referred to by the individual who instigated the distinguishing features. This is a convenient label rather than an ascription of an *auteur* to a map. So, 'the Salomon map' refers to editions of the official map of the New York City subway from Winter 1958 to Spring 1967; 'the D'Adamo map' refers to editions from Autumn 1967 to 1969 inclusive; 'the Vignelli map' refers to those from August 1972 to 1978 inclusive; 'the Tauranac map' refers to editions from June 1979 to 2011, and that series continued to the present times; and 'the Waterhouse-Cifuentes map' refers to the Weekender map and print renderings thereof.

Large changes of a map herald a new *design*, while the smaller increments introduce *versions* and *variants*, although Roberts (2018) advocates a strict notion of design succession, in which any non-trivial changes constitutes a new design. Here we deem that the New York City subway shifted to new *designs* in October 1958 (Salomon), November 1967 (D'Adamo), August 1972 (Vignelli), June 1979 (Tauranac), and September 2011 (Waterhouse-Cifuentes), and other editions are deemed to be *versions*.

2 Findings

Before the first diagrammatic map. The subway in New York City was built by three companies (IRT, BMT, and IND), who ran their networks independently until they were unified under municipal control (the BoT) in the summer of 1940. Until then, each company made a map showing only its own services. Private cartographers (such as Hagstrom, Nostrand, Voorhies, General Drafting) made maps of the complete network, which were either sold to passengers through newsagents, or overprinted with promotional material and circulated free of charge by hotels, banks, conventions and other businesses. After unification under the BoT in 1940, almost two decades passed before they commissioned a new map: black-and-white versions of the former operating companies' maps continued to be issued by the BoT for a few years. Then they started issuing Hagstrom's map of the integrated system, and the TA continued this practice from 1953—alongside, from 1954, Voorhies' map (overprinted the Union Dime Bank's promotional material). These topographic maps continued until the autumn of 1958.

1958: the Salomon map—the first diagram. George Salomon (1920-1981) came as an émigré via London and in 1940 settled in New York City. He was inspired by London Underground's signage and map to create a systematic service nomenclature, colour-coding scheme, signage system, and network map for the New York City subway (M. Salomon, 2006, F. Salomon, 2003). His nomenclature also resembled the trunk-

and-branch scheme of the early 1950s Berlin U-Bahn map which he probably received copies of. Salomon aligned himself with the Bauhaus school, and with modernist artists, especially Mondrian, who settled in New York in the same year (F. Salomon, 2004).

By 1948, Salomon was actively working on his concepts for wayfinding in the subway, which was at first a private project (M. Salomon, 2006). In 1953, the TA succeeded the BoT, bringing a proactive approach to promotion and information delivery. Salomon approached the TA immediately (G. Salomon, 1956b), and by 1956 had submitted two prospectuses outlining his concept for an overhaul of wayfinding: renaming the routes and colour-coding them using a trunk-and-branch structure, systematising the signage, and creating a diagrammatic map (G. Salomon, 1955, 1956a). What he proposed to them was the culmination of several years of his personal research. In September 1956, the TA selected Salomon's map (G. Salomon, 1956b), but kept the nomenclature and tricolour scheme of the long-gone IRT, BMT, IND. They issued their first diagrammatic pocket map, designed by Salomon, in October 1958 (Fig.1), which also appeared in carriages and on station walls over the months from December onwards. The TA had commissioned the map to solve problems with outsourced maps, which had been apparent under the BoT (Daly, 1952) and would be exacerbated by increased print runs from about 50,000 maps (at $32.50 per thousand) a year (BoT, 1952) to about 500,000 a year. The use of Union Dime's free Voorhies maps from 1954 could solve the cost problem, but the map leaflet was dominated by Union Dime rather than the subway body. Moreover, the lack of direct control over editorial content and the slowness of updates remained problematic. Salomon's overtures, motivated by his passion for better wayfinding, converged with the TA's desire for cheaper and easier in-house mapmaking. Internal memoranda reveal this as the actual motivation, while public-facing documents indicate a *post hoc* rationalization: "A new subway map has been designed to simplify the problems of those who seek to find their way around the city on rapid transit lines," from the Annual Report a few months before the map was launched. (TA, 1958a; see also TA, 1958b and TA, 1959).

