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## Urban routes and commuting bicyclists' aesthetic experiences

### **Abstract**

*This study examines whether and in what way aesthetic experience is involved in the perceived quality of bicyclists' chosen routes between their home and work. It is important to distinguish aesthetic experience from experience that is related to the influence of instrumental features. The aesthetic impact is primarily connected to features that stimulate emotional well-being when cycling. An online survey was conducted in three Nordic cities, Odense, Trondheim and Reykjavík, concentrating on cycling in different urban surroundings. The interpretation of the meanings and values associated with certain features or characteristics that influenced the commuting cyclists' aesthetic experience is based on three theoretical viewpoints: (1) the phenomenology of perception and experience, (2) urban design theory and (3) environmental aesthetic theories and methods. The last theoretical viewpoint involves the interpretation of experience of the environment into aesthetic meaning. The survey results indicate that aesthetic experience is valuable to most of the respondents and is therefore important in developing the quality of bicycle routes for commuting. Greenery, contact with the natural environment and distance from motorised traffic are the most important influences on a pleasurable aesthetic experience.*

**Keywords:** Bicycle commuting, aesthetic experience, urban design, bicycle routes, emotional well-being

### **1. Introduction**

In a city, a cycle tour between home and work provides a serial experience of changing urban spaces with different characteristics such as congested roads, calm streets, narrow paths and even vegetated parks or fields. As the cyclist moves through the different spaces, he or she senses the environment through vision, sound and smell. Mainly due to travel speed, this experience of the city from the bicyclist's viewpoint is very different from the city experienced when driving or walking (Forsyth & Krizek, 2011). Although knowledge about bicyclists' experiences might be an important criterion for the design of cycling-oriented urban spaces, little attention has been paid to this theme in academic research (for exceptions, see Fleming, (2012); Forsyth & Krizek, (2011); Marling & Jespersen, (2013). However, these studies did not focus on commuting cycling, which is found to have different needs and expectations from cycling for other purposes (Heinen, Wee, & Maat, 2010). For instance, commuter cyclists may be likely to emphasise functional issues more than people cycling for recreational purposes. In this article, the concept of aesthetics is assumed to be the key to the experience of urban space, which is an important dimension of urban design (see Carmona, Tiesdell, Heath, & Oc, 2010).

It is well known that cycling is an environmentally friendly and healthy mode of transport. Therefore, many cities are looking for possibilities to encourage people to choose the bicycle as their mode of transport instead of the car. The goal is to improve the overall liveability of the urban environment and the sustainability of transportation systems (Pucher & Buehler, 2012). Earlier studies have demonstrated that instrumental features are crucial to promoting bicycling (Abraham, Mc Millan, Brownlee, & Hunt, 2002; Heinen et al., 2010; Larsen & El-Geneidy, 2010; Pucher & Buehler, 2009; Pucher, Dill, & Handy, 2010; Tilahun, Levinson, & Krizek, 2007). Consequently, the design of a cycling-oriented urban environment has focused extensively on functional issues such as cycling facilities and networks, while the aesthetic dimension has received little attention. Although an improved aesthetic experience among cyclists on its own is unlikely to stimulate additional commuting cycling, earlier research on the functionality of cycling is important in understanding this topic.

Aesthetic experience refers to a complex relationship between a person's sensuous perception, cognitive understanding and interpretation of the physical environment, which ends with responses to subjective thoughts and feelings during the course of an experience (Cold, Kolstad, & Larssæther, 1998; Gobster & Chenoweth, 1990). Aesthetic experience is emotional and can be associated with, for example, enjoyment, but is not directly related to function. Cyclists' emotional well-being has often been associated with cycling for the purpose of recreation but has rarely been associated with commuting (Garrard, Rissel, & Bauman, 2012). Several studies have indicated that enhanced emotional well-being is an important motivation to commence and continue cycling for all purposes such as stress reduction, pleasantness, excitement, fun and enjoyment (Garrard et al., 2012; Gatersleben & Appleton, 2007; Gatersleben & Uzzell, 2007). Scenery and the experience of urban spaces have also been shown to be important parts of the quality of travelling by bike (Gatersleben & Uzzell, 2007; Skov-Petersen, Jacobsen, Vedel, Snizek, & Nielsen, 2012).

Earlier studies have suggested that, for cyclists, environmental experience is a multisensory phenomenon. In addition to vision, hearing and smelling, kinaesthetic sense is very important to cyclists (Jones, 2005; Spinney, 2006, 2007, 2009). It enables the sensory organs of one's body to sense movement in space and spatial qualities (Tuan, 1977; Urry, 2007). It is therefore important for this study to examine the sensuous perception of aesthetic experience through vision, hearing, smelling and kinaesthetic sense.

Several quantitative studies have found that certain route environments such as beautiful, green and safe environments in inner urban areas (Wahlgren, 2011) or off-street and low-traffic residential roads (Abraham et al., 2002; Tilahun et al., 2007) have a positive impact on cyclists' experiences (for all purposes). However, certain route environments can also have a negative impact, such as environments with high levels of exhaust fumes and traffic congestion (Wahlgren, 2011). Vegetation and objects in nature have been found to produce an aesthetic experience (e.g. Gobster & Chenoweth, 1990; Kaplan & Kaplan, 1989). Vegetation may have both an instrumental and a psychological function, including visual sensory benefits and symbolic aspects (Appleyard, 1980; Smardon, 1988; Ulrich, 1981, 1983; Ulrich et al., 1991).

