

## Summary

# Showing the way

## Baseline report for a new bicycle wayfinding concept in Oslo and Viken

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*Bicycle guidance has mainly been based on signage principles for motorists, however, there is currently little knowledge of cyclist's needs with regard to wayfinding, and little is known about how the current wayfinding system works. In the fall of 2019, we conducted a roadside survey among cyclists in Oslo (n = 99) and "commentary cycling" sessions on selected bicycle routes in Oslo (n = 10). The results show that although many people use a smartphone to plan the route in advance, few want to stop to check the phone on the go. The fact that cyclists navigate in speed is thus an important prerequisite that provides guidelines for how to sign. For cyclists signage to work well, signs and the font size should be large enough, Moreover, the background color should preferably be a strong or fluorescent color. The signs should be placed consistently, and they should include destination points that are considered relevant. Signage can in some cases be supplemented by road markings, as long as it does not introduce too many visual points that exceed the cyclists attentional capacity (eg. in complex traffic environments). Road markings may not replace signage, but if properly used, it can work well as a supplement.*

## Background

Increasing cycling shares is a stated goal to achieve national targets to reduce car use and greenhouse gas emissions. Measures for increased cycling have mainly been aimed towards the development and improvement of physical infrastructure. However, there is evidence to suggest that better infrastructure alone is not enough, implying a need to think more broadly about strategies and measures to get more people to cycle.

In Denmark, there is evidence that better bicycle signage can be an effective way to attract new cyclists. The current system for bicycle signage is largely based on signage principles for motorists. Although cyclists share many similarities with car drivers, it is conceivable that they have other needs. Knowledge concerning cyclists' information needs and wayfinding strategies is very limited and little is known about how well current bicycle signage actually works. Therefore, there is a need for increased knowledge on how bicycle signage best can be adapted to support wayfinding for cyclists and contribute to increased cycling.

The R&D project "User-oriented bicycle guidance" is carried by TØI together with the Oslo municipality and Viken County Council, to form the basis for a new guideline on bicycle guidance and signage. The guideline is meant as a supplement to the Norwegian Public Roads Administration Handbook N300 - Traffic signs.

An important backdrop to this work is to attract new cyclists – this includes the ones who are not yet cycling but are considering starting, the ones who use their bike occasionally, and the ones who are not familiar with cycling infrastructure in the area they live. Consequently, the resulting guideline should therefore not only appeal to the most experienced and tough cyclists.

The project consists of four phases:

1. Analysis of the current situation regarding bicycle signage
2. Define problems, propose and specify possible solutions, conduct a workshop and a final conference
3. Testing proposed solutions
4. Preparation of new guideline

This report covers phase 1 of the project and aims to answer the following overall research questions:

- Is poor signage an obstacle to new cyclists?
- What information is most relevant to cyclists in different situations?
- In what way is information about routes best presented to cyclists?

## **Methodological approach**

In order to gain knowledge about how the current bicycle signage system works and what user needs and considerations need to be addressed, the current study draws on several sources of data. We have conducted a review of research-based literature. The review includes both international and national research relevant to bicycle wayfinding. This includes both theoretical and empirical studies. In order to gain insight into user experiences and needs among different types of cyclists, and at the same time gain knowledge about how the current bicycle signage system works, new and innovative methods have been applied. Field interviews were conducted with cyclists at different locations in Oslo. In addition, "commentary cycling" sessions were conducted with 10 cyclists wearing a helmet-mounted camera while describing choices and reflections along the way. The method makes it possible to study wayfinding behavior, navigational choices, obstacles and immediate reflections in real time. Finally, we analyzed interview data obtained by Oslo municipality. The material consists of in-depth interviews with road users in Sagene in Oslo.

## **Literature review**

According to the seminal work "The image of the city" by Kevin Lynch (1960), our mental image of a city can be broken down into five basic components: paths/roads, edges, districts, intersections/nodes and landmarks. Several recent studies support these findings, implying that landmarks and major arteries are particularly important points of reference when navigating in areas that are unknown to us, but it is not clear which of these is most important with regard to learning to read a new city or area. Several studies report differences between women and men in orientation strategies. Men more often prefer global reference points such as cardinal directions, while women are more often oriented to specific characteristics of the environment, such as landmarks, buildings, etc. Women and elderly more often than men report experiencing wayfinding anxiety, which can also affect both route choices and the willingness to try out new bike routes, and can likely result in choosing a longer and more familiar route rather than trying out a shorter, unknown route. We find very few empirical studies examining wayfinding behavior among cyclists or how bicycle signage supports cyclists wayfinding needs. The majority of this research is based on motorists. The literature suggests that size, font size, positioning, amount of

information presented and color of the signs all influence how detectable the signs are to cyclists.

