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Visual Analysis of Gender Smart Mobility

Bike-sharing Schemes, Female
Entrepreneurs, and Rollers as examples

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Publishable summary

This report gives three examples on how to approach digital images in analyses of transport and mobility. It includes an analysis of a) Bike-Sharing Schemes, b) Female Entrepreneurs and gendered innovation within Biking, and c) Rollers as Gendered and Social Innovation. The images are collected on Danish webpages, as this is a biking nation and a country where rollers are widespread, and offered to needy for free by authorities. The three analyses have in each their way shown that available digital images are never neutral, but represents stories and conceptions that its viewers can respond to. In the analysis of Bike-Sharing Schemes, and in the analysis of Female Entrepreneurs, images as data material were both approached quantitatively (distant) and qualitatively (close), by questioning who were represented, how were they represented, and importantly: who were not represented (Spiering). These questions of diversity help us to map, perhaps not acknowledged excluded groups, and challenge areas to include bodies that are not slim, young, and abled, but also fat bodies, older persons, and persons who travel with a dependent. The report too includes an analysis of Rollers as gendered and social innovation, and here we suggested yet another approach to use digital images as starting point for analysis. Where the two first analyses pick out images illustrating a company's overall representation, the third analysis examines potential users' responses and associations to images of commonly known persons, who can illustrate barriers for the roller as innovation, as well as challenge the narrative of a roller user on a larger scale.

We find in the case of bike-sharing scheme companies Voi, Lime, Donkey Republic and Nextbike that overall more women were represented in graphics that the companies varied in their representation of non-white persons, and that young adults dominated the representation of bike users. This means that some of the excluded groups in the representation of imagined bike tours are elderly persons, or people travelling with a depended. A qualitative interpretation of selected images showed that the represented users at LIME, Donkey Republic, and NextBike often were young, slim, and enabled. This representation of bodies was challenged by VOI that included spacious graphics of bodies, including the fat body to be a healthy, biking body too. Especially LIME, but also Donkey Republic and VOI appealed to amusement, youth, and freedom, and though this may be attractive, the service may not reach its full potential, as it is still being marketed towards early adopters, who have freedom of choice. Transport is not a spontaneous idea for all, but requires planning for example reasoned to different family constellations (Breengaard, Henriksson, and Wallsten 2021:9, forthcoming).

In the case of female entrepreneurs, we see that Hövding, Safe+Sound, and Påhoj all contribute to gender smart mobility through social innovation. All three cases of female entrepreneurship have developed innovative solutions to everyday challenges, including a high degree of safety in traffic. These innovative solutions strengthen mobility and smart transportation - especially for women and mothers - and illustrate a greater focus on diversity when it comes to navigating easily in traffic. Traffic and transportation are commonly associated as a masculine domain but are within all three cases challenged on this assumption through the innovative contribution from women and through the inclusion of female consumers within the design and images. Despite the greater degree of inclusion, our visual analysis did show a tendency to neglect representations of elderly and non-white users. Only few images depicted such, indicating an inclusion gap and potential for greater diversity representation in the future. In general, the images illustrate great diversity when it comes to gender; both in terms of consumption, use, and safety.

In the case of rollers, we argue that smart is not always digital, as rollers be understood as gendered and social innovation. Still rollers are not a sexy or cutting-edge research topic, not even when it comes to studies of elderly and mobility of those conducted in fields of design and assistive technologies (Christensen 2021). By using the theoretical notion of scripts in combination with visual analysis and interviews, it is demonstrated how rollers, and their users are intertwined in everyday practices and how these relationships intersect with notions of age and social welfare provision (see Christensen 2021). One can argue that the roller can be seen as a simple, disruptive innovation emerging from the bottom up with contradictory scripts of gender and age. Still users understand the roller both negatively per se for example not feeling elegant, as related to norms of being a correct roller user with an upright/ rank figure, or as positively related to private socializing.

Overall digital images provide a huge amount of material for the researcher to investigate, and we encourage with these three different visual analysis researchers to use the many available images, as they are suitable for especially examining representation, dominating narratives, imagined realities and to engage with what implications certain representation may have. The images are at the same time representing and recreating conceptions and narratives, and therefore hold a great potential for change. The analyses shown in this report have further examined cases that contribute to sustainable and effective mobility solutions, and thereby contribute to understand who is included and excluded.



