



Subway Map

MAJOR RESEARCH PAPER



THE “UGLY” TTC SUBWAY MAP

(AND HOW IT RUINS YOUR MOOD
AND MOVEMENT IN THE CITY)

a case study and redesign

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THE “UGLY” TTC SUBWAY MAP
(AND HOW IT RUINS YOUR MOOD AND MOVEMENT IN THE CITY)
A CASE STUDY AND REDESIGN

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ii. ABSTRACT

The TTC subway was built in 1949 to resolve the traffic issues of that era, issues that have only since intensified. At the time, any underground transportation system was an impressive accomplishment in design, engineering, construction, and city planning. Today, those same accomplishments—left to stagnate, age, and become overburdened—have become outdated and—measured against contemporary designs—sometimes even ridiculed. As the TTC continues trying to expand its infrastructure to meet the demands of a growing urban population, its progress leaves much to be desired—past decisions made without the foresight of urbanization, globalization, and technological innovation are being revealed to be inadequate. What we are left with is a face lift and hair extensions for a transit system that actually needs a brain transplant and genetic modification. But while this Major Research Project acknowledges the infrastructural inadequacies of Toronto's TTC metro system, the focus here will specifically be on the TTC's transit maps, branding, and graphic design which itself, I will argue, has not aged gracefully and is in serious need of an update—one that responds to and satisfies the needs of today's mobile, increasingly design-savvy, and digitally connected citizens.

Keywords: subway, map, representation, branding, wayfinding

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iv. DEDICATION

To the ingenious Harry Beck and his iconic work on the London Underground Tube Map, proving that truly great design stands the test of time.

To all the tourists that glare at a TTC subway map, wondering where the rest of it is, and to all the Torontonians and Greater Area Torontonians who ride the TTC nearly every day—often more than once—while forced to stare up at a dimly flickering LED in a stale, dark, expanse I hesitate to call a map... this is for you.

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I. INTRODUCTION

The TTC subway is “Canada’s First Subway” (“A Cavalcade,” n.d., para. 3), built in 1949 to resolve the traffic issues of that era (para. 5), issues that have only since intensified. In 1949 any underground transportation system was an impressive accomplishment in design, engineering, construction, and city planning. Today, those same accomplishments—left to stagnate, age, and become overburdened—have become outdated and, measured against contemporary designs, sometimes even ridiculed. As the TTC continues trying to expand its infrastructure to meet the demands of a growing urban population, its progress leaves much to be desired—past decisions made without the foresight of urbanization, globalization, and technological innovation are being revealed to be inadequate. What we are left with is a face lift and hair extensions for a transit system that actually needs a brain transplant and genetic modification. But while this Major Research Project acknowledges the infrastructural inadequacies of Toronto’s TTC metro system, the focus here will specifically be on the TTC’s transit maps, branding, and graphic design which itself, I will argue, has not aged gracefully and is in serious need of an update—one that responds to and satisfies the needs of today’s mobile, increasingly design-savvy, and digitally connected citizens.

Maps, like the TTC transit map, represent three-dimensional objects in two-dimensional space. Cartography, the art of map making, is a technical craft that—with the rise of Google Maps, Google Earth, Waze, and other digital wayfinding tools—is increasingly

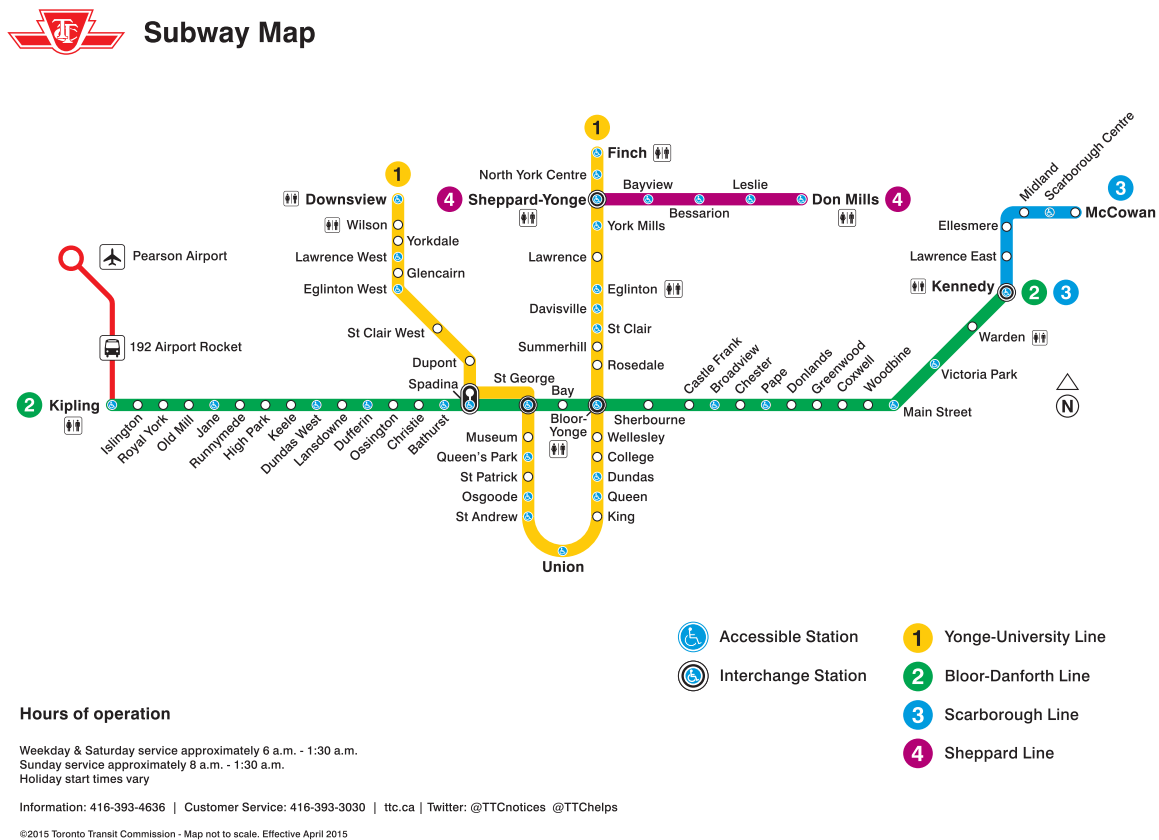
influencing the evolution of the ways we are navigating our connected and increasingly globalized world. The cartographic process—both the making and the consuming of maps—has changed since the introduction of technologies such as digital cameras, mobile devices, and satellites. Indeed, contemporary maps provide us with previously unimaginable ways to access every surface and corner of the earth; no longer is the exploration of the world's territories and minutiae limited by distance, space, or time. However, maps are more than a patchwork of images and symbols. They serve a functional purpose: to serve as carefully designed directional tools for the human-made, or human-imagined, world. Furthermore, maps often inspire movements that are both intentional and, perhaps most significantly, unintentional.

But what is unique about the transit map? Its design and purpose, in many ways, runs counter to the conventions of other forms of cartography. Transit maps, for example, are rarely if ever designed to scale, and they do not include the granular levels of detail we observe in physical space. Yet, in today's densely populated global cities, subway and transit maps serve as illustrations or representations of the city itself, transforming the concrete complexity of the urban grid into colour-coded and navigable transit routes and station points. Indeed, in the digitally-driven world, the subway map—on station platforms, in a booklet, inside the subway car, on a smartphone—remains an anchor of everyday life. Baudrillard (1994), Hadlaw (2003), and Isenberg (2013) recognize that maps are symbolic representations of reality that can be distorted through aesthetic elements and, in turn, alter and shape human perceptions of spatial and temporal reality. Although the subway map “is only a map after all” (Hadlaw, 2003, p. 35), a study

of map design can provide us with an understanding of the psychological influence and aesthetic and affective power of subway maps, helping us to identify the design properties that influence travelers' navigational behaviour, decision making, and experiences.