This study examines whether and in what way aesthetic experience is involved in the perceived quality of bicyclists' chosen routes between home and work. It is important to distinguish aesthetic experience (which is emotional and is related to judgment of beauty, cf. above) from experience that is related to the influence of instrumental features (refers to function or use). An online survey was conducted in three Nordic cities: Odense in Denmark, Trondheim in Norway and Reykjavík in Iceland. The innovative method used to interpret the survey results involves connecting the participants' answers to both multiple-choice and open-ended qualitative questions to their sketches of their route, whose characteristics can be viewed in Google Street View.

The structure of the article is as follows: Section 2 presents a relevant theoretical background for interpreting the meanings and values associated with certain features that influence commuting cyclists' aesthetic experience. In Section 3, the methods used in the study are explained. Sections 4 and 5 present and discuss the results of the online survey. Section 6 presents the concluding remarks.

## **2. Theoretical background**

Aesthetic experience is a process that starts with stimulus input through the senses (sensation) and is continued by a complex process of cognitive understanding and interpretation of the stimulus input (perception) (Carmona et al., 2010). The process ends with an evaluative judgment of the perceived feature(s) of the environment and/or aesthetic emotion (e.g. feeling of pleasure) (Markovic, 2012). The meanings and values that a person might associate with

certain features or characteristics within the environment can influence aesthetic judgment (Gjerde, 2010). Aesthetic judgment encompasses a wide range of emotional and critical responses that can go from extreme pleasantness to unpleasantness (see Russell, 1988). In this article, aesthetic features refer to aspects of the physical environment that prompt aesthetic emotion(s) and are thus aesthetically appreciated. Aesthetic experience can be induced by both pleasurable and displeasurable features (Markovic, 2012). Aesthetic emotion is, however, basically positive (Markovic, 2012).

The interpretation of the meanings and values associated with certain features or characteristics that influence commuting cyclists' aesthetic experience is based on three theoretical viewpoints. The first involves the phenomenology of perception and experience. This phenomenology gives an insight into what could affect individual opinions about the meanings or values of certain features, such as those with aesthetic meaning. Perception is not a passive background but a dynamic background that can change (Dahlberg, Drew, & Nyström, 2001) and be influenced by learning, memory and expectations (Goldstein, 2007).

The second theoretical viewpoint involves urban design theory. Its focus is on the different physical elements of urban space and how their composition and interrelationships at any time constitute the characteristics of urban space. Travel speed affects the manner in which these characteristics could be perceived visually.

The third viewpoint concerns theories within the field of environmental aesthetics (Nasar, 1988) that are relevant to the interpretation of features in terms of aesthetic meaning. Specifically, it considers the instrumental values that influence the aesthetic experience (Heath, 1988), symbolic aesthetics (Lang, 1988) and the notion of distance (Berleant, 1988). Symbolic aesthetics have an associational meaning in which the environment gives people pleasure (Lang, 1988). The *participatory* landscape in the proximity of the observer and the *visual* landscape at a distance that primarily has a visual meaning are quite different modes of experience (Berleant, 1988). Heath's (1988) hypothesis is that instrumentally influenced behaviour will inhibit an aesthetic response, while behaviour that seeks experience will permit or even enhance it. Heath (1988) based his hypothesis on Maslow's (1943) hierarchy of needs, in which cognitive and aesthetic needs are considered the least urgent. Earlier studies have demonstrated how instrumental facilities promote bicycling, but how aesthetics affect it is not as obvious. There seems to be some overlap between the two, implying that Maslow's (1943) hierarchy of needs is not fully applicable here.

A verbal scaling system developed by Russell and Pratt (1980) and Russell (1988) has been applied in this article to systematise the cyclist's aesthetic judgment of the different environments. This approach is based on persons' judgments of places using adjectives, which Russell (1988) called "affective appraisals". To find a place pleasant, disgusting, stressful and so on is to attribute to that place an affective evaluation of quality, using words that describe its components. The verbal scaling system is proposed with a circular order, the relevance of which was further supported by a factor analytic study (Russell, Ward, & Pratt, 1981). According to Russell (1988), the terms for the affective qualities of places are systematically interrelated. The network of these interrelationships can be described using a diagram that Russell calls a *spatial metaphor* (Figure 1). Its base consists of two bipolar dimensions. The horizontal axis ranges from extreme unpleasantness through a neutral point to extreme pleasantness. The vertical axis concerns the arousing quality of a place and ranges from sleepy to extremely arousing. Figure 2 shows how Russell (1988) located forty descriptors of environments within the diagram shown in Figure 1.

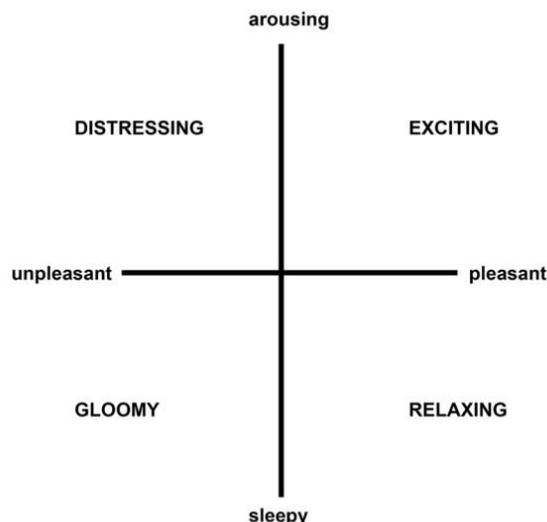


Figure 1: A spatial representation of descriptors of the affective quality of environments (Russell et al., 1981).