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Introduction

This report consists of three cases that relate to smart mobility. The cases show the emergence and growing recognition of both new designs, new forms of entrepreneurship, and gendered innovations. Gender and socio-cultural diversity are relevant factors in product design, development, and appeal to consumers. These issues have been addressed by several of scholars for example through the “Gendered Innovation” research programme at Stanford University, which accentuate the concern of ‘gender blindness’ within transportation, mobility and safety (Stanford University and European Union 2011). ‘Gender blindness’ is understood as the neglect of inclusion of diversity, thereby creating solutions which are mainly beneficial for the male population (Christensen et al. 2007:36; Christensen and Breengaard 2019:20). Newer transportation and mobility solutions have emerged, and it is therefore relevant to examine whether these modes initiate a shift towards greater inclusion, mobility, safety, and sustainability. This report will treat the visual representation of mobility solutions that are not traditionally associated with transport such as the roller¹, bike sharing schemes, and expansion of safety and mobility in traffic through helmet designs, headphones, and baby strollers/seats. The aim of the following TInnGO report is to explore how new emerging brands on transportation and mobility present and represent their products and users, and we will discuss how these representations resonates with the TInnGO Smart Mobility Indicators (Christensen and Breengaard 2019:45f).

Visual analysis has the methodological advantage of providing insights on aesthetic diversity and how sociocultural structures and expectations are produced and reproduced within images. As goes for data in general, digital images are generated within a sociocultural reality, and are therefore never neutral. By using images, we gain access to which narratives and identities are represented within the images, thereby achieving valuable insights on who is included and who is excluded from a particular brand or product. Such insights generate knowledge on existing diversity gaps and identify potentials for change in relation to achieve a greater degree of inclusion within transportation and mobility. Three types of visual analysis have been conducted using digital images from each of these case selections. The analysis departures from the following case selections:

1. Bike-Sharing Schemes
2. Examples on Female Entrepreneurs
3. The Roller

The case studies presented here will hopefully inspire to make use of the huge amount of available digital images that shape our lives and are available to research. Each case analysis contains innovative solutions related to transportation and mobility, and contributes with valuable insights on how greater diversity, sustainable and safety solutions are created, and which needs are being meet

¹ Roller is here used as meaning a walker/zimmerframe with four wheels, elsewhere also named rollator.