During the ongoing repetitions of day-to-day life, people do not often stop to think about the environment around them. Objects such as traffic lights, signs, doors—and of course, transit maps—fade away from our conscious awareness. Nevertheless, human behaviours are greatly influenced by such artifacts. The objective, then, of examining transit maps as objects of design is to gain a deeper understanding of how the physical world is depicted in maps and the resulting impact of these depictions on everyday citizens as they navigate through their urban worlds. For the purposes of this major research project, literature on mapping ideology, semiotics, and aesthetics will help us explore the technical and aesthetic intricacies of transit maps. Furthermore, a look at theories of representation and wayfinding will address the meanings that these maps can convey. This research will seek to reveal a set of best practices that can be used to redesign an existing transit map for improved wayfinding through the city, and there's no city transit map more ripe for redesign than the city that is the focus of this project: Toronto, the most livable city in the world ("World's Most Livable," 2015, para.1)!

Figure 1 – Toronto Subway Map (TTC)



For over 95 years, the Toronto Transportation Commission (TTC) has governed transit services in Toronto (“Milestones,” n.d., para. 62). The current transit system in downtown Toronto consists of four underground subway lines and eleven above ground streetcar lines. On the average weekday, 1.6 million passengers ride the TTC. How many of these passengers enjoy the experience? Estimates would suggest very few. Despite its storied history, today the TTC is perceived to be one of the most inadequate major city transit systems in the world, which largely stems from the lack of infrastructure in place and perpetual underfunding (“TTC Problems,” 2016, para. 11). To put it in perspective: in 2015, New York City’s population was approximately

8.55 million (“Current Population,” n.d., para. 1) while Toronto’s was approximately 6.13 million (“Population of Census,” 2016). New York’s subway system includes 21 subway lines that span 660 miles of track (“About New York City Transit,” n.d., para.1). Toronto’s subway system includes 4 subway lines that span 42.4 miles of track (“2013 TTC Operating,” 2013). This means that while Toronto’s population is over 70% of New York’s, New York riders have access to five times the number of subway lines than Toronto riders and these lines run 15.5 times the track length than the TTC. But while basic infrastructure may be lacking, there are no excuses to be made for the TTC’s lacking in other, more easily amenable, areas such as its visual design and branding. However, as this MRP will argue, this certainly seems to be the case. Indeed, I would like to suggest that perhaps the TTC subway map (See Figure 1 and Appendix A) itself contributes or even exacerbates the dislike transit users have for their TTC experience. My interest, then, is to ask: *How does the design of the TTC transit map (and its associated branding) influence traveler’s feelings about Toronto and the TTC? In other words, how can a transit map shape the ways we feel and think about Toronto?*

With one of the simplest transit networks in the world (there are only two subway lines), the TTC map should be an easy design problem to solve. Yet, it is dark, uninspired, and quite frankly, rather aesthetically challenged—in sum, it is ugly and at the very least, dated looking. Unfortunately, this ugliness is not limited to the map. Perhaps, in an effort to preserve the TTC’s long history, the TTC brand suffers. Take the TTC logo, for instance. Unfortunately, I can find no information as to the history or origins of the TTC logo, although it appears to be rather unchanged from a 1954 photo of two women

holding a cutout of the logo (Flack, 2011). On the other hand, I can find several, maybe even dozens, of TTC logo redesigns voluntarily shared on the Internet by their creators. These many attempts to modernize the TTC logo suggest users' dissatisfaction with the brand and how seemingly minor design and branding elements, like a logo, can reflect positive or negative impressions of a city.

Despite large infrastructure plans to extend subway services and efforts to improve signage, the ongoing changes seem disjointed. Thus, by focusing on subway map design and branding—using the TTC as a case study—this research will explore the ways design, aesthetics, and beauty can shape our experience of the contemporary city and its subways. Further, this major research project will propose a redesign of Toronto's existing transit map for improved wayfinding through the city's underground network of tubes and tunnels.

In what follows, I will outline the two primary research questions and methods used to address these questions. I will discuss the literature as it relates to transit maps, focusing on topics such as ideology, design principles and issues, cognition, and wayfinding. Next, I will focus on Toronto's TTC map in a comparative case study with the London Underground map, including a brief history and brand critique. Finally, I will discuss a potential solution to the TTC's branding struggles and try to apply theory in practice with a proposed redesign of the TTC identity in the form of a brand guide. Lastly, I'll provide a reflective look at the paper itself, discussing its limitations as well as opportunities for further research.

PART 1

II. RESEARCH QUESTIONS

Maps begin with basic design principles and require strategic design planning in order to be communicative, readable, and usable. As will be seen in the literature review, subway map design has notable psychological influences on travelers' perceptions of the city and their wayfinding performance. Based on the literature review, two primary research questions will be used in this study of transit map design. These questions are framed by the themes discussed in the literature review—design, representation, and wayfinding. For the purposes of this MRP, the questions will take as their object of study Toronto Transit System's map, the TTC, and will compare this map to the map used by the London Transit System in the United Kingdom:

Question #1: What design elements are crucial to transit maps, such as the TTC map and the London Transit Map, and how do they impact readability, usability, and consistency?

- a) What design elements make the TTC and London Transit maps “good”?
- b) What design elements make the TTC and London Transit maps “bad”?
- c) What design elements about TTC and London Transit maps are truly “ugly”?

Question #2: Can the current TTC map be redesigned to improve its representation of the physical city of Toronto and travelers' experiences through the system using best practices in transit map design?

III. METHODS

To address the research questions, several methods of analysis are used. Semiotic theory and visual content analysis helps to assess the individual micro components of the map. Theories of representation help us to understand the collective meaning of these components. Aesthetic theory, especially as it relates to ugliness, applies design thinking to the research questions and takes a macro approach to defining successful mapmaking—in other words, how does the map as a whole look and make you feel as a result? Finally, field observation and application of design concepts are used to complement theoretical analysis and experiment with potential best practices in map making.

IV. LITERATURE REVIEW

a. ideology and mapmaking

Ideology obscures the real conditions of existence by presenting partial truths. It is a set of omissions, gaps rather than lies. (Barton & Barton, 1989, p. 59)

What is ideology and how does it relate to maps? In mapmaking, Barton & Barton (1989) define it as the human attempt to present a selected version of reality as information. Instead of exact depictions, the map is constructed of carefully selected partial truths. The purpose of this ideological form of representing “truths” is to present a more manageable reality, one without the noise, distractions, and complexity of reality itself. Yet, there is an argument that “the map ... is not coterminous with the reality, and attempts to make or conceive it so are doomed to failure” (Barton & Barton, 1989, p. 51). The map cannot be equated with reality, although it is, in a way, designed to do exactly that. The consequences, then, are no longer the map as a sign or ideal, but the map as the signified, where “one says spontaneously and unhesitatingly... of a map of Italy ‘That’s Italy’” (Marin as cited in Barton & Barton, 1989, p. 52).

Barton & Barton (1989) describe the selection of truths in mapping ideology as “Rules of Inclusion [that] determine whether something is mapped, what aspects of a thing are mapped, and what representational strategies and devices are used to map those aspects” (p. 54). The map selectively isolates symbolic features of a city, often with the

perspective of an optimist intent on focusing on those features that portray the city in a positive light (Barton & Barton, 1989).

Barton & Barton's (1989) rules of inclusion extend to transit map design and "go beyond establishing the ideological interest underlying mapping practice to projecting a positive program for new map design methodologies... One solution... is to design maps that... frankly proclaim themselves as sign systems" (p. 69). Perhaps more than any other kind of map, the transit map is ultimately one composed sign system made up of various smaller signs. In this way, the transit map can take a selective approach in its design, with no attempts to become anything more than a technical diagram and navigational tool. However, stripping away reality to include only the necessary truths required for such a sign tool would be a mistake—and herein lies the downfall of the TTC map. It is too stripped down, and its decision makers exclude potentially valuable information – aesthetic and informational – that travelers could use to make navigational choices. However, this is only known to experienced TTC riders—tourists and new users would assume, perhaps with some hesitation, that the TTC map was a snapshot of the entire transit system in Toronto.