Small-sized signs with small font sizes are generally difficult to detect while driving at moderate to higher speeds. The time it takes to read a sign is found to increase with the amount of information presented on the sign. Furthermore, a few studies imply that fluorescent colors, such as bright yellow, are easier to spot than more common colors such as dark red and blue.

The most frequent challenges associated with bicycle signage include lack of signage, poor or inconsistent signage positioning, too small signs, as well as vegetation or other obstacles that make it difficult to read the signs. There are generally few studies on the use of digital mapping services, such as Google maps among cyclists, and thus little knowledge exists of the degree to which cyclists use them and in what situations.

In Denmark and England, road markings have been tested as a supplement to sign posts. Evaluations show that the combination of road markings on the ground and signage is perceived as useful by cyclists, especially as it reduces the need to pick up the phone to reorient along the way. These studies, however, say little about how information ideally should be distributed on signs and road markings, that is how much or what type of information is suitable for presenting on the ground, and what information should be presented on signs. Simulator studies indicate that road markings are noticed and contribute to fewer wrong turns. Moreover, the studies show that simple symbols in combination with bright colors such as orange or green appear to be most effective and conspicuous, while rich textual information reduces readability. So far, the research says little about the traffic safety implications of presenting information both on the ground and on signs at eye level. In general, it is important to limit the number of visual elements that road users must attend to, especially in complex traffic environments. The suitability of road marking may thus vary according to the complexity of the traffic environment and the number of competing visual elements. In sum, findings indicate that road markings cannot replace signage, however if used properly, they can work well as a supplement to signage.

## **Field survey among cyclists**

Field interviews were conducted with 99 cyclists on selected locations in Oslo. To capture cyclist with varying cycling experience, interview sites were chosen based on assumptions about where we would be more likely to encounter more inexperienced cyclists. Despite our efforts, the majority of the sample turned out to be relatively experienced cyclists.

However, we did ask the respondents to place themselves in a wayfinding situation, by instructing them to think back on the last time they were on an unknown route. The most common strategy was to utilize preexisting knowledge of the city, followed by electronic maps. About a third of the respondents reported using bicycle signage to find the way. When participants were asked how they went about planning routes in unfamiliar areas, google maps was by far the most common answer, followed by their preexisting knowledge of the city. The fact that people are relying on their preexisting knowledge of the city implies not having a clear strategy in advance, but suggest a more emergent strategy that is formed after the journey is started, based on information that is encountered along the way. This information can most likely consist of all of the elements identified by Lynch, but findings indicate that known routes/roads, intersections or landmarks appear to be the most common types of information.

On the question of what is essential to know when planning a route, the distribution of responses show that the information deemed most important is the location of bike lanes,

while traffic density and steepness of terrain was deemed least important. In general, participants reported to a little extent having noticed signposts on the last route they had cycled, which can be explained by the fact that they were most likely on a known route.

Very few of the participants would choose not to ride their bike rather than traveling an unknown route. However, there were quite a few that reported they would rather chose a detour rather than an unknown route. Taking into account the level of experience, we find that those who had little cycling experience were a bit more inclined to select other transport modes, compared to those with more experience. There was, however, no difference in level of experience with regard to choosing a detour.

## **Commentary bicycling**

In order to obtain knowledge of how today's bicycle signage works, and to gain insight into cyclists' user experiences and reflections, we conducted commentary cycling sessions.

Participants were provided with a start and finish point, and instructed to make their way to the destination in the manner that felt most natural to them. To ensure a certain degree of variation, half of the participants were given the opposite starting and ending points. In the first sessions, the start- and end points were the Monolith in the Frogner Park and Ullevål Stadium. Another session was conducted with Aker Brygge as the starting point and Monolitten as the final destination. Participants were equipped with a helmet mounted camera, and instructed to comment on navigational choices and reflections along the way.