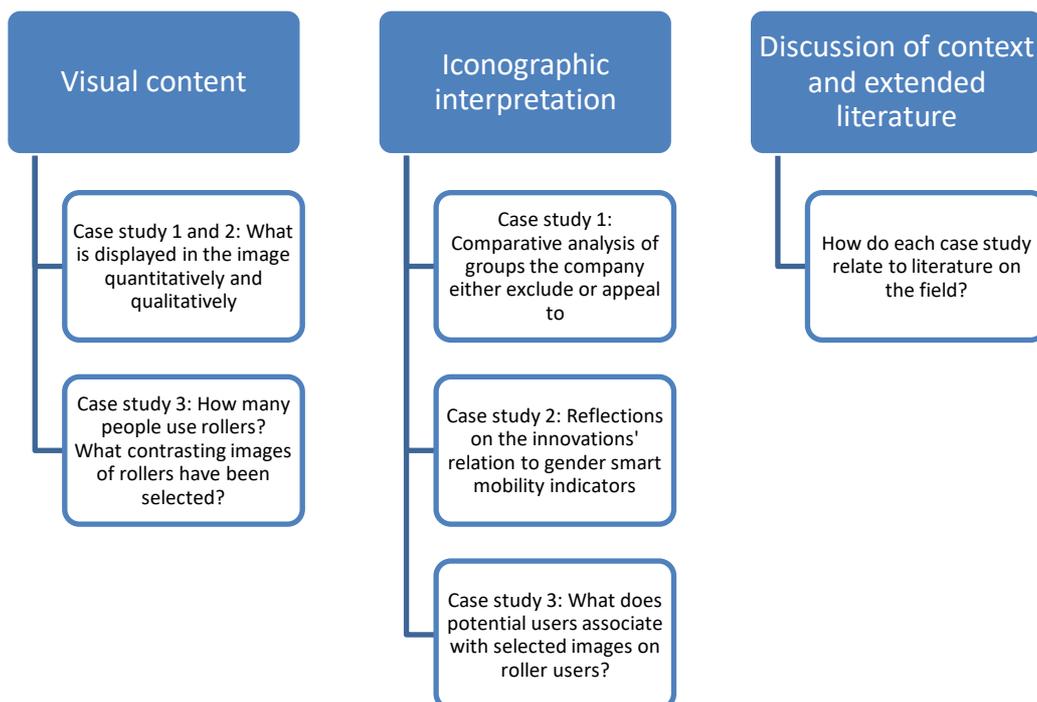
Methods

The starting point for this report is that images are never neutral nor innocent, and they do not show or mirror the world as "it is" - they rather interpret the world and represent it in specific ways, depending on who is the sender and who is the receiver, or who sees the picture. Images can both function as disciplining in the ways it forms our ideas about ourselves and the others; yet images can also create an imagined community and imagined identity which is central for the field of e-marketing. To use images as a social scholar implies an interest in what the images tells us about society (Sturken & Carwright 2009; Rose 2012; Clarke 2005; Henriksson 2014: 64). Scholars of visual analysis in social studies have both suggested handling visual material as a) Visual culture: i.e. research that analyses the content of pictures, and b) Visual research methods: Research that responds to research questions via creation or application of images as research tools. The difference between the two is that the first approach focuses on visual analysis, and the second approach analyses how people create interpret and talk about pictures.

In the following case study analyses of images, we have considered these differentiations and approached the case studies on three different paths. The case studies are in the following named as case study 1, 2, and 3.

- First case study: Bike sharing scheme companies
- Second case study: Female entrepreneurs and gendered innovation
- Third case study: Rollers as gendered innovation

Model 1: Visual analysis in three case studies



As for the first method we have focused on analysis the content of the pictures exhibited the various brands and firms. More particularly, we have been guided by a three-step model of analysis developed by social and political scientists. At the same time, we apply an explorative research design, meaning that we have tailor made the analysis of either each company or of relevant academic literature to depict and analyse particular profiles of smart bikes, gadgets, or rollers. The explorative research design can be spelled out in three steps, which we have connected into the framework of smart cars and their YouTube brandings (Doerr 2014: 430ff; Müller & Özcan 2007: 288). The three steps include the following dimensions and guidelines for looking at content and interpretation of images:

1. visual content analysis
2. deeper iconographic analysis of distinct symbols
3. connection of the two first steps with contextual analysis and use of extended data and literature.

The three steps model of how to analyse images have been applied flexible, and each case study focus on content, but have each their relevant iconographic analysis as illustrated in model 1. The third step both serves the reliability of the visual analysis and form a link to consider how the companies and social innovations in their visual representations and more broadly connects to the indicators that have been developed as part of the TINNGO Gender smart analysis.



Case: Bike-Sharing Schemes

Case study 1: Bike-Sharing Scheme Companies

This case-study will examine visualization of products and users among four different bike-sharing schemes in Europe. Bike-sharing schemes have the potential to make transport more sustainable, but the implementation of bike-sharing schemes and offers are however not user-neutral, but relates to different society groups (Böcker et al. 2020; Midgley 2009; Breengaard, Henriksson, and Wallsten 2021, forthcoming; Uteng 2019). Awareness of socio-economic factors and the representation thereof has relevance, not only for inclusiveness in transport, but also the possibility to make a sustainable impact through transport solutions. In the first analysis we will examine who bike sharing scheme companies represent, who they appeal to, and who they exclude. A total of 134 images have been manually collected from four bike-sharing schemes companies with services in Europe: NextBike, Lime, VOI and Donkey Republic. The companies have been selected as four well-known brands in the market, and considered as typical of the field (Neergaard 2010:25). Below follows a short presentation of the four firms.

Donkey Republic is a Danish company that offers 16.000 bikes in 71 different cities worldwide. The company's offer depends on the city, but can include pedal bike, e-scooter, e-bike, and trailer. However, there is no overview or images of the various products that they offer, and it is not clear in which cities they offer which products. The company announce that there are restrictions on age, when using an e-bike, but security and safety procedures are not further pronounced, for example the person in their graphic illustrations does not use a helmet. One can choose to get a monthly membership, which indicates that the shared bikes are also aimed at citizens rather than tourists. One can lock and unlock several times during a trip, and at the end, the bike should be returned at a dock-station.