Barton & Barton champion an expanded view of design, declaring that "what is really needed is a new politics of design... where difference is not excluded or repressed, as before, but valorized" (Barton & Barton, 1989, p. 70). Barton & Barton (1989) recommend a "more inclusionary visual design practice" (p. 76) that favours "the postmodernist 'less is a bore' aesthetic—an aesthetic that privileges complexity over

simplicity and eclecticism over homogeneity, an aesthetic that tends towards the fragmentary and the local, an aesthetic that renounces the driving ambition toward Unity” (p. 76-77). For the purposes of this research and as it applies to the TTC case study, Unity is the intuitive integration and synthesis of design decisions that align with travelers’ deliberate—although, possibly subconscious—intentions. If this design and aesthetic Unity can be achieved with an approach that focuses not on what is excluded, but what can be included, then the ideology of map-making may shift closer towards whole truths. By whole truths, it is not necessarily that all truth must be revealed. Rather, these whole truths relate to that which connects what is presented and what is experienced in real time. In other words, my objective is to create a map where the information that is included in the transit map and used by travelers to make decisions contributes to how the traveler actually moves and feels as they navigate through the system.

b. transit maps and design principles

Design does not only refer to how something looks. De Jesus (1994) argues that subway map design must move beyond aesthetically pleasing colours and symbols for the purposes of optimizing wayfinding, which should “do its best to make our collective and individual experiences with the built world also an opportunity for communication and human interaction” (p. 50) rather than using maps to present cities as “information environments” (p. 50). Hadlaw’s (2003) study of the 1993 London Tube (LT) Map—designed by Henry Charles Beck—agrees with Vertesi (2008) and supports de

Jesus' (1994) argument, concluding that the effectiveness of Beck's map is largely attributed to his acknowledgement of the ways "new developments in transportation and communication rendered existing notions of time and space anachronistic. It acted to overlay everyday life with modernism's concept of space and time as malleable and serviceable" (p. 35). This insight ties together common themes in the literature perfectly—the design of a subway map is not solely a visual depiction, but a sign system that creates an alternative perspective of reality that is deeply experienced by travelers both spatially and temporally, thus emotionally, affectively, and aesthetically guiding movement through urban spaces and places.

At the same time, of course, the functional requirements of a transit map demand that its design be readable, usable, and consistent as the following authors' work explains.

Readability: Bogen, Brandes, and Ziezold (2010) study the operational use of schematic maps—to situate, to orient, and to navigate—by evaluating the design of historic maps. They note that the schematic design of transit maps comes from a need to improve readability, arguing that limiting the volume of information presented on a map allows content to be arranged more clearly (Bogen, Brandes, & Ziezold, 2010). Their research informs modern map designs, providing design techniques to improve the effectiveness of schematic maps as practical tools.

Usability: The usability of transit maps becomes increasingly important in situations that require multiple navigational tools; thus, Bogen, Brandes, and Ziezold (2010)

suggest merging various map layouts to produce a single, integrated map that can be used for a combination of navigational tasks. Their research suggests a layered planning process that considers map design for a variety of travelers with diverse transit needs.

Consistency: Information must be presented in a way that is clear, such that symbols used within the map have a singular, direct meaning. Ashwin (1984) refers to the drawing of maps as “metalinguistic communication ... that depends heavily upon conventionalized codes. To achieve a high level of specificity, the code must establish a close and unequivocal correspondence between signifier and signified, with the elimination of ambiguities” (Ashwin, 1984, p. 51).

In so far as the ugliness of the TTC map is a design problem, it remains a problem. Indeed, as designers have argued, the problem with design problems is that they are in many ways unsolvable—they are “ill-structured, ill-defined, and wicked” (Cross, 1982, p. 224). This is not to say that there are no solutions to design problems. Rather, the idea of design problems as “wicked” suggests that a singular, absolute solution often does not exist due to the nature of these types of problems, particularly design problems and solutions that need to respond to the needs of millions of users. Design is neither math nor science; thus, using mathematical or scientific analysis does not necessarily lead you towards singular or one-size-fits-all solutions (Cross, 1982, p. 224).

In the case of subway map design, the wickedness of design problems becomes clear.

One can design and redesign and redesign over and over again, but which is the right design? When does the designing end? How is one design compared to another, and how do you determine if one is better or worse? Designing a subway map is not the same as designing a subway, and herein lies the limitations and another element of wickedness. Is the problem of the TTC subway map in its design? Or is it in the subway itself? Cross (1982) suggests that in order to address wicked design problems, the designer must change the problem in order to create the design solution (p. 224). For the purposes of this research, then, we can redefine the problem of the TTC's map design as one of a primarily aesthetic nature, rather than of engineering. Even with this assumption, the design problem remains wicked since the result of a redesign is only one result, regardless of the research and consideration that was involved in that redesign. Buchanan (1992) suggests that "the problem for designers is to conceive and plan what does not yet exist, and this occurs ... before the final result is known" (p. 18). In other words, the successes and limitations of a subway map are only discovered once they are created, unlike in mathematics or science, where the answer already exists and is waiting to be found. In the case of design, there are no true answers, so what is it that you are finding? Without necessarily knowing what you are looking for, the designer must create these findings on their own.

c. semiotics and mapping

A pioneer in semiotics, C.S. Peirce distinguished signs into icons, indices, and symbols:

If the constraints of successful signification require that the sign reflect qualitative features of the object, then the sign is an *icon*. If the constraints of successful signification require that the sign utilize some existential or physical connection between it and its object, then the sign is an *index*. And finally, if successful signification of the object requires that the sign utilize some convention, habit, or social rule or law that connects it with its object, then the sign is a symbol. (as cited in Atkin, 2013)

Peirce's ideas are important for classifying signs used in transit map design and, in turn, understanding why users may interpret such signs as they do. If map designers apply signs with the knowledge of their connected meanings, then they may design a better map. Therefore, they should consider not only the relative relationships of objects presented in subway maps, but also the relationship of these objects to the signs that depict them. These considerations may largely influence the meanings transit maps convey. Further, these representations and interpretations may extend beyond the designed map to become idealizations of physical space.

Similarly, Ashwin observes that:

A sign may be construed as composed of two ingredients, a *signifier* and a *signified*. The function of the sign is to communicate a *message*, and in purposive communication, the process requires two participants, an *emitter* and a *receiver*. The message is embedded in a *medium* and subsists in a set of conventions or

code. (Ashwin, 1984, p. 43)

If we apply semiotic literature like Peirce's and Ashwin's to the subway map, the traditional subway map itself represents the signifier and the signified is treated as the subway system. What if, in the modern subway map, the city, instead, is viewed as the signified? The message, then, of the subway map as a sign, is to communicate location and the city's geographic infrastructure. The process requires the visual depiction of the subway map itself as the emitter, and the traveler as the receiver. The medium may be a poster, pamphlet, or digital copy of the subway map, presenting transit information using a series of established symbols and codes. From this breakdown of the subway map, the traveler as the receiver of information may be expected to interpret data based on personal experiences, pre-existing knowledge, or other characteristics. These interpretations may vary from traveler to traveler, which implies a series of varying perspectives dependent on how information is translated into action. This further implies that a single map, interpreted in diverse ways, can result in differentiated outcomes or user experiences. Thus, understanding how a subway map is designed, perceived, and experienced may provide opportunities to improve the urban transit experience in a variety of different ways.

d. map design and cognition

Montello (2002) explores the design of maps and the ways these designs are now being created to respond to cognitive research and the insight that maps affect the mind. This

is a result of the map's inability to replicate the world perfectly. Similarly, geographers Wood and Fels consider the map a crafted concept produced by culture to perform a required task (as cited in Hadlaw, 2003). The map represents space that cannot be fully experienced; thus, "it is a way of coding a reality we 'know' but can never really see for ourselves" (as cited in Hadlaw, 2003, p. 26). The map ultimately becomes a substitute for this invisible reality. As a result, how a map is interpreted becomes how reality is experienced.

Kazmierczak (2003) adds that communication begins with meaning, where design guides the cognitive process of understanding that meaning—design acts as "cognitive interfaces that enable reconstruction of intended meanings" (p. 1). In other words, travelers construct their own perceptions of the city based on its transit maps. While these constructions may be accurate or not, they nevertheless impact the overall transit experience of the transit user and the transit map interpreter.