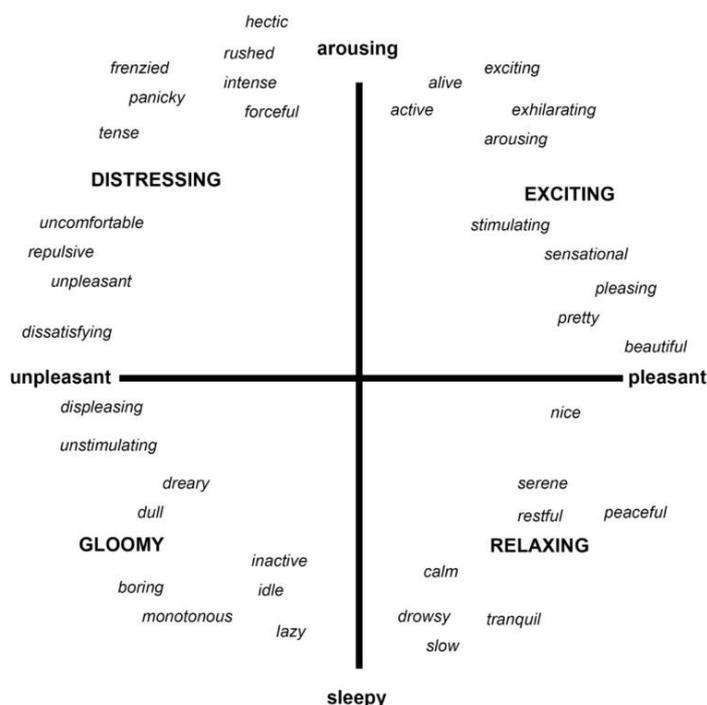


Figure 2: Russell's (1988) descriptors of the affective quality of the environment located in the diagram of Figure 1.

### 3. Methods

Three medium-sized Nordic cities were chosen as cases to study: Reykjavík, Trondheim and Odense. Within the three cities, companies were selected and invited to participate in an online survey in the summer and autumn of 2011.

The chosen companies were located within about 3 km of the inner city centre. The areas where the companies were located differed in their environmental characteristics such as proximity to the city centre, proximity to natural landscapes and greenery and proximity to traffic-dominated roads and streets. The companies were of different sizes and represented both

big institutions and firms with few employees. Their workforce included middle-class employees and persons with higher education.

The three cities were used to compare the importance of aesthetics for commuting cyclists between cities with different bicycle cultures. The different percentages of cycling in the three cities were assumed to reflect differences in the cycling culture. The percentage of cycling, measured as shares of the total number of trips, was lowest in Reykjavík (4%, Capacent\_Gallup, 2011). The percentage of cycling in Trondheim (7%, Trondheim\_kommune, 2010) was rather low compared to that of Odense (25%, DTU, 2011).

For the purpose of ensuring minimum participation in the survey, the companies chosen in Reykjavík and Trondheim had participants registered in the "Cycle to Work Competition" project ("Hjólad í vinnuna [Cycle to work]," ; "Sykle til jobben [Cycle to work],"). It proved to be more difficult in Odense than in the other two cities to find companies willing to participate in the study. Therefore, companies in Odense were not limited to participants of the "Cycle to Work Competition" project. An email was sent to a contact person in each company with a request to send information regarding the survey to all employees. In some bigger companies or institutions, the survey was announced only on a webpage.

The survey questions were formed in relation to three main themes: (1) background questions, (2) questions related to the importance of various physical features in respondents' commuting routes and (3) questions about the best and worst parts of the route. The first two themes included 22 multiple-choice questions, and the third theme included three open-ended questions. In the background questions, respondents were asked about their former cycling experience, travel routines, frequency of cycling and reasons for choosing to cycle to and from work (see also Section 2 about the influence of lived experience on cyclists' opinions of which features may have aesthetic meaning and how). Respondents were also asked to rate their route from 1 to 6 (6 being the highest) in terms of how good they thought their route was. In the first two open-ended questions, respondents were requested to describe the street and the parts of their route that they liked and disliked the most when cycling. They were also asked to describe briefly the reason for their replies. In the third question, they could comment on additional important aspects regarding their choice of route.

In addition to answering the questionnaire, respondents were asked to make a sketch of their most frequently used bike route between home and work. This was done using an online program, "WalkJogRun.net" (WalkJugRun.net), which is linked to Google Earth. The sketches were linked with the answers of the individual participants. The benefit of this method is that the bicyclist's attitude towards the environment, as well as his/her experiences, can be viewed in context with the sketch. The link to Google Earth made it possible to discover the characteristics of the routes using the "Street View" function. This is available for most streets accessible to cars in the case cities.

#### 4. Results

In Odense, 12 companies participated in the survey. Eight companies participated in Reykjavík, and nine participated in Trondheim. In Reykjavík, 141 people completed the survey; the corresponding numbers in Trondheim and Odense were 82 and 51, respectively. Altogether, 276 respondents (123 women and 151 men) completed the survey in the three cities. A total of 109 respondents completed the drawing of their route.

Sections 4.1 and 4.2 present the results of the multiple-choice questions. Replies to open-ended questions about the best and worst route sections and the reasons for these opinions were the focus of the interpretation of the survey data. A summary of the results from open-ended questions is presented in Section 4.3. All text related to the survey and quotations were translated from the various Nordic languages by the author. Section 4.4 examines how the

respondents judged the different features (see also Section 2 about aesthetic judgment) of the best and worst route parts, using Russell's (1988) diagram of affective qualities.

#### ***4.1. Characteristics of the respondents***

The majority of the 276 survey respondents were middle aged and were frequent cyclists. In Odense, only 10% of the participants were under 30 years of age; the corresponding percentages in Trondheim and Reykjavík were 9% and 5%, respectively.