LIME is an American company that offers vehicles in more than 100 cities around the globe. The company offers electric bikes, electric scooters, and electric mopeds. The company has age limitations on the use of electrical driven bikes or vehicles. They too encourage the use helmets, offer discounts and currently run a campaign, where they offer 250.000 free helmets. It does not seem however, that there any helmets available on the spot if one wishes to rent a product. The products do not have to be delivered to a dock station, but can be parked within a given area. It costs a certain amount to unlock a vehicle, and the price is hereafter running by minute.

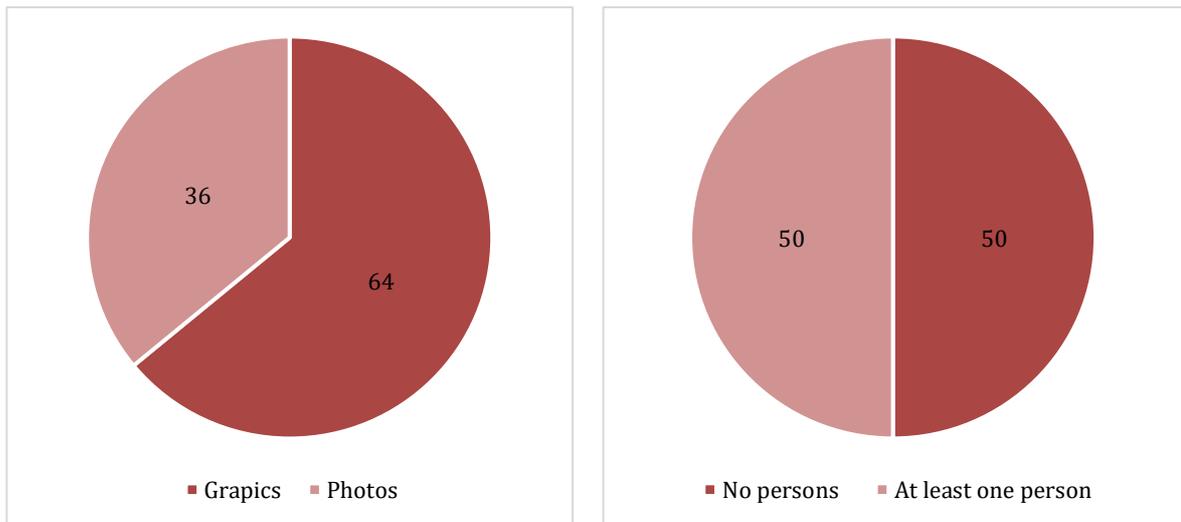
VOI is a Swedish company that offers electric scooters and bikes in 57 cities around Europe. One is allowed to park the vehicle depending on the city either wherever or in special parking zones in chosen cities, though not limited to dock stations. The company seems aware of safety and security issues, which may be wise, as electric scooters have received massive critiques (Winchcomb 2021:3). Voi offers traffic schools, where one can learn how to use an electric scooter, and some areas in the cities are marked as "low speed areas", where the vehicle automatically cannot drive as fast. One can also manually press "beginner mode", where the vehicle cannot drive just as fast as otherwise. The company do not offer a helmet when renting a vehicle either but do encourage the use of one. VOI offers a 24-hour pass or a monthly pass with a fixed fee.

NextBike is a German company which offers bike-sharing in more than 300 cities around the world. The company offers bikes that are not bound to a dock-station but can be left on whatever street within a certain area. They have some collaboration with German universities, which could indicate, that they aim at citizens other than tourists. Generally, NextBike do not offer helmets. In certain renting areas more possibilities are given, where the company offers children’s bikes and tandems, as well as pedicels and cargo bikes are used in other cities. Many of the photos and illustrations of the bicycles, show users riding the bikes without helmets.