These studies suggest that travelers may, over time, begin to view the map as an accurate depiction of the physical world, despite the inaccuracy of the presentation of information. As a schematic image, subway maps are, again, signs aiming to communicate specific messages; moreover, their symbolic representation of the city transforms to become an imagined space or idealized reality all its own. Thus, transit maps become a real way to understand a city, influencing logical decision making and navigational movement.

e. wayfinding and mapmaking

Pictorial communication usually presents interpreters with manifold ensembles of signs rather than sequences, and the interpreters must make their own order of the presentation, perhaps attending first to the whole and then its parts, or vice versa. (Ashwin, 1984, p. 52)

In this quote, Ashwin (1984) is essentially describing wayfinding: “the mental processes of orientation in space” (de Jesus, 1994, p. 33). Similarly, Fuller (2002) adds that wayfinding can be defined as “spatial problem solving” (p. 234) where the traveler makes a series of decisions in order to reach a set destination. In other words, wayfinding can be viewed as a focused, objective task—for instance, Hochmair (2009) studies wayfinding through trip planning and travelers’ estimation of the fastest transit routes based on visual layouts of schematic maps. Fuller (2002) studies a well-known directional sign—the arrow—to address the need for guided “movement and... stability” (p. 239) in complex transit networks. On signs, she states that nearly everything is associated with a sign, and “these signs create a globalised navigation system, a visual interface through which one moves. These signs don’t merely represent the [environment], they create it” (Fuller, 2002, p. 231). As a result, schematic maps and the symbols they use ultimately define the set of routes a traveler may choose to take.

Task-orientation: Guo (2011) further adds to the discussion of task-oriented wayfinding by providing a framework based on four criteria: distortion, restoration, codification,

and cognition that informs how travelers make route decisions on public transit. Her research, a case study of the London Underground, finds that passengers are twice as trusting of the subway map than their personal experience (Guo, 2011, p. 636), suggesting the important influence of the subway map on wayfinding decisions. Additionally, Guo (2011) concludes that in order to improve passengers' wayfinding performance, transportation bureaus should be more mindful of maps during planning phases. This relates back to the relevance of subway map design in urban areas, not only for travelers, but for the transit systems themselves.

Exploration: On the other hand, wayfinding can be seen as an organic process that is intuitive and exploratory. Soh and Smith-Jackson (2004) study the impact of individual characteristics and the transit environment on wayfinding performance. Further, the explorative potential of transit maps is discussed by Vertesi (2008) who notes that if we approach the map as “visual technology in action” (p. 25), then it can become a representational interface for users, “presenting and concealing opportunities for engagement, and making sense of the city” (p. 25). Vertesi's (2008) study of the London Transit map reveals the powerful influence of map design on transit patterns and the allure of a city.

f. ugliness and aesthetics in mapmaking

If there is one particularly striking characteristic of the TTC transit map, especially compared to other transit maps of the world, it is that it is rather ugly looking. What

features make it ugly, and why is ugly the first adjective that comes to (my) mind? Well first of all, there is a place for ugly in the art world. There is even a place for ugly in the design world. Yet, the ugliness that we find on the TTC map has no place, particularly given its design objective to help move people efficiently and optimistically through the city. The TTC map feels dark, uninspired, static—ugly. There is in its design no natural flow or movement, no beauty or finesse. The immediate reaction to the TTC map—that it's ugly—is not a foreign response since ugliness is all around us as we go about our everyday lives. Ugliness is also, of course, somewhat subjective. Ugliness can be defined as that which “[alters a] person’s aesthetic sense in such a way that the formal qualities of the experience ... appear to become the sources of our most disturbing and repulsive feelings” (Hagman, 2003, p. 959). *Disturbing*, *repulsive*, these are not, I’m afraid, extreme descriptions—their accuracy is what highlights the aesthetic and experiential problems that define the TTC map.

Psychoanalyst, George Hagman (2003), writes of the impactful significance of ugliness when he explains that:

Experiencing something ... as ugly is a powerful aesthetic response that is accompanied by intense negative affect (fear, horror, disgust, and/or loathing), moral condemnation (reprehensibility), and behavioral reactions (being repelled, looking away, fleeing). It is important to note that from a psychoanalytic perspective, ugliness is not a quality of things; rather, it is a psychological experience that is felt to be external to the self. (p. 961)

These behavioral reactions, particularly that of wanting to *flee*, is especially relevant when thinking of one's own experiences with the TTC. Faced with the decision to take the TTC or an alternative transit method I, for example, would choose the latter—walking, ride sharing, biking, anything else—regardless of added consequences such as physical exertion or time. In fact, I actively avoid the TTC at all costs. In fairness, the reasons for this flight response towards the TTC extends beyond simply the poor design of its map. However, for someone like myself who is highly sensitive to my environment, the combination of poor design and dissatisfactory service contribute to a highly negative experience. While an alternative transit method may also be negative, the TTC experience is something that I cannot control. I cannot avoid the ugly map or the dense crowds in the subway car, unless I choose to avoid the system all together. The ugliness of it all has this profound impact on my decision making because it plays such a prominent role in how I experience the TTC.

Further, Hagman (2003) describes the way in which ugliness connects reality with our subconscious expectations of that reality—the feeling that something is ugly is the “unexpected shattering” (p. 961) of our innate desires for that reality. Indeed, the TTC map's relative ugliness is also a result of our expectations of what other transit maps look like and the disjunction we experience when we compare the dated and uninspired TTC design—its overwhelming mediocrity—to our experience of the modern and pleasing designs of other transit we may experience as we travel across the world. Our needs for an acceptable level of aesthetic accomplishment are unmet when faced

with the TTC's reality, and as a result we are overcome with anxiety and discomfort (Hagman, 2003). This "collapse of idealizations" (Hagman, 2003, p. 975) disrupts the ideology established by society—the ideology that Barton & Barton (1989) use to argue for mapping *Unity* towards a closer reality. In this sense, *Unity* refers to alignment of the map as it represents reality, and reality itself (or at least our expectations of it). They argue, not for excluding all that is seemingly excessive, but for including what may be necessary to represent what actually exists. The problem is that what actually exists is not necessarily the ideal, which results in misalignment of a map that attempts to unify representation and experience with the experience itself. These encounters, then, leave travelers with "struggle and negativity" (p. 976) and "strong negative affects. ... Disgust, fear, anxiety, terror, repulsion, and dread" (p. 978). This interaction with ugliness reveals the hidden power of design, where "our deep-set emotions and its horror lingers in the memory. ... It is something ... so [profound] that our minds cannot let the object alone" (Rickman as cited in Hagman, 2003, p. 976).

So what can be done to address our experiences of ugliness? It is important to note that these feelings of ugliness are not limited to transit maps or even design on a broader scale. These aesthetic judgments exist across situations and societies, occurring with enough frequency that there is an ongoing tug-of-war between fascination and frustration—a conflict between our ideals and our fears (Hagman, 2003). There is an inevitable acceptance of this ugliness where we feel an impulsive—almost obsessive—desire to equalize our inner fantasy with the external reality. Hagman (2003) believes that "many experiences of ugliness lead to a process of working through in which

the sense of disruption and disorder is subject to integration into familiar modes of understanding and aesthetic order” (pp. 982-983). He argues that “ugliness can be an opportunity ... and through the creative process, [one can bring] form and perfection to bear on disintegration and disorder ... whether through art or understanding, ugliness can become a valuable part of a meaningful life world, ... In this way, ugliness succumbs to beauty” (Hagman, 2003, p. 984).

The ugliness I am associating with the TTC map may also serve as a reminder of the social changes experienced in urban cities over the last decade. The design of the TTC map is an indication of the increasing demands of society on infrastructure and technology, and the lagging innovation of public services such as transportation. Indeed, while the TTC map is aesthetically ugly, in its ugliness there is opportunity to transform its dissonance into an ideal experience, one more in keeping with the branded and slick design experience that we’ve come to expect from our modern world.