The cyclists in Odense used their bikes more often than the cyclists from the two other cities, especially in the wintertime. Other employees (non-cyclists or infrequent cyclists) of the companies that participated in the study showed limited interest in cycling.

In all three cities, the most common reason for cycling to work was related to fitness and lifestyle. Many participants also indicated that they cycled because it was environmentally friendly. Involuntary reasons for choosing the bike were seldom cited. The financial crisis in Iceland might have caused at least some participants in Reykjavík to say that they biked to save money. In general, a slightly larger number of men cycled to work than women. Their reasons for cycling to work included the following: (1) they did not have access to a car or parking at work, (2) to save money and (3) it takes less time.

#### ***4.2. The importance of attractive scenery and preferred elements***

The respondents were asked whether attractive scenery while cycling to work mattered to them. Attractive scenery proved to be very important to almost half of the respondents and somewhat important to one third. It was slightly more important to women than to men.

The respondents were asked which of the following elements in the environment they would prefer to experience while they bike to or from work: moving cars, quietness, view, buildings, vegetation/trees, pedestrians or other cyclists. Vegetation/trees was the most favoured feature by far in all three cities or for 46% of the participants. Slightly more than one fifth (22%) of the participants in all cities thought quietness was the most important feature of their experience. Altogether, 16% of the participants in all cities thought the view was the most important feature of the experience. Vegetation/trees was the most important feature to the respondents in Odense, and quietness was the least important to women in Odense.

#### ***4.3. Best and worst parts of the routes***

A total of 194 participants answered the qualitative open-ended question about the best part of their routes, while 192 answered the question about the worst part of their routes. The answers were divided into two groups by theme. One group included answers that were clearly related to aesthetic features, while the other group included answers related to instrumental features (see also the discussion in the introductory section about the importance of distinguishing between different kinds of experiences). The answers in the aesthetic group included descriptions of the best or worst parts of the route. In this group, the respondents' evaluation of environmental quality or disadvantages was based on visual perception, hearing or smell. In the instrumental group, the quality of different parts of the route was evaluated based on instrumental or functional qualities or the lack thereof.

For about half of the respondents in all three cities, the perceived best part of the route was related to aesthetic features (with about one fourth citing both aesthetic and instrumental features). About one fifth of the answers about the worst part were related to features that produced negative hearing and smelling sensations. However, comments about the worst parts of streets were most often related to the lack of instrumental qualities such as safety or the presence of too many forced stops because of traffic lights.

Participants in Odense seldom mentioned particular streets or parts of streets as the best or worst parts of their routes. They most often described general characteristics such as "the

most quiet and greenest,” “forest path” and “the most beautiful route, a good start of the day.” A female participant in Odense considered the best part of her route to be the first part, which goes through a small forest area in her neighbourhood. For her, the worst part was “the long part where the bike path follows a very busy road, which is very open to wind and weather.” A male participant in Odense described the best part of his route with the words “forest, beautiful and sheltered” and the worst part with the words “big road, noise and exhaust fumes”. These comments describe stimulating aesthetic features as well as negative experiences for the senses. The affective appraisal “beautiful” described the forest, which also had the instrumental quality of being sheltering.

In Reykjavík and Trondheim, participants mentioned most often specific places, areas or streets as the best or worst parts of their routes. The best parts in Reykjavík were mostly along the coast, through green valleys that stretch from the fringe areas as well as small parks in the inner city. In Trondheim, closeness to the Nidelva River was found to be particularly attractive in addition to paths along vegetated areas. All these route parts are away from roads and streets with motorised traffic. In all the cities, residential streets and other calm, vegetated streets were mentioned a few times as the best parts of the routes because of the benefits of vegetated and quiet streets with little or calm traffic. Trails separated by trees from traffic roads were also appreciated in all the cities. Comments on the worst places involving negative sensual experiences concerned a car-dominated environment. These common features of the best and worst route parts are exemplified in the following subsections.

Section 4.3.1 describes the features that were shown to stimulate the respondents' aesthetic experience. Sections 4.3.2 to 4.3.5 explain the themes that were most important to the respondents' route environment. Each of the section headings reflects the most important themes. Additionally, results about the correlation between instrumental and aesthetic qualities are presented in Section 4.3.6.

#### *4.3.1. Stimulating and negative features for aesthetic experience*

The aesthetic features (aesthetically appreciated features, see Section 2) that were related to the best parts of the routes included quietness, vegetation and closeness to natural elements. Distance from heavy traffic was also important. This was the case for all three cities. Quietness is linked with hearing, while beauty relates to the visual sense, although it could also be connected to other senses. The absence of motorised traffic was described several times as an important reason for participants' selections of the best parts of their routes. Sometimes, it was not clear whether the participants' usage of words was related to safety or whether the proximity to motorised traffic was related to negative sensual experiences.

#### *4.3.2. Lack of aesthetically stimulating features in a car-dominated environment*

Comments about the worst parts of the routes concerned closeness to motorised traffic, pollution and noise. An environment that could be interpreted as lacking aesthetic quality was sometimes described as “boring” or “ugly”. A female participant in Reykjavík wrote the following: “Passing the mall is ugly; the boring concrete environment is totally designed for cars, but not people. The same is the case for bicyclists, pedestrians and the people stepping out of cars and walking to the mall.” She stated that the best part of her route was “along bicycle paths in green areas. It is quiet and beautiful.” She added that it would be “much more fun to bike where ... routes with good scenic views were available.” The affective appraisal “boring” refers to the human-made environment constructed with concrete, which she obviously connected to the absence of a pleasurable visual experience. She seemed to consider greenery as stimulating to the visual sense and the separate path away from the main road as an opportunity to avoid unwanted noise.