An overview: The Images in Numbers

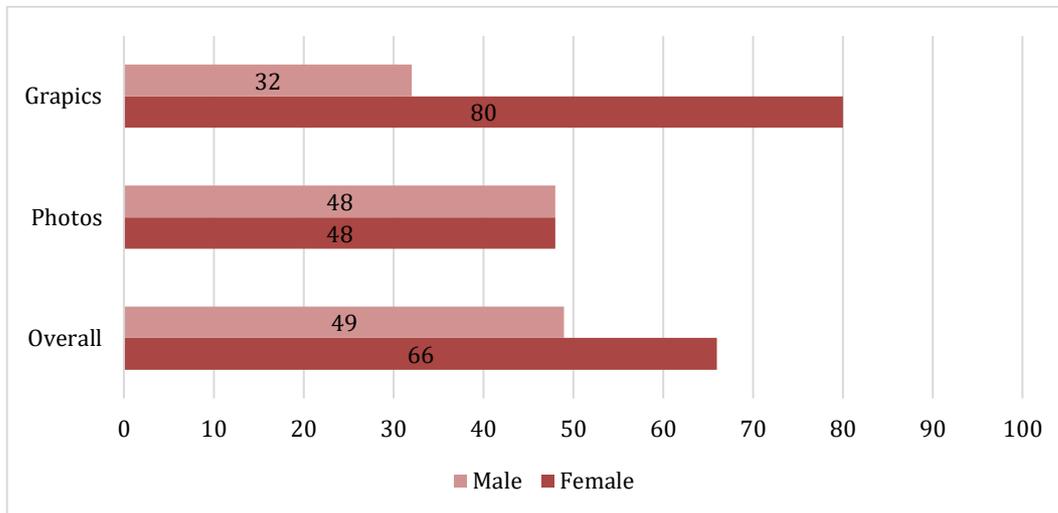
In all 130 images, both graphics and photos, were retrieved from the four webpages of the companies. The images were retrieved from the company’s Danish webpage, when available (Donkey Republic 2021; VOI 2021), and an English webpage when not (LIME 2021; NextBike 2021). If an image appeared more than once, it was counted as many times as it appears on the webpage, except the logo. Images from videos were not counted. Below follows an overview of ethnicity, age, and gender representation in the photos and graphic illustrations in the four bike-sharing scheme companies.

Figure 1 & 2: Distribution of Images



n = 130. Distribution of images in percentage.

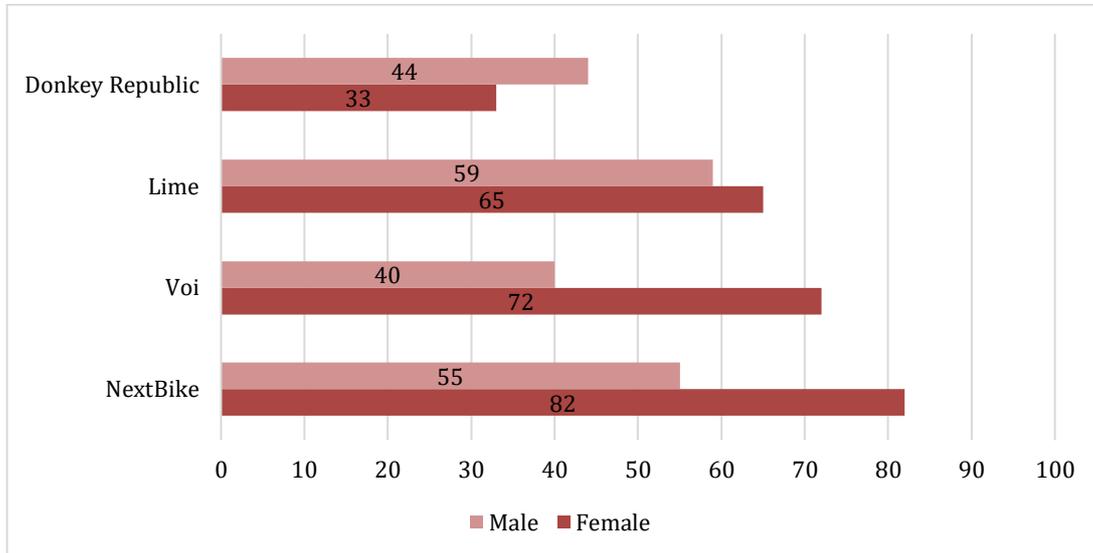
Figure 3: Gender distribution in Images with persons



The count illustrates the number of at least one person of the observed gender in an image, where at least one person is registered. The count may therefore sum to more than 100 % if more persons are counted, or less than 100 % if the gender is unclear. n: Overall = 65, Photos = 40, Graphics = 25.