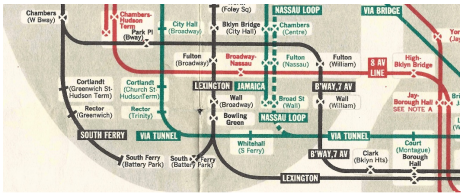

Fig. 1. Excerpt from Salomon 1958 map

1958: colours. There was no prior official colour coding: from 1943, the BoT had used the Hagstrom map with spot red (IRT), process blue (BMT), and process orange (IND), although the latter had changed to spot yellow by 1948. From 1953, the TA continued using that map and, from 1954, added the Voorhies map, which had spot blue (IRT), process orange (BMT), and spot red (IND). So, when Salomon prepared his report, he had no official constraint on possible colour schemes. He proposed a nomenclature that he based on the main trunks running north-south in Manhattan, giving each trunk a letter code and a colour (Fig. 2a). Where

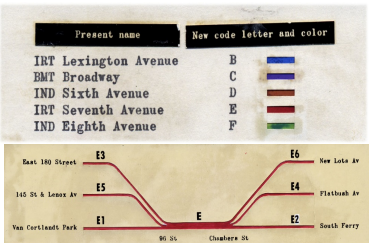

Fig. 2a Trunks & **2b** branch scheme in Salomon's report

routes branched off from the trunk, they retained the letter and colour of the trunk, but acquired a numeric suffix. (Fig. 2b shows the trunk-and-branch structure for the E train (red), formerly known as the IRT Seventh Avenue.) Stations would be uniquely identified by the route label, route colour, and the station name in signs displayed in stations and carriages (Fig. 3). That system was rejected, but we can see what might have been in Roberts' (2012) reconstruction.

Fig. 3. Station identifiers in Salomon's report

Although the TA made Salomon keep the three-colour principle, he did choose his own colours: key black (IRT), spot green (BMT), and spot red (IND). They paid $3000 for his map, but sought neither his involvement in managing the map, nor his signage, nomenclature, or colour coding. Salomon's proposed trunk-coloured map would have been clearer than the tricolour map, but the cost of changing the signage to match his trunk-and-branch nomenclature would have been prohibitive.

1967: the D'Adamo map. A year after its birth, the TA announced a massive programme of infrastructure works to ease the major bottlenecks in the subway network (Ingalls, 1954). One of these works was a two-mile tunnel under Chrystie Street, which was contracted nine years later (anon.,1963). That tunnel allowed the inter-working of trains on the former BMT and IND networks, which undermined the principle of a three-colour map that had been the common convention since the early 1930s.

By 1964, it was believed that completion was imminent and in late summer the TA opened up a Subway Map Contest to seek from the general public ideas on how best to revise the map, which they expected to need the following year.

Shaw (2011) suggested that it was not the Chrystie Street connection that triggered the Subway Map Contest, but the World's Fair, which New York City hosted from May 1964 to September 1965, and which led to a surge in the use of public transportation. In fact the TA had already put in place a comprehensive wayfinding programme by April (anon., 1964) including the 'blue streak' on the Salomon map, new route numbers on all buses, and new bus-stop signs (Perlmutter, 1964), by the time they first mentioned a Subway Map Contest (Perlmutter, 1964). The first year of the Fair closed in September when the Contest was ending, and they expected the new map to be out in autumn 1965. So the Map Contest can hardly have been aimed at the World's Fair.

Although the contest was intended to accommodate the inter-working of the BMT and IND networks, the materials sent to applicants made no mention of the Chrystie Street connection but included a copy of the 1964 pocket map as a reference. In May 1966, when the new map was quite advanced, Harold McLaughlin presented a paper on it at the annual meeting of the American Transit Association, but the TA immediately withdrew it and confiscated every copy they could find (anon., 1966), and it was omitted from the archives of the ATA. The TA remained reticent about the changes until very late, at which point it caused a lot of dissent, including attempted legal action to stop the opening of the Chrystie Street connection. It seems that the TA correctly expected a strong adverse reaction to the route changes that were concomitant with the opening of this new tunnel—which, as we shall see, had lasting ramifications.

In October 1964, the TA awarded $4000 to each of three winners (R. Raleigh D'Adamo, Harris Schechtman, and John & Mary Condon), but their maps were shelved

and lost. (Fifty years later, Reka Komoli used a colour photograph to reconstruct D'Adamo's hand-drawn map as a vector file (Rhodes, 2015).)