Figure 3 shows the worst part of the route for another female respondent in Reykjavík along the road Hringbraut. She wrote, “There is much traffic and it is not specifically enjoyable.” The worst parts of the route mentioned by the other participants are presented in the following sections, as parts of the sequence of changing urban spaces.



Figure 3: The worst route parts are dominated by urban spaces designed for car traffic.

- a The new Hringbraut in Reykjavík.
- b–c The junction of new Hringbraut and Njardargata.
- d Along the new Hringbraut.

#### 4.3.3. Routes through inner-city parks and calm streets: Short break from motorised traffic

In the inner city of Reykjavík, people frequently mentioned urban parks as the best parts of their routes. The participants described these parks as quiet, beautiful places that are close to the water and have greenery inhabited by singing birds. They are far from motorised traffic or have calm traffic. A young male participant who bikes in the inner city said that the best part of his route was along “Reykjavík city lake. It is a beautiful place” (see Figure 4). An elderly woman said that the best part of her cycling route was through the city park Hljómskálagardurinn: “This route has, at the same time, a beautiful environment and limited car traffic.”



Figure 4: A route in Reykjavík through an inner-city park.

- a Entering Hljómskálagardurinn from the bridge with a view of Reykjavík city lake.
- b Path along the Reykjavík city lake.
- c Cycling alongside the lake on the street Lækjargata.
- d Intersection with traffic lights in Lækjargata.



Figure 5: A route in Odense through a cemetery.

- a–b Sønder.
- c J.B. Winslows Vej.
- d Heden.

Calm and vegetated streets were mentioned a few times as the best parts of the route. A female participant in Odense wrote that the best part of her route was the street “Heden, because it is the most quiet and the greenest” (see Figure 5d). The map shows that Heden is a street that passes through a cemetery. Meanwhile, the worst part of the route for a female participant in Odense was “along Sønder Boulevard, because it has heavy traffic and several traffic lights” (Figure 5b). Sønder Boulevard has a bicycle track separated from car traffic, which seems to be of good quality from an instrumental viewpoint. Therefore, it is likely that the amount of traffic affected the participant's emotional well-being. She rated this route as bad. Sønder Boulevard, regarded as the worst part of the route, constitutes about half of the total route length of 2.6 km. Heden constitutes only a small part of this route.

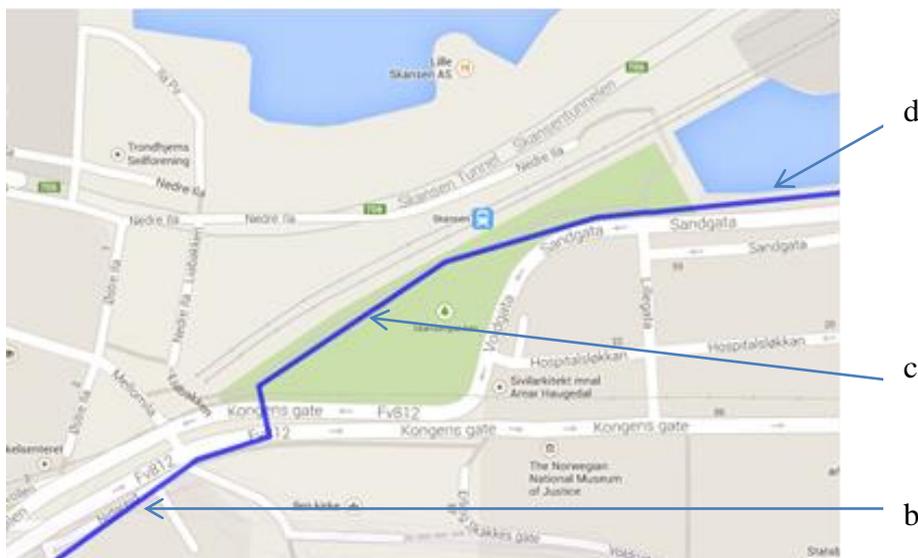
As in the other two cities, the best parts of the routes in Trondheim were frequently associated with moving away from motorised traffic into a more vegetated and quiet environment. Figure 6 shows a part of the 7.4-km-long route cycled by a female respondent who said the best part of the route was when “passing Skansen, along the path through the green area”. This respondent cycles through the park instead of along the street. She rated the route as medium (3). The best part, at Skanseparken, constitutes only a small part of the route. In connection to the relatively low rating, it should be pointed out that the rest of the route is not similar to the worst part or the best part.



Figure 6: A route in Trondheim through a small park.

A part of the map of the route in Trondheim is shown above. The lowercase letters show the location of the photos below.

- a Along Byåsveien. The characteristics shown in the figure are typical for a large part of the route.
- b Along Ilevollen.
- c Through Skanseparken.
- d On a path along Sandgata with a view of the harbour.



#### 4.3.4. Trails separated by trees from traffic roads

Short distances from heavy traffic and the presence of vegetation can be enough to change the experience from an overwhelming traffic environment to an aesthetically pleasing environment. Such places were mentioned several times in the survey. A female participant from Reykjavik described the best part of her route as “on a path along Sudurlandsbraut. I like it because the path is separated from car traffic by trees and a small green area along the path” (see Figure 7).



Figure 7: Part of the route along Sudurlandsbraut in Reykjavik.

*a* Cycling alongside the motorised traffic.

*b–c* Near the part where trees separate the path from the motorised traffic.

*d* Cycling in another urban space away from motorised traffic.