PART 2

V. A COMPARATIVE CASE STUDY

a. the TTC: a brand critique

As a corporation and business, the TTC is more than a service, it is a brand; as such, the TTC must embody its brand story and identity in every way it connects to its riders. Yet, the current brand identity of the TTC is perplexing and the TTC brand as a whole fails to find its purpose (other than communicating that it's outdated or, at best, a mediocre transit service). There is no story or unified brand identity, and attempted improvements seem disjointed, unnecessary, and misplaced. The rich history and progress of Canada's First Subway is lost in the noise of transit delays and price hikes without noticeable system improvements, and—perhaps more relevant than one realizes—a tired logo that only reminds us how behind we are in transit compared to the rest of the world. We are behind, not only in infrastructure and technology, but also in branding approaches and ideology. The TTC should be more than a transportation option that physically moves one from Point A to Point B—the TTC should be an *experience*. Of course, it is undoubtedly an *experience*, but not the kind we all hope for, expect, and desire.

While some may view the TTC brand as traditional, classic, and perhaps even quaint, if we look at other transit systems around the world—many of them older, more complex, and with far greater engineering challenges than the TTC—we start to wonder if the TTC is falling too far behind. And if so, then it may be time for a revitalization of the TTC

brand. To do so, it is worth comparing the TTC's branding with the branding of perhaps the world's most iconic and well known transit system—the London Underground.

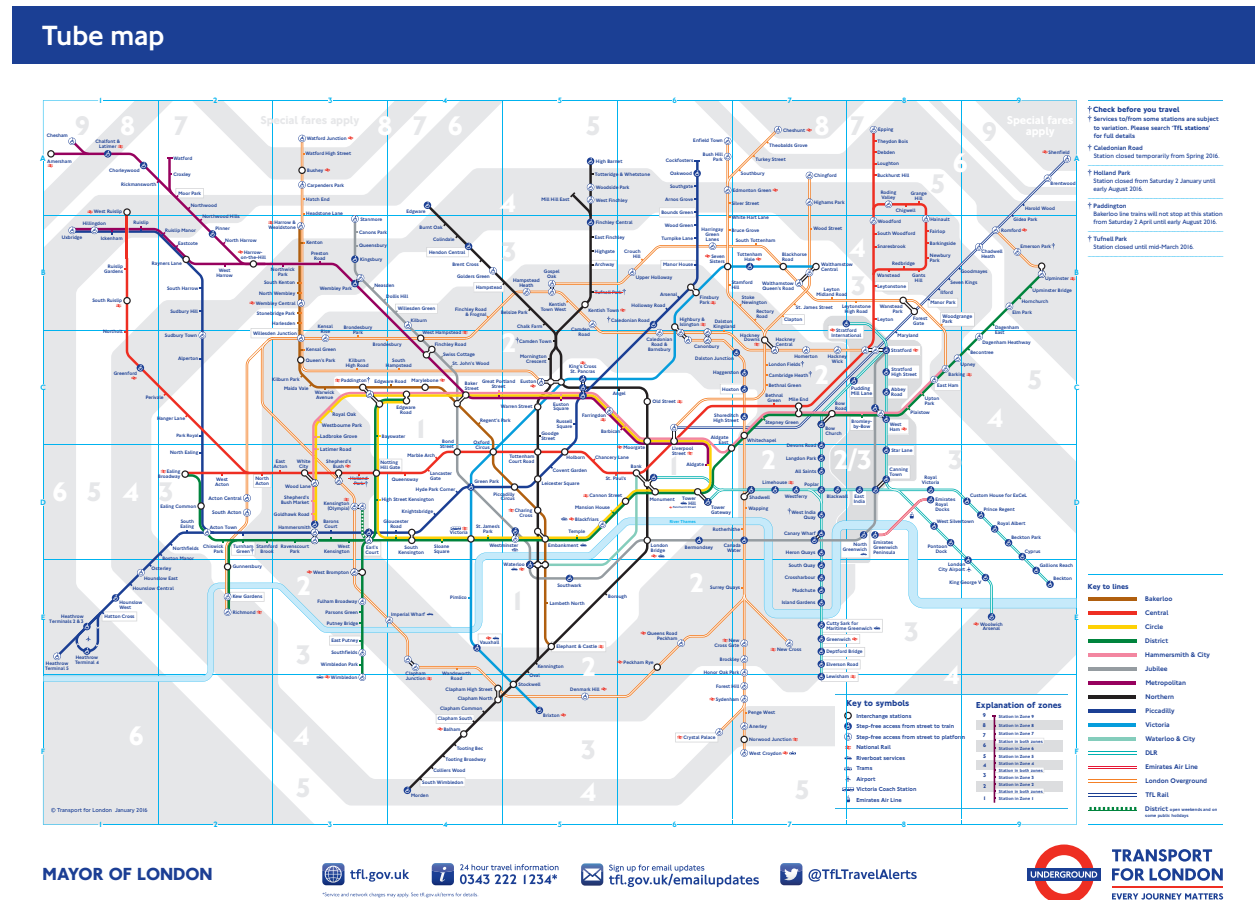
b. the Underground: history and design

In 1933, The London Transit (LT) map underwent a transformation under the direction of Harry Beck ("Harry Beck's Tube Map," n.d., para. 1). An electrical draughtsman, Beck radically removed *scale* from the subway map, focusing instead on creating a diagram of sorts that was both readable and usable ("Harry Beck's Tube Map," n.d., para. 2-4). His approach put the LT map *on the map*. After more than 80 years, Beck's map is considered a classic example of smart design; thus, it is used as "a template for transport maps the world over" ("Harry Beck's Tube Map," n.d., para. 4).

Today, the redesigned LT map (See Figure 2 and Appendix B) lives up to its iconic status and is at the heart of the London Underground's branding and is one component of a much larger design strategy – a design strategy that is constantly being updated, revised, and refined. In 2015, for example, Transport for London released a "revolutionary new design vision" ("London Underground," 2015, para. 1) called the *London Underground Station Design Idiom*. While the Idiom details nine governing principles for station development ("London Underground," 2015, para. 2)—indeed, in the LT document there are few direct references to the famous transit map—the project as a whole embodies the London Underground brand and carries the essence of the LT map, uniting physical space and representations of that physical space. The Idiom

is design innovation (“London Underground,” 2015, para. 7) through a holistic approach towards a complete network revitalization (“London Underground,” 2015, para. 8).

Figure 2 - London Transit Map (LT)



VI. TTC VS. LT

VISUAL CONTENT ANALYSIS (RESEARCH QUESTION 1)

Question #1: What design elements are crucial to transit maps, such as the TTC map and the London Transit Map, and how do they impact readability, usability, and consistency?

- a) What design elements make the TTC and London Transit maps “good”?
- b) What design elements make the TTC and London Transit maps “bad”?
- c) What design elements about TTC and London Transit maps are truly “ugly”?

The TTC and the London Underground as institutions are themselves very different. A brief look at their historic roots offers a starting point for understanding the differences in their transit maps and mapping ideologies. Using visual content analysis, we can further understand the differences in the maps themselves, breaking down the map to its various components. In particular, I look at the lines, the station points and labels, colours, and how these elements contribute to the overall design aesthetic. Further, how do these factors contribute to readability, usability, and consistency?

a. the good

The TTC map has one thing going for itself: simplicity. The rather basic infrastructure of the TTC system lends itself to a rather straightforward map design. In this way, the map is quite readable and easily used, perhaps even by new travelers. Usability of the TTC and LT maps may vary by the user, however, each map provides a key to define the meaning of symbols or colours used. These keys are crucial to the effectiveness of the map designs. The lines are well-defined by different colours and labels, and the station points are visible and fairly easy to identify. Compared to the LT map, which is busy and densely packed with multiple layers of information, one could argue that the TTC map is more user-friendly. In terms of readability, the greater number of lines available on the LT map make it more difficult to read at first glance. The text size used in the LT map is particularly small, which suggests that the map was designed to be printed on a larger scale. The lack of white space and abundance of information requires that the reader study the map carefully before starting a trip. However, station locations and lines are still recognizable, an impressive achievement considering the LT's high level of complexity. While this complexity demands more of the user, it does not necessarily contribute to a negative experience—the complexity is executed effectively. On the other hand, despite the TTC's basic architecture, there are many issues with the TTC map.

b. the bad

Consistency relates to both readability and usability, but is noted as a separate theme due to its importance to map design. Both maps are consistent within themselves and seemingly follow their own set of assigned principles. Notably, there are also consistencies across the two maps. For instance, they both use bright colours to denote different lines. However, the choice of colours for major lines differs. Where the LT map uses red for its major line—red is known to stand out and catch the eye—the TTC map uses red to represent the Airport Rocket shuttle, which is the only line shown that is not part of the subway. This is troubling because your attention is immediately drawn to this area of the map, which only represents a small part of the entire transit system—an important part, arguably, but perhaps not enough to warrant the dominant red colour (despite that part of the system being known as “The Red Rocket”).