In the second part of the experiment, two cyclists were given a start and a finish point, but this time, they were instructed to navigate using primarily bicycle signage. In this round, participants were not allowed to use maps or electronic devices. The first participant was instructed to cycle from Sinsen to Oslo Science Park via Ullevål hageby, following the bicycle signage of "city route 7". The second participant traveled in the opposite direction.

With regard to how participants made use of signage, three behavior patterns emerge; one-third of the participants actively used the bicycle signage, one-third relied on signage on parts of the route and one third relied mostly on other wayfinding elements and used the signs only to a small extent. Half of the participants used electronic maps on the phone, for the most part in advance, but sometimes during the journey. On average, participants saw (actively commented on) six of 17 signs along their respective routes.

As important as signage, it was for participants to find elements such as tramways, highways, and familiar buildings to signal direction, often toward the "anchor point" they were familiar with. Some chose a route that was initially longer, based on known main roads or areas, rather than a shorter and unknown route.

Participants both commented on signs they encountered along the way as well as the information presented on the signs. Some signs were too small or had too much information, and were therefore difficult to read without having to stop, something the participants did not want to do. Although several of the participants were quite familiar with the city, many felt that the reference points referred to on the signs did not provide them with the information they needed in order to navigate in more unknown areas.

A third challenge we found concerns temporary redirectional signage due to road and construction work. Although such instances are exceptions, towns and cities are constantly changing – hence for cyclists, temporary changes is probably the exception that proves the rule.

In the second part of the experiment, participants navigated primarily by means of bicycle signage on the newly established cycle route “city route 7”. Both participants said navigating using signage was fairly unproblematic, even though none of them had navigated using bicycle signage in the past. One of the participants said she was surprised at how frequent the signage actually was. Despite frequent signage along the route, one of the participants did lose her way at one point.

In order for the bicycle ride to feel comfortable, even on an unknown route, it is important that the signage is both consistent and legible enough so that flow is not compromised.

Findings suggest that poor signage can be a hindrance to new cyclists, and furthermore that signage also can cover an important advertising function to promote cycling as an alternative to other means of transportation. Use of route names as a supplement to destination points may in some cases work well. Experience from England and Denmark suggests that assigning identity markers for the most important cycling routes can be useful. However, current research into orientation strategies suggest that this would require that the route already is well represented in people's mental maps of the city, such as tram infrastructure and other major arteries. Signage can in some cases be supplemented by markings on the ground, as long as this does not mean that cyclists get more viewpoints they have to alternate between looking at, for example in complex traffic environments. Markings on the ground may however not replace signage entirely, but used properly, they can work well as a supplement to signage.

## **In-depth interviews with potential cyclists**

In February 2019, the Agency for Urban Environment conducted 16 semi-structured interviews with respondents at Torshov Park, outside the Sandaker Center and at Sagene district housing. The purpose of the interview was to give insight into people's daily travel habits and decisions about ways of traveling. The respondents were not asked directly about wayfinding, so the analyzes are about the extent to which they mentioned this unsolicited.

Most respondents reported public transport as their first choice. Two of the respondents were primarily cyclists while two reported traveling mostly by car. The respondents stated several reasons why they did not travel by bicycle more often. Poor signage was however not among the stated reasons. For many of the respondents, finding a safe travel route was deemed as the most important priority when choosing bicycle route. When discussing distance, all of the respondents mentioned travel time unsolicited, which implies that travel time could be relevant information to present on signage.

## **Summary**

In this report, we have looked at how the current bicycle guidance system is experienced among cyclists, and to what extent the current system meets new cyclists needs when it comes to wayfinding. This is seen in light of the fact that cyclists in many ways can be regarded as a hybrid between motorist and pedestrian.

In order for the bicycle ride to feel comfortable, even on an unknown route, it is important that the signs are so clear and easy to understand that the flow is not destroyed. We have also shown that poor signage can be a hindrance to new cyclists, but that signage can also play an important advertising function to promote sickness as an alternative to other means of transport. Use of route names as a supplement to destination points may in some cases

work. Experience from England and Denmark suggests that creating a personal identity for the most important cycling routes can be useful. But general knowledge of orientation strategies indicates that this requires that the route already has a clear track in people's mental maps of the city, such as tram routes and other major roads. Signage can in some cases be supplemented by markings on the ground, as long as this does not mean that cyclists get more viewpoints they have to alternate between looking at, for example in complex traffic environments. Notes on the ground may not replace signage, but properly used, it can work well as a supplement to signage.