A similar example is the route of a male participant along a traffic road in Odense. The best part of his route was “Niels Bohrs Allé – a natural trail runs along it so you can avoid traffic and traffic lights.” It is not clear whether “natural trail” means closeness to nature or whether avoiding traffic and traffic lights is the reason it was considered the best part. The participant rated his overall route as very good (5–6). Many other answers in the survey indicated that route quality had a relationship with both aesthetic and instrumental features. The trail along Niels Bohrs Allé (see Figure 8a, 8b and 8c) clearly meets the preferred aesthetic qualities frequently mentioned by the participants: greenery, quietness and distance from noise and pollution. Other parts of the route also have qualities assessed by the author to be similar to that of the natural trail by Niels Bohrs Allé, but they were not mentioned by the participant. These parts, together with Niels Bohrs Allé, constitute a large part of the route. The worst part of the route was at a particular place at the junction of Munke­rudsvej/Rødegaarsvej (Figure 8d). It received a poor evaluation because of the slow traffic lights and heavy traffic. Slow traffic lights clearly had an effect on the instrumental quality of the route, while heavy traffic could have both an instrumental and an aesthetic meaning.



Figure 8: A route in Odense separated from motorised traffic by trees.

- a–c The trail by Niels Bohrs Allé.
- d The corner of Rodegardsvej/Munke­rudsvej.

#### 4.3.5. Closeness to nature and green paths in the urban fringe

In the fringe areas of Reykjavík, the green valleys of Fossvogsdalur and Ellidaárdalur were frequently mentioned as the best parts of the routes. Routes along the coast were mentioned several times as the best route parts because of the view. One respondent also considered the sound from the sea as pleasant. What these routes have in common is that they include qualities that were regarded by participants from both instrumental and aesthetic viewpoints. These routes are green, long and continuous, have few or no crossings and are far away from motorised traffic, noise and pollution. A female participant described her route, which passes through Fossvogsdalur and along the coast, as a “good place to think and watch a beautiful environment

on the way.” Ellidaárdalur was also considered a beautiful place where people could experience nature and the seasons better than when driving. The main reason for selecting Fossvogsdalur (Figure 9) as the best part of the route was best expressed by a female participant, who said that it was a “beautiful area and away from car traffic.” She rated the route as very good. Notably, the best part of the route constitutes a very large part of the total route length.

In Trondheim, the best route parts in the urban fringe were, as in Reykjavík, often along paths in natural and vegetated environments away from motorised traffic. In addition, the best part of the route in Trondheim was frequently identified as the stretch where the cyclist crosses or comes close to the Nidelva River. The river runs through the middle of the city, down to the fjord adjacent to the city centre. Many of the respondents need to cross the river on their way to and from work. Some of the bridges are used mainly for motorised traffic, but others allow only pedestrians and bicycle traffic. The bridges that were mentioned as the best parts of the route are those that do not have motorised traffic (see Stavne Bridge in Figure 10). The landscape around the river is easy to cycle through, as it is the flat part of the city that collects the water from the surrounding hills. The area was found to have a beautiful view of nature and far from motorised traffic.



Figure 9: Example of the best part of the route in the urban fringe in Reykjavík.  
a–d Bike path through the 3-km-long valley Fossvogsdalur in Reykjavík.



Figure 10: Passing the bridge at Stavne in Trondheim.

#### 4.3.6. Route choice and instrumental/aesthetic qualities

Several answers to the open-ended questions on issues related to route choice clearly described the importance of the instrumental and aesthetic qualities of the available routes. A male participant in Reykjavík stated that the most important factor in route choice is “safety and health”. He explained,

Ideally, I would like to be able to cycle farther away from the main roads because of dust and soot emissions. I have tried to find such routes, but they have disadvantages. There are wonderful small parts ... but it's not easy to connect them to the cycling route network.

Although he preferred the aesthetically pleasing routes, he could not choose them because of instrumental reasons, i.e. they did not fit into the infrastructure network. Another participant said that he chooses a route in the winter that provides shelter, although it is not aesthetically attractive. Wind and shelter are important factors for participants in Reykjavík and Odense.

A female participant from Odense said she preferred “as little pollution from cars as possible. But because the route I prefer to ride is a field track, I can only ride this path if the weather permits.” Another female participant said, “I do not avoid things. I take the route that allows me to get quickly to and from work, but it would be great if that route was nicer. There is too much traffic on my route.”

Some participants in Trondheim described how the hilly terrain in the city affected their choice of route. The best part of one female participant's route was the “Tyholt area, because this is the flattest part ... and, at the same time, it is very nice there.” Even if the terrain was the main influence on her choice of route, aesthetics were also important for evaluating the quality of the route.

#### 4.4. Aesthetic judgment of environmental features

To systematise and interpret how the respondents judged the various features from an aesthetic viewpoint, affective appraisals were abstracted from the bicyclists' descriptions of the best and

worst parts of their routes in their qualitative comments. The affective appraisals indicate where the linked physical features (affective quality) are placed in a modified Russell-type diagram (Figure 11), which represents a summary of the most frequently mentioned physical features related to aesthetic experience.