Perhaps most intriguing is the use of the circle. The circle is a consistent symbol on both maps; however, it signifies different meanings from one map to the other. For the TTC, it represents a station, with a larger circle denoting an interchange station. For the LT, the circle denotes an interchange station only. The circle will be discussed further in Part 3 of this paper.

Focusing on the TTC in particular, an important inconsistency is also observed. This is between the physical subway map seen on the subway cars themselves and the online version available for download. The physical subway map has a black background and

a wider aspect ratio, compared to the online version that is on a white background in a standard paper size. The online version, which is the version used in this research, is arguably better than the subway car version. Why the difference and the stunning inconsistency at such a basic level? It seems to simply reflect the TTC's carelessness and a lack of attention to detail! Understandably, the online version is ideal for printing at home; thus, there may be a practical explanation for the difference. However, it still creates an inconsistency. While this is seemingly only a minor issue that most travelers will never notice, it does affect the TTC's overall brand identity, which in turn influences traveler's perceptions of the TTC brand (even if it's merely on a subconscious level). Thus, this issue of inconsistency between maps and across platforms must be addressed. This further extends to the multiple maps on the TTC's website, which all apply a different design style and further muddle the TTC brand. In comparison, the LT map also has several versions of the map available online, each with a specialized focus for travelers' various needs; however, the maps are consistent across the versions in regards to style, design, and preserving the Underground brand.

Another theme in the analysis involves representation of reality. The relative placement of stations on the line can influence navigational decisions made by travelers. If two stations appear seemingly close, a traveler may decide to walk or bike instead. On the other hand, if two stations appear seemingly far, a traveler may decide to ride the subway. Either way, the decision may influence the traveler's experience through the city. In both the TTC and the LT maps, it appears that stations are positioned equidistant apart on the various lines, regardless of their actual distance in reality. In

some instances, stations are placed further apart; however, these placements are also not related to reality. While station positioning does demonstrate consistency, the experience of traveling from one station to the next does not match the map. Considering first time transit users in particular, travelers may find it difficult to plan or anticipate travel times based on the existing map. At least, the TTC map discloses that the map is not to scale.

c. the ugly

Overall, there are noticeable differences in the way information is presented, which extend beyond the physical infrastructure of the TTC and the LT. For instance, The London Underground takes a different approach to organizing a complex network of data—the LT map uses a grid system and includes a detailed index. Further, the level of information presented also varies. While the LT includes a full network of transit alternatives in a single map—such as light rails, private lines, and trams—the TTC subway map does not. In addition to consistency, perhaps this is the most prominent issue with the TTC map—the overall look and feel is bland and in a way, too simple. It lacks excitement, and considering that streetcars or connections to other major transit systems are not depicted, one could argue that it is notably incomplete. This is also particularly interesting because the streetcar system makes up a considerable portion of the TTC as a whole; yet, streetcar lines are not included in the main map. A traveler would need previous knowledge or require access to a different map to see streetcar lines. This is important because looking at the main map alone, it appears that the

transit system covers very little area. When making navigational decisions, this can significantly impact a traveler's experience and directional movement.

Recently, the New York transit map was unofficially redesigned by transit user and map designer Anthony Denaro to combine the subway routes and bus routes in one map (Leber, 2016, para. 3). This redesign was inspired by the declining use of bus routes, despite their ubiquity across the city (Leber, 2016, para. 1). The new map effectively links the subway system with the bus system, improving travelers' navigational efficiency—transfers across buses and subways are included in a single fare, and increased use in the bus system can reduce overcrowding on the subways (Leber, 2016, para. 4). Similarly, this concept is seen in the LT map and can be applied to the TTC map in regards to streetcar routes.

Further, another unique element is present in the LT map that intriguingly influences representation of the city: The Thames river, which runs through London and notably plays a role in the overall transit system—there are boat services that travelers can take to cross the river, for instance. While Toronto does not have a major river running through the city, there is a large body of water that is missing from the map: Lake Ontario. One may question whether including this geographic landmark is necessary, but the waterfront is arguably a central part of the city where people gather and socialize. The transit system does not run through the lake, but it does travel alongside it and water taxis travel across it to Toronto Island. Yet, with the current TTC map, how would anyone know this information without having taken the route before? Again, this

can be partially attributed to the absence of streetcar lines in the main TTC map. Thus, without the lake, there is a misrepresentation of Toronto and travelers are left feeling that something is missing, contributing again to feelings of disconnect and mediocrity.

In summary, the sample comparative analysis suggests that map design is a strategic process—the information presented is as important as how it is presented, and these decisions may greatly influence a traveler’s transit experience. The question then becomes: How should the TTC map present information? Can it apply strategies from the iconic LT map? If so, which ones? And what other factors should be considered? Surely, it is not enough to give the map a cosmetic makeover—it requires an integrated approach that considers the TTC brand story as a whole.

PART 3

VII. DESIGNING TRANSIT MAP SOLUTIONS

a. the case for minimalism

What constitutes the ideal TTC map—one that knows what it stands for, confidently represents the city, and has a positive impact on individual travelers—is a complex topic and up for debate. On the other hand, the physical TTC map is rather straightforward: a condensed, data-packed sign system. Despite the simplicity of the infrastructure, the nature of a transit map implies that a lot of information will be presented across a small surface area. Is all of this information necessary? Beyond the information alone, is there excess? While the goal is not to reduce the transit map to such minimalist principles that it is no longer functional to the average traveler, there is some value in applying minimalist thinking to the aesthetics of transit map design. The LT map is complex in its presentation due to the complexity of infrastructure and network of services; however, its foundational origins are minimal: a circuit board—a systematic diagram of points and lines—and in my view minimalism, as a strategy and aesthetic, might provide us with some answers and solutions to the TTC problem.

The difficulty is this: “Although simplicity as a value is widely accepted, simple systems are rare—most instead threaten to burst with complexity” (Obendorf, 2009, p. 6). It is often more challenging to create something that is both simple *and* sufficient than it is to throw everything you have into the thing and hope it works. Obendorf (2009)

argues that minimalism appears as simplicity if the results are accepted blindly, without understanding the purpose of the minimalist approach; however, minimalism is more than best practices—it is a mindset. Simplicity is not achieved with deceptive covers and cosmetic changes; instead, “design must go beyond the surface” (Obendorf, 2009, p. 299).

Minimalism in the fine arts originated in painting, and was later continued in sculpture. Its different protagonists ... followed different conceptions of reduction. In reduction, they focused on topics such as color, material, and structure... Consequently, the overall Gestalt of an artwork evolved into a central aspect of minimalist art, and relationships that extended beyond the object, and included the spectator, became relevant to minimalist artists. (Obendorf, 2009, p. 23)

The minimalist art movement of the 1960's was popularized by anti-expressionist artists who thought that any personal emotion or expression should be removed from art in such a way that the art referenced only itself in an objective manner (“Minimal Art,” 2009, para. 6). The objective of minimalist artists was to strip art down to its fundamental, literal self (“Minimal Art,” 2009, para. 10). In this way, art became less about the meaning of art and more about art itself (“The Difference,” 2009, para. 2). Where minimalism is sometimes described as extreme simplicity through reduction, the result in art is often geometric and without purpose. However, when looking at minimalism in design, the focus shifts from design towards design's intent. Thus, minimalism in transit map design implies a need to simplify while also conveying

functional meaning. Minimalist design still requires purpose, which can be achieved through the combination of typography, colour, and only the necessary lines required to communicate that purpose.