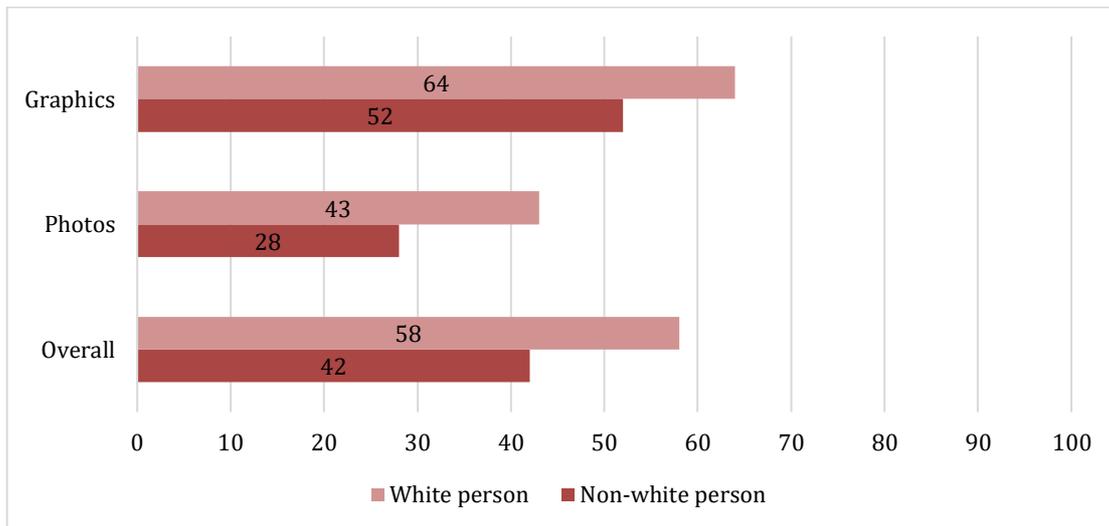
In the outline of images above it appears that there are people on half of the images. Of these, at least one woman appears in 66 % of all images, and at least one man appears in 49 % of the images. The count of photos had an almost identical share of men and women, where at least one person appeared on 48 % of the photos, where at least one person was present. The more skewed distribution is to be found in the graphics, where at least one woman appeared in 80 % of the graphics where there was a person apparent, but only 32 % with at least one man. Figure 4 shows the gender distribution in images with persons across companies. We see that images with women are represented relatively more than men in the companies LIME, VOI and NextBike. Be aware that the total amount of images is smaller when distributed on each company than all together, and in NextBike's case it shows a difference with at least one woman apparent in 9 out of 11 images with persons, and at least one man apparent in 6 out of 11 images with persons.

Figure 4: Gender distribution across Bike-Sharing Companies



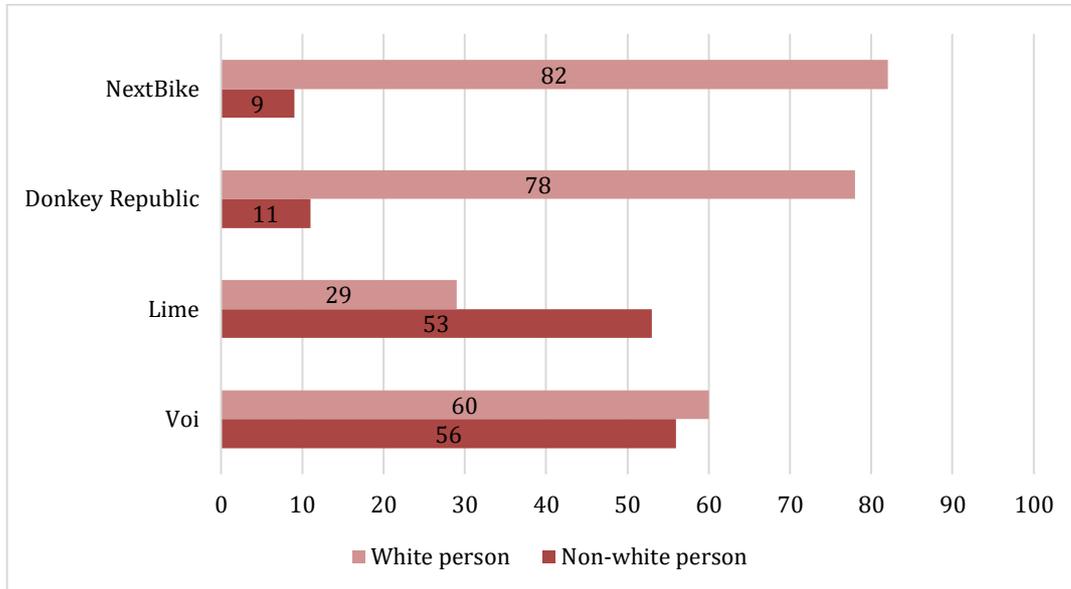
The count illustrates the number of at least one person of the observed gender in an image, where at least one person is registered. The count may therefore sum to more than 100 % if more persons are counted, or less than 100 % if the gender is unclear. *n*: VOI = 25, LIME = 17, Donkey Republic = 9, NextBike = 11.