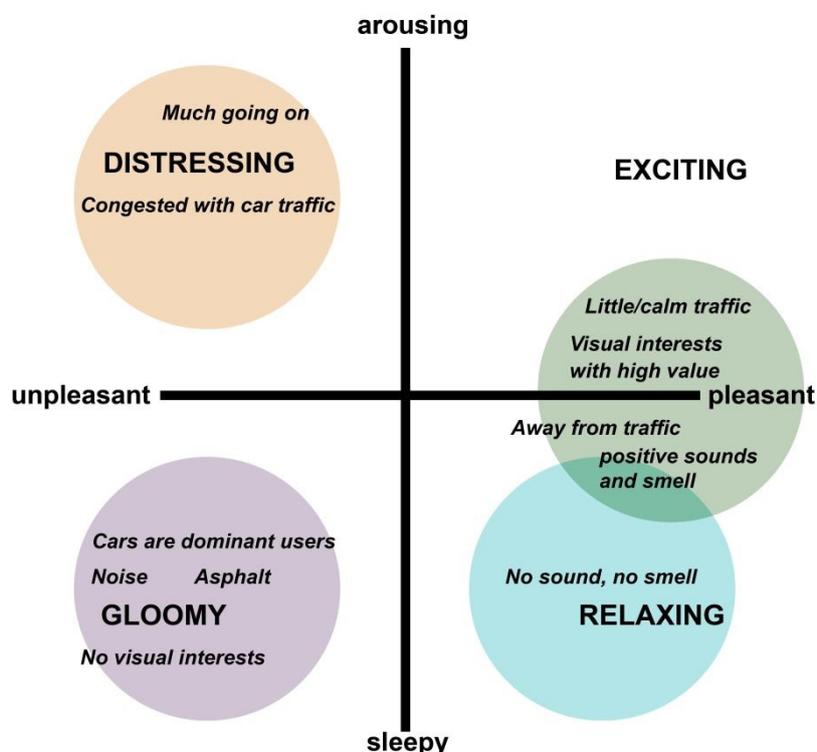


Figure 11: Modified Russell-type diagram. A summary of the most important physical features of the urban space for the aesthetic experience

The cyclists' choices of the best and worst streets show that the best streets have features associated with the categories "pleasant" and "relaxing", while the worst streets have characteristics associated with the categories "distressing" and "gloomy". A "gloomy" environment lacks stimulating aesthetic features; here, cars are the dominant users. This environment was described as boring and grey, with no visual interest. A "distressing" environment is congested with vehicular traffic and characterised by intensive activity. No environment fell under the category "unpleasant", most likely because the cyclists may have avoided routes that they found unpleasant. The most preferred environment, "pleasant" and "relaxing", includes the most preferred element, i.e. vegetation. It is also quiet or may have stimulating sounds and smells.

## 5. Discussion

### 5.1. The influence of lived experience on aesthetically valued features

Earlier research on bicycling has shown that instrumental facilities constitute a very important part of encouraging bicycling. However, the results of the present study show that the aesthetic experience of the environment was also important to most of the participants, and attractive scenery appeared to have some or great importance. Presumably, this importance was affected by their expectations and attitudes towards their trip, which involved environmental awareness and objectives related to fitness and good lifestyle. These results are in line with those of former studies in the United Kingdom (Gatersleben & Appleton, 2007; Gatersleben & Uzzell, 2007)

and Australia (Garrard et al., 2012). It should be noted that outdoor activities in a natural environment are deeply embedded in the Nordic culture. With another group of participants, such as immigrants, the results might have been different. The results do not indicate how the aesthetics of the environment influence non-cyclists or infrequent cyclists because this group showed limited interest in participating in the survey. Further research is needed to elucidate this issue.

## **5.2. Features with aesthetic meaning**

Vegetation was the element that most respondents in all three cities preferred to experience when bicycling. The appreciation of the natural vegetation structure is in line with the findings of earlier studies. The roles that urban vegetation plays with respect to human perception of the urban environment have already been discussed (e.g. Appleyard, 1980; Smardon, 1988; Ulrich, 1981, 1983; Ulrich et al., 1991). The role of urban vegetation along roads was also discussed in a review by Smardon (1988). As the opposite of an environment characterised by vegetation, urban spaces in which motorised traffic and concrete buildings form an oversized grey asphalt landscape were considered boring by several cyclists.

Three theories within the field of environmental aesthetics were used to interpret and discuss the aesthetic meaning of the features mentioned by the respondents: (1) the theory of symbolic aesthetics (Lang, 1988), (2) the theory of instrumental determinants/aesthetic experience (Heath, 1988) and (3) the notion of distance (Berleant, 1988). The results from the viewpoint of these three theories are discussed in Sections 5.2.1 to 5.2.3.

### *5.2.1. Symbolic aesthetics*

Only a few comments in the results revealed viewpoints that can be related to symbolic meaning. The overwhelming priority given to private cars was reflected in the character of the environment, the amount of motorised traffic, the size of the infrastructure reserved for cars and the constructed environment. All these symbolised the priority given to motorised vehicles and reflected how unwelcome other transport modes are in this environment.

A female participant in Reykjavík described the worst part of her route, which follows Hringbraut (Figure 3), as follows: *“there is much traffic and it is not specifically enjoyable.”* Another wrote that the environment surrounding the mall was an ugly and boring concrete environment, designed for cars but not for people. These comments clearly reflect the lack of aesthetic stimuli in the minds of these cyclists.

The aesthetic experience that trees and other vegetation can offer might play an important part in achieving mental restoration on the way to and from work for some of the respondents. For example, a woman in Reykjavík said she liked the green route through Fossvogsdalur and along the coast because it was a *“good place to think and watch a beautiful environment on the way.”*