For the TTC map, a map that is relatively simple in comparison to the LT map and other transit maps around the world, how can optimal simplicity be achieved in a way that is both beautiful and desirable? It is common to associate simplicity with reduction; yet, how does one decide where and to what extent this reduction takes place? With a minimalist approach—an approach centred on *less is more*—there is a risk that Barton & Barton’s argument that *less is a bore* will hold true. Boring is not the ideal. To avoid this, minimalist techniques must be strategic and forward-thinking. The case for minimalism is not that the map should be reduced to its bare bones, but that the map should integrate minimalist principles in such a way that allows its design to evolve with ease and beauty alongside the evolution of the whole system itself.

b. the (minimalist) role of the circle

On a transit map, the circle is often used to indicate a station stop. The circle is a “geometric form” (Leborg, 2006, p. 28) where “all points have the same distance from a given point (centre)” (Leborg, 2006, 89). In astrology, it represents life and eternity; in mechanics, it symbolizes a point of rotation; and in cartography, the circle denotes a city or a juncture (Leborg, 2006, p. 28). However, to the average traveler, this circle may be better defined as a point. Considering the point as “an abstract phenomenon

indicating a precise location” (Leborg, 2006, 93), these station points act as anchors and relative indicators on the transit map. The idea of these circles as points is significant to the idea of minimalism in that the circle effectively communicates the substance of the transit map—the location of stations—without any need to be more than a small point. Further, the relationship of the circle to itself—how two points in the map relate—is easily depicted without excess or complexity. For instance, on the concept of *interchange* stations, where two independent stations are also physically connected, the circles that represent them merely overlap and compound (Leborg, 2006, p. 78-79). This ease of relating one station to another is achieved through the circular form. To contrast, imagine that instead, stations were represented by ticks or squares. While individual stations may remain discernible, the joining of two such stations would result in a confusing aesthetic. Thus, a better choice is the use of a circle—representative of a whole, of a unity, of an idealistic completeness that one strives to achieve. The circle signifies a destination that for the traveler, opens doors to opportunity and perhaps unexpected adventures.

VIII. A NEW OPTIMISM

REDESIGN EXERCISE (RESEARCH QUESTION 2)

Question #2: Can the current TTC map be redesigned to improve its representation of the physical city of Toronto and travelers' experiences through the system using best practices in transit map design?

a. rebranding

In order to reimagine the TTC map, we can refer back to the theory of unity and begin with the TTC brand as a whole. As discussed, its history is rich and reflective of a progressive city, yet the TTC brand has lost its identity. Thus, a rebranding exercise may help revitalize the TTC and improve travelers' overall perception and experience of the transit system. The TTC brand guide (Appendix C) presents a proposed redesign of the TTC brand, outlining key elements such as logo, colour palette, typography, taglines, sample mockups, and of course, the TTC map.

b. refreshing

The idea behind rebranding the TTC comes from a need to refresh the entire system, without the ability to make any changes to infrastructure or the physical system itself.

This refreshed brand has roots in the logo and TTC brand itself, but its core lies in the TTC map. The map redesign process begins with breaking down the TTC map into key components, and comparing those elements to the LT map. While not all design elements in the LT map can be adopted in the TTC map, the iconic LT map serves as a strong reference point and source of inspiration—after all, it is widely known and highly respected for its design. Taking these references into consideration, the redesigned map begins to take shape. Another important consideration is the theory of minimalism (and by extension, of exclusion). What elements are necessary and “good,” and what elements do not contribute to the overall functionality and aesthetic appeal of the map? On the other hand, what elements are missing from the map, and how can they be integrated with minimalism in mind? Ideally, the end result is a map that causes the traveler to feel a sense of excitement, inspiring joyful wayfinding through the city. The redesigned map should not only convey information, but also should communicate feelings of intrigue and wonder, as well as a strong sense of the TTC brand identity.

c. renewing

The proposed TTC brand guide may not be the perfect answer, but this is the perpetual designer’s dilemma: “The problem for designers is to conceive and plan what does not yet exist, and this occurs in the context of the indeterminacy of wicked problems, before the final result is known” (Buchanan, 1992, p. 18). The TTC brand, including its logo and map, has been redesigned over and over again by local designers and frustrated Torontonians. The volume of voluntary redesigns suggests a need to revitalize the TTC

brand. Ultimately, the goal is to modernize the transit system, restoring traveler's trust and loyalty towards the TTC. Whatever the final design becomes—should the TTC ever make the bold move to rebrand—it would ideally emulate the characteristics of the city that make it one of the most livable in the world and instill within its riders a renewed experience of travel that makes taking the subway and streetcars a pleasure and privilege.

IX. THE NEXT STATION IS...

Several challenges were faced throughout the research process, and may have limited the outcome of this study. Time limitations only allowed for a sample of two maps to be studied. Thus, it is difficult to create a single set of best practices for map design—cities vary greatly from one to the next on factors such as landscape, existing infrastructure, technology, and financial resources. The lack of access to internal data presented another barrier, limiting the depth of research that could be conducted. Another challenge was the inability to physically experience or test out these maps in real-time, due to geographical distance—this may be possible for a larger-scale, funded study.

This research study sought to examine the design of the TTC transit map and to propose design solutions that make the map more effective, efficient, and aesthetically pleasing. While perhaps only demonstrating that extensive research is required in this area, the results may be applied and extended to other related studies. The methods of analysis may be used to assess other major transit maps around the world—this would help confirm themes or present new findings. The TTC case study may be expanded to consider new developments in infrastructure, such as the addition of new subway lines. Alternatively, one could narrow the study to focus on a particular audience—for example, traveler groups with specific characteristics, such as tourists, cyclists, commuters, travelers requiring accessible accommodations, or individuals with language barriers who may not be able to read printed maps. Further, the subject of

wayfinding design is relatively new and understudied, and can extend to specialized groups such as the visually or aurally impaired, where traditional wayfinding tools become irrelevant.

Additionally, participants were not interviewed in this study, but should the TTC undergo a complete rebranding, travelers may be interviewed to study changes in perception, transit experience, usability, and so on. How, for example, can the TTC brand be integrated with other brands in the transit network, such as Presto and Metrolinx? Are these brands and systems streamlined in such a way that movement is seamless and intuitive, or are these brands disjointed in such a way that hinders wayfinding through a city? Other future research considerations include the use of transit signs within the network and their influence on wayfinding, the ease or complexity of transferring between different transit systems (i.e. Go Transit to TTC to Union-Pearson Express), and the advancement of technologies—interactive, virtual reality, real-time, and so on—in the transportation industry.

It seems that transit systems and subways are not heavily studied in academia; thus, the opportunities for research are significant. There are questions of social interaction, patterns in human movement, efficiency, engineering, and so on. The topics and approaches are endless, but less discussed are the wicked problems of design in transit. In this area, London leads the way thanks to its iconic LT map and ongoing rebranding exercises. Although the TTC is steaming ahead trying to catch up, it has a ways to go before the next station comes into view.

X. CONCLUSION

Transit maps in particular, are more than a navigational tool. Often a topic of pop culture, the subway map of a particular city can be a source of either inspiration or annoyance. For many designers, reinventing the subway map is the ultimate design challenge, especially for complex systems such as the London Underground. However, map design extends beyond infrastructure, and having fewer routes in a transit system does not necessarily equal a more effective map—as we found when looking at our beloved TTC. Many factors are relevant to map design and not only must the map be functional, but it must also be a symbolic, representative evocation of the city. The significance, then, of this research is the underlying connection between map design, aesthetic experiences, and social behaviour.

With a greater understanding of the communicative capacities of subway maps, particularly how subway maps are designed, perceived, and experienced, we can begin to find best practices in mapping and the navigational behaviour they inspire. For citizens and tourists alike, the connection to a subway map can be the key to life and exploration in the contemporary city.