Figure 5: Ethnicity distribution in Images with persons



The count illustrates the number of at least one person of the observed ethnicity in an image, where at least one person is registered. The count may therefore sum to more than 100 % if more persons are counted, or less than 100 % if the ethnicity is unclear. *n*: Overall = 65, Photos = 40, Graphics = 25.

Figure 6: Ethnicity distribution across Bike-Sharing Companies

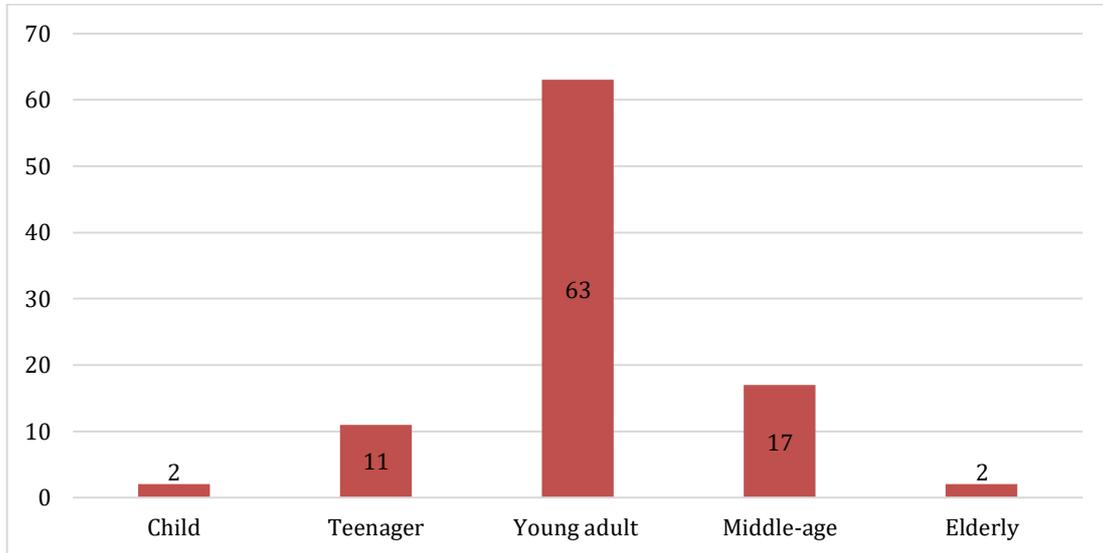


The count illustrates the number of at least one person of the observed ethnicity in an image, where at least one person is registered. The count may therefore sum to more than 100 % if more persons are counted, or less than 100 % if the ethnicity is unclear. n: VOI = 25, LIME = 17, Donkey Republic = 9, NextBike = 11.

If we look closer at the representation of ethnicity as in Figure 5, we see that at least one non-white persons is presented in 42 % of all images that contains person(s), and at least one white person is presented in 58 % of all images that contain person(s). Especially Donkey Republic and NextBike have each just one image of a non-white person, resulting in respectively 9 % and 11 % of all images with person(s).

At last, we will look a bit closer at the age groups represented in the images of the bike-sharing companies. Figure 7 shows, that young adults (around 20-39 years) were represented in 63% of the images that contained persons. Teenagers were represented in 11% of the same images, and middle-aged persons in 17 %, and children and elderly were each represented in 2 % of the images that contained persons. A fair share of the represented users was therefore centred around youth or young adults.

Figure 7: Age group distribution in Images with persons



The count illustrates the number of at least one person of the observed age group in an image, where at least one person is registered. The count may therefore sum to more than 100 % if more persons are counted, or less than 100 % if the age is unclear. n = 65.