One winner, D'Adamo, submitted a report, explaining his principle of drawing each route in a distinct colour, and splicing together differently coloured routes running along a trunk. The TA hired Stanley Goldstein, a rocket scientist at Hofstra University, and passed D'Adamo's report to him. Goldstein submitted his report a year later: he and his students prepared four prototypes, and recommended #4, in which each route was drawn in a distinct colour (as proposed by D'Adamo) but routes running in parallel on a trunk were drawn side-by-side rather than spliced. Station stops were represented by squares (express) and circles (local), and transfers by proximity (the "no dot, no stop" rule). In #3 Goldstein reinvented Salomon's trunk-colour scheme: each trunk had a distinct colour, and each station was represented by a square in which was written the route codes of all the trains that stop there. Goldstein also took over D'Adamo's use of route identifiers in line-coloured rectangles at termini. In January 1966, Jerome Adler (Division Engineer in the TA Designs Division) decreed that the new map would combine Goldstein's prototypes #3 and #4. Each route would be drawn in a separate colour (as in #4) but each station was to be a box containing the route labels (as in #3). After a usability study in June (Barrington, 1966), which yielded pink rectangles around transfers, the map passed to Diamond Packaging for editing and printing. There, Dante Calise selected the route colours and typeface, and the station maps were printed and installed for 26th November 1967, when the Chrystie Street opened (Fig. 4).

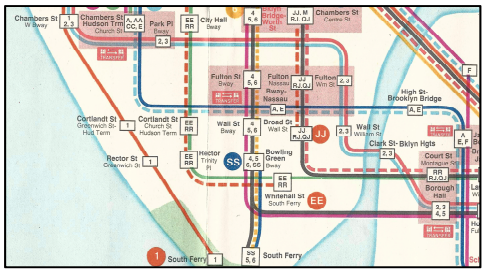

Fig. 4. Downtown excerpt from D'Adamo map, issued November 1967

1967-1970: the aftermath. Although the new infrastructure eased the bottlenecks, the launch of the D'Adamo map was flawed. By announcing the changes just ten days before the opening (Perlmutter, 1967), the TA left passengers no time to absorb the changes, or for the TA to absorb feedback. As only wall maps were printed on time, passengers had no pocket maps to study at home. By not updating the signage in subway cars and stations, they prevented passengers from relating the map to the platforms and services. The TA got many complaints, nominally about the new map but really prompted by the circumstances of its introduction. Also, the map itself was criticised: as a result of Adler's merging Goldstein's prototypes #3 and #4, the map was more fragmented and cluttered than necessary. D'Adamo himself sent in a critique of the new map, prompting TA to at least replace the pink boxes with clearer, station boxes.

1972: the Vignelli map. A year after Chrystie Street, the TA was subsumed under a new state organization, the MTA, under the chair of William Ronan, and efforts soon commenced on a new subway map. What prompted the TA to seek a new subway map so soon after the three-year development of the D'Adamo map? Probably: (a) Bad press around the 1967 map might have motivated them to try again, this time with an outside

firm rather than in-house. (b) As a new body, the MTA needed some early wins to build its brand in the public perception. (c) Unimark's signage project was concluding in 1970 with the release of the Graphic Standards Manual, and this created a natural opportunity to hire Unimark again to redesign the map as well. (d) Although the City of New York had only indirect influence over the TA, they were very critical of information delivery. For example, the City's Transportation Commissioner, wrote in the autumn of 1968, "The history of the TA's efforts to straighten out their graphics and designations is pitiful. […] We could proceed […] by simply telling the TA and the MTA that their present system is cockeyed and should be revised." (Sidamon-Eristoff, 1968). Massimo Vignelli, head of the Unimark New York office, was already in touch with the TA on the signage project with Bob Noorda. He was scathingly critical of the 1967 map, and initiated a project to create a new, modernist map. With Joan Charysyn as graphic designer under Vignelli's direction, a comp was prepared by the summer of 1970 (Fig. 5), and quickly approved, with a contract signed between the TA and Unimark on 31st July 1970. The TA paid Unimark $17,600 for the map, but after it was issued in August 1972, neither Unimark nor Vignelli had any further involvement in the map. All modifications were handled in-house. In 1974, the map was completely redrawn, moving more of the map content into the empty north-east corner, and changing the typeface. A total of seven editions were issued (detailed by Lloyd, 2012). The map was honoured as a 'design classic' and as 'iconic', but had vociferous critics who desired a return to a topographic map.