### *5.2.2. The notion of distance to potential aesthetic features*

Another viewpoint of an aesthetic experience reveals the differences between an aesthetically stimulating environment and a discouraging environment for commuting cyclists. This viewpoint can be explained with the notion of distance (Berleant, 1988). A comparison of the routes in Reykjavík shown in Figures 3 and 7 provides insights into the differences between the nearby *participatory* landscape and the *visual* landscape at a distance. Figure 3 shows a route along the large trafficked road Hringbraut. Figure 7 shows Sudurlandsbraut, including a bike path a few metres away from motorised traffic and separated by trees and a small green area. Niels Bohrs Allé in Odense (Figure 8) and Skanseparken in Trondheim (Figure 6) are similar examples in which a barrier of vegetation separates the cycling path from the trafficked road and provides a division between the urban space of the bicyclist and the motorised traffic. The

route along Hringbraut (Figure 3) follows a very large and open urban space and includes a *visual* landscape at a distance, but it has no protective and nearby *participatory* landscape within it. This urban space is not designed for the rather slow cycling speed that allows a detailed experience. The rhythm of changes occurs slowly in this large urban space. At a close proximity, there is little to experience other than the closeness of motorised traffic, pollution and noise. By dividing this urban space with a row of trees, the cyclist riding the path becomes part of another urban space on the opposite side that could be described by the concept of a *viewshed*, as shown by the examples in Figures 6, 7 and 8. It is generally accepted that urban vegetation is usually ineffective in blocking unwanted noise (see Smardon, 1988), but it helps mitigate the physiological effects of noise by visually screening the adjacent source of noise.

### 5.2.3. Instrumental determinants/aesthetic experience

The results of the survey support Heath's (1988) hypothesis regarding instrumental determinants. This means that a satisfying instrumental quality is a precondition for the choice of an aesthetically pleasing route. One's preference, however, is not always the same as what one actually chooses. A preference is more about what makes the person satisfied. Route choice always involves an evaluation of many factors; the chosen route is the best overall alternative among those available and is related to the cyclist's personal attitudes at a particular time. For example, a female participant in Odense said that the route she prefers to cycle is a field road, but she can only ride this path if the weather permits it. Her comment reflects an instrumental quality, the quality of the surface of the field road, which is a precondition for her to bike this path, even though she prefers it based on her aesthetic point of view. The survey results contain several similar examples. A male participant in Reykjavík said he would like to be able to cycle farther away from the main roads because of dust and soot pollution. Aesthetically pleasant features would please him more as a cyclist, but because the instrumental conditions for bicycling have not reached a satisfying level at the "*wonderful*" places, he cannot use them.

### 5.3. Reflection on the method used

Respondents evaluated and explained the qualities and disadvantages of the routes they most often cycled between home and work. The linkage of the individual participant's answers to the questionnaire and his/her route drawing was very useful in understanding how aesthetic experience was involved in the perceived quality of the bicyclist's chosen route between home and work. Background questions on lived experience gave information about possible influences on the individuals' opinions. Open-ended questions were particularly useful, and the choice of the best and worst parts of the routes forced the participants to describe the features that stood out in their experience of their route environment. Google Street View made it possible to look closely at the route environments and the best and worst parts of the routes. However, the street view is usually only available for streets where it is possible to drive a car. The best route parts were frequently through paths that were not shown in Google Street View. The researchers therefore had to visit some of these places during the study. Google Street View can be very useful for environmental studies. Further studies in this field can add the street view for paths that have no motorised transport. Complications related to making the drawings of the cycling route may have reduced the number of participants that completed the survey.

Participants in Odense who provided descriptions of the best and worst parts of their routes and related them to their aesthetic experiences did not necessarily present drawings of their routes. They seldom mentioned particular streets or parts of streets as the best parts; instead, they described the general characteristics of the best and worst route parts. This might be due to smaller contrasts in the urban spaces in Odense compared with the two other cities. This made it difficult to locate the best and worst parts of the routes on a map.

The theories applied to interpret which of the perceived features could have aesthetic meaning were useful and gave logical answers to the research questions. The theory of symbolic meaning was useful in interpreting how associational meaning in the environment influenced the respondents' experiences. The theory of instrumental values gave insight into how such values affected aesthetic experience. The notion of distance revealed how nearby elements were perceived differently from those that are far away.

The verbal scaling system by Russell (1988) and Russell and Pratt (1980) was found to be appropriate for this study. It was used to abstract affective appraisals and their linked components (physical features) from the open-ended questions. The Russell (1988) diagram was applied to systematise the results. Daniel and Ittelson (1981) criticised this method because it was derived from responses to colour photographs, not real environments. They believed this could mask the specific effects of environmental features. In this study, however, participants responded to real environments and described their experiences in their answers to open-ended questions.

## 6. Conclusion

The results of this study show that aesthetic experience was important to most of the commuting bicyclists. The aesthetic experience made an important contribution to the quality of bicycling routes in all three cities considered in the study. Vegetation and proximity to the natural environment were the most important aesthetically pleasing features. In the inner city, bicycle routes running through urban parks or routes that were separated from motorised traffic by trees or green areas were contributing factors to an urban design that can stimulate commuting bicyclists' aesthetically pleasing experiences. To stimulate an aesthetically pleasing experience during long-distance bicycling from urban fringe areas, continuous green structures were important. In general, proximity to traffic seemed to be the most negative factor affecting cyclists' emotional well-being. The cyclists wished to move away from the uncomfortable experience caused by closeness to motorised traffic and into an environment characterised by vegetation and the opportunity to experience nature, fresh air, quietness and positive sounds. The results of the survey also indicate that participants with the opportunity to experience aesthetically pleasing features during a longer part of their routes, accompanied by a continuous infrastructure for cycling with few stops, rated the quality of their routes higher than those with only brief parts with aesthetically positive features along their commuting routes.

The challenge for urban planning and design is to link routes and places with potential aesthetic qualities into a continuous infrastructure network. The results show that a satisfying instrumental quality of bicycle routes is a precondition for the cyclist's aesthetic experience. When instrumental needs are met in an acceptable way, commuters can be further stimulated by the inclusion of aesthetic features such as vegetation in the urban space.

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