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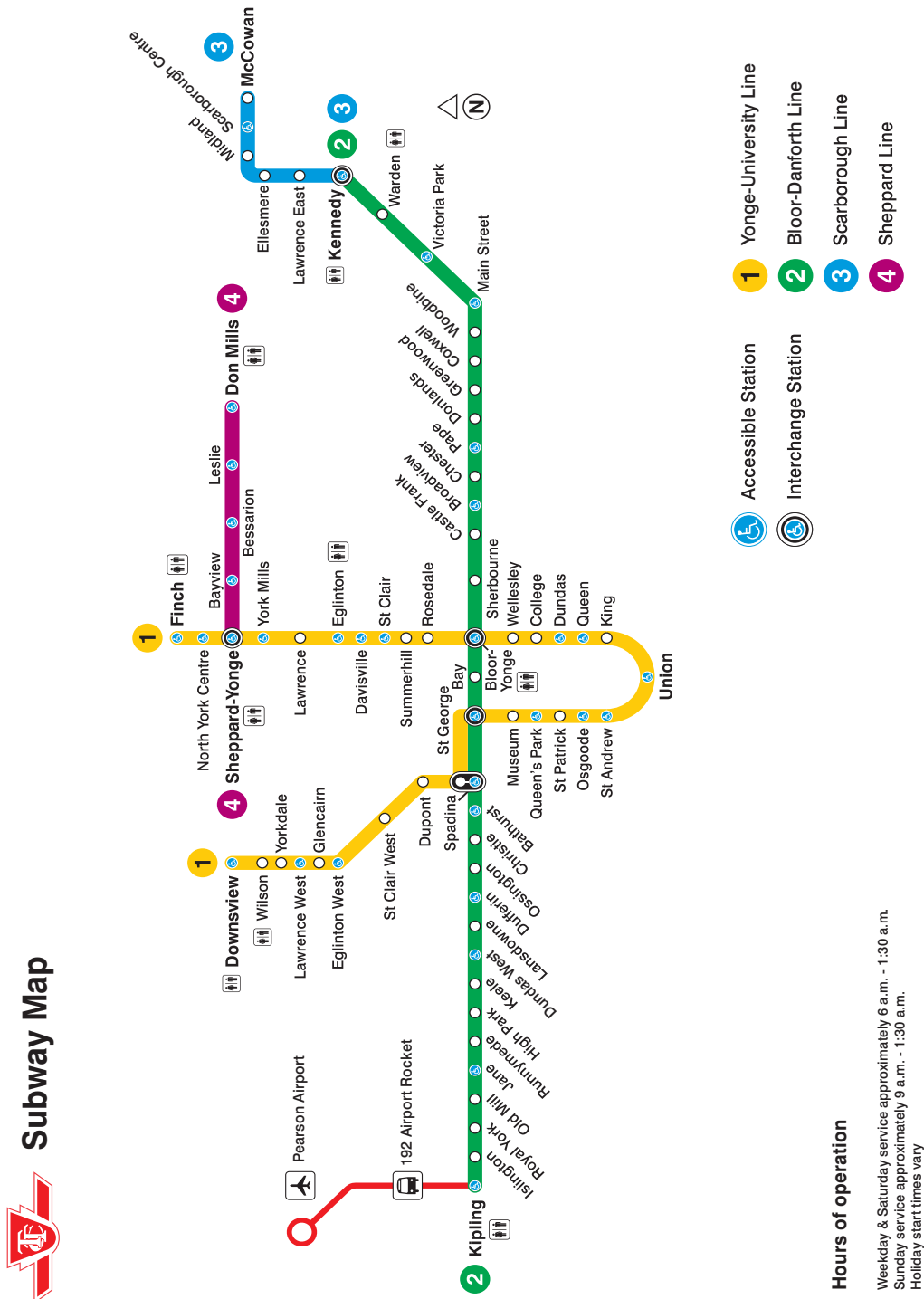
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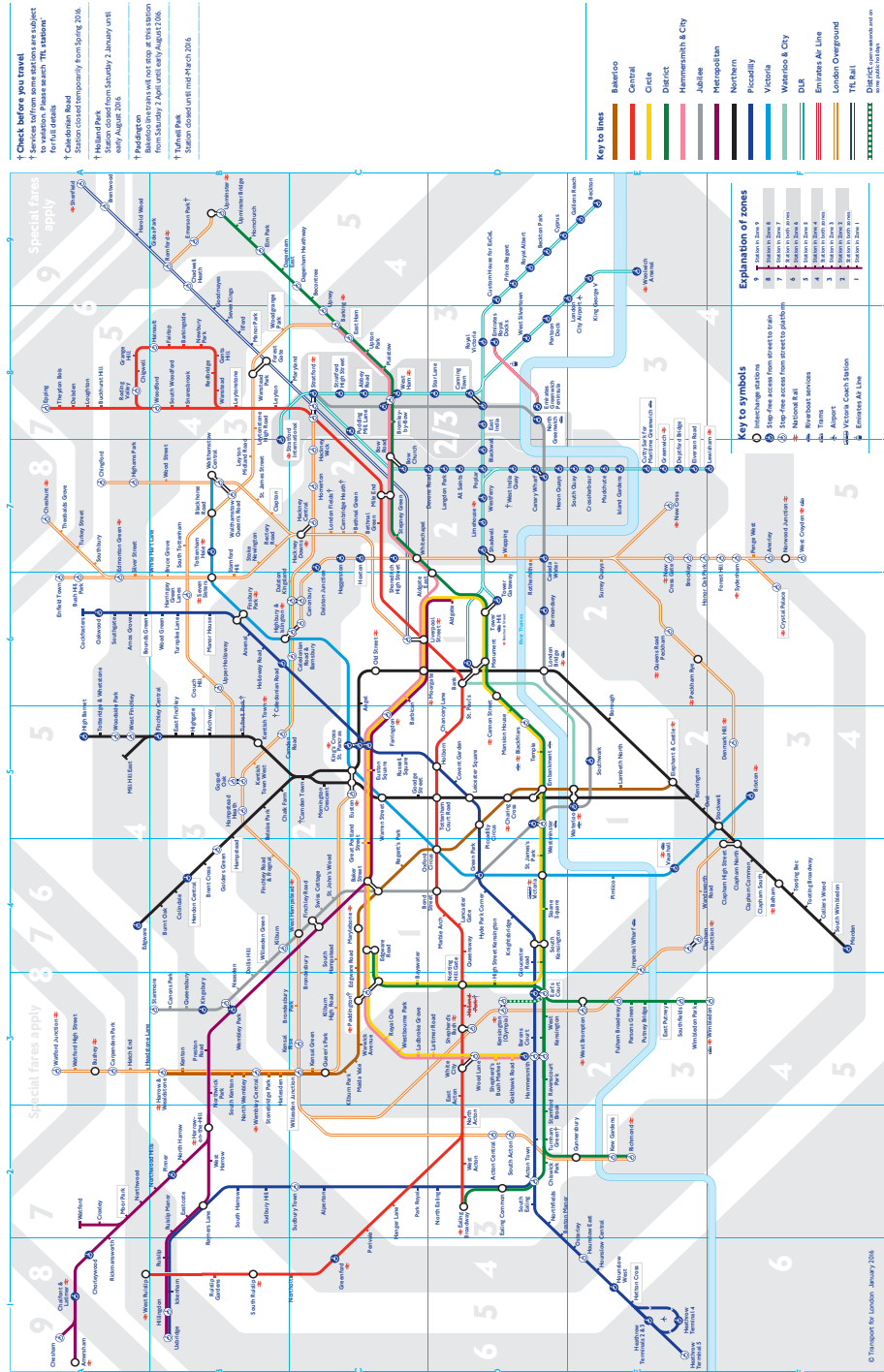
XII. APPENDICES

appendix a - toronto subway map (TTC)



appendix b - london transit map (LT)

Tube map



appendix c - a redesign: TTC brand guide

Please see accompanying attachments: (1) *Sida(Joanna)Liu_MRP_BrandGuide* for the redesigned TTC Brand Guide and (2) *Sida(Joanna)Liu_MRP_MapRedesign* for a standalone copy of the redesigned TTC Subway Map seen in (1).