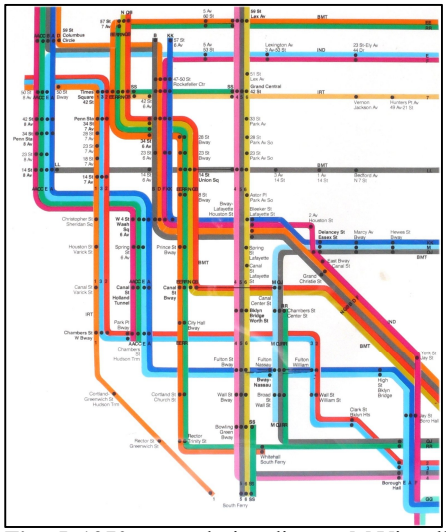

Fig. 5. 1970 comp: design director M.Vignelli, graphic designer J. Charysyn (Lloyd, 2012)

1979: the Tauranac map. Ronan, who had championed the Vignelli map, was replaced in April 1974 by David Yunich, a Macy's marketing executive (Burks, 1974). He created the MTA Marketing Department, and hired his former Macy's colleague Fred Wilkinson, who in 1975 formed the Subway Map Committee to supplant the Vignelli map with one that would lure in more passengers: subway maps had become primarily a marketing tool. For its first year, the Subway Map Committee had no vision of what should replace the Vignelli map, and even mooted a return to a tri-color scheme. In 1976, John Tauranac took the Chair, with an agenda of creating a topographic map, starting from that of the new guidebook (MTA, 1976). With Tauranac

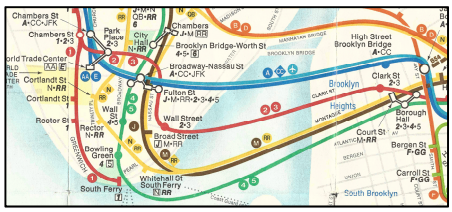

Fig. 6. Tauranac map, 1979

as design director and Mike Hertz as graphic designer, and inputs from other members of the committee, by January 1978 a prototype map was publicly presented. As Tauranac knew, the map was flawed by using a single colour for all routes. In September, however, new funds became available and Tauranac was able to realise his vision of switching the subway from route colours to trunk colours, and hence deliver a topographically realistic map with trunk colour coding. This was issued on 25th June 1979 (Fig. 6). Basically the same concepts continue in the current MTA subway map: a trunk-coloured topographic map with the stopping routes listed alongside each station.

2011: Waterhouse-Cifuentes map. In 2011, the MTA re-introduced a diagrammatic map in the style of Vignelli, designed by Yoshiki Waterhouse and Beatriz Cifuentes, to report temporary outages and re-routings because of engineering works. The intention was simply that the route-drawn diagram facilitated showing visually which individual routes were affected. This cannot be done visually in a trunk-drawn map such as Tauranac's, where outages must be listed as text. For example, in Fig. 7, if the N train had a weekend outage, then that route's line would be greyed out to show at a glance that service change. In the Tauranac map, this would require a textual note alongside each station where the N would normally stop. Originally existing only on the MTA Weekender web site (MTA, 2017), the map is now routinely used in printed advisory notices that are displayed in stations.

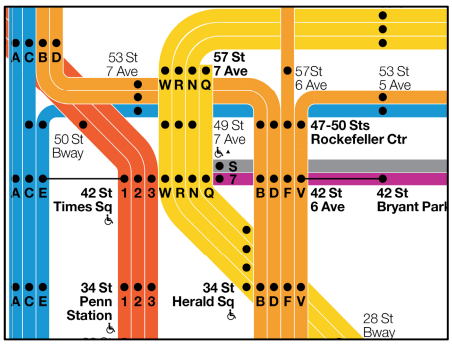

Fig. 7. Excerpt from MTA Weekender map

3 Conclusion

The initial leap from geography to diagrams was driven chiefly by the TA's desire to cut costs and streamline map production, which fortuitously coincided with Salomon's long-standing desire for a clear London-style wayfinding system. The shift from the tri-colour company-based colour scheme to route colouring was driven by the need to keep the map legible after the BMT and IND merged. And the famous transformation into Vignelli's minimalist design was motivated by a corporate desire for rebranding after the creation of the MTA. Finally, the exit from the 'diagram decades' was instigated by Tauranac's vision of a 'didactic' map. Latterly, the Vignelli-style diagram was brought back because its separate route lines made it easier to show outages visually.

There is no grand narrative of the transitions of the diagrammatic subway map of New York City. Each change was made by individuals either to solve pragmatic problems or to express personal preferences. The simplistic notion that diagrammatic maps somehow do not suit New York is not supported by a close examination of the map's history, nor is the naïve notion that New York must inexorably follow an evolutionary trend from geographic maps to diagrams. Diagrammatic maps of the subway have specific advantages and disadvantages, and their comings and goings in NYC reflect this.

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