In sum the count of the visualizations with person(s) in the images shows that there are representations across gender, ethnicity, and age. We do see however that women are more represented in graphics, and that white persons are represented in more images than non-whites. The representation of ethnicity differed across companies. At last, what really came to the eye was the repetition of youth and young adults in the images, leaving little visualization of elderly users or for example a person travelling with a dependent. With this in mind, we will now move on to the qualitative interpretation of bike-sharing images.

A Visual Analysis: Who does the Bike-sharing companies appeal to?

In the previous section we are given an overview of the statistics and the distribution of the images. All 130 images have hereafter been inspected, and a few have been selected as intensified examples of the companies visualizations (Neergaard 2010:28). It is these photos and graphics, that we will make a qualitative interpretation of in the following. The case selection of intensified examples are often used to illustrate examples that excel in a certain way without being so extreme, that the examples distorts the phenomena that one wishes to show (Neergaard 2010:28). The images interpreted are selected to give a good general impression of the visualizations made.

Graphics: The Healthy Body

We will now look at the graphics used in the four bike-sharing scheme companies. The comparative analysis will here focus on NextBike, Donkey Republic and Voi, as Lime do not have graphic illustrations with persons present. In opposition to the other bike-sharing

companies it only contains graphics where the vehicle is presented on its own, presenting the product itself as something attractive and luxurious².

Image 2: Graphic illustration, Donkey Republic.



Image 3: Graphic illustration, VOI.



Image 4: Graphic illustration, NextBike.



The three above graphics all show users of shared bikes. NextBike shows more persons in little space, many younger adults, and a single elderly. The persons are both men and women, have different ethnicities, but are all slim. No eyes are illustrated on their faces, and the cyclists appear anonymous almost as if they were a crowd. None of the cyclists use a helmet, one person gives a signal either to wave or to stop and let others pass by, which gives a feeling of a city rush with many persons, many things to be aware of and some speed.

If we look at Donkey Republic, we see an illustration of a young, white woman who uses a Donkey Bike for a spare time activity. The Donkey Bike is a very visual orange and matches the basketball that the woman uses. The graphic of the woman is simply drawn, almost like a stick

² See Image one of the product presentation of a Lime Bike at https://images.ctfassets.net/f107dq97zt0a/5fsMvVVFDbY0va3zNfcVFX/11eef7251265ace6336155f5af405aee/Group_403.png?w=1024&q=70

figure, without any curves or muscles, but as slim and active. One can see in a storyboard how the woman uses a bike to find her way to a (public) basketball dunk court, where she plays basketball by herself. The bike here fulfils a need for an active (free) lifestyle in a city.

The graphic illustrations from both Voi, NextBike and Donkey Republic shows faces that are quite anonymous. The two bodies represented in image 3 from Voi, are though quite different as the figures have spacious arms and bodies. The two persons in the graphic express femininity through small heels on the shoes of the e-scooter user, and the waving blue hair in motion from the cyclist. The image too shows a sign with a bicycle on it, which guides that the vehicles should not be used on the sidewalk. Though it appears that both the persons are moving, there are a lot of room surrounding the two bodies which gives the image a calm expression.

If we compare the three images above, we see that where NextBike and Donkey Republic both show active, biking bodies that are slim, the graphics from Voi includes bodies that are allowed to be fat but still illustrated as healthy, biking bodies. The three companies represent both bike activity as a city rush, as spare time activity, and as a civilized mode from A to B with nice transporting facilities. Here it is important to notice that the possibility for safe, spacious, and civilized travelling of course depends on the biking infrastructure in the city and country in which the user lives.

Photos: Youth, Freedom, and Adrenalin?

We will now move on and take a closer look at the photos that represent the users of the bike-sharing scheme companies. This we will do now with a focus on Lime. If we look back at the statistics across all the bike-sharing companies, what really came to the eye was the repetition of youth and young adults in the images, leaving little visualization of elderly users or persons travelling with a dependent. In the following, we will interpret how youth is presented in the Lime visualizations, and at last compare this with representation amongst the other companies. See images 5,6,7 in the links below³

In the three images, we see a young Asian woman driving an e-scooter in image 5, a young man who has parked his bike and looks out in the open sea in image 6, and a group of youngsters ready to move on each of their vehicles in image 7. The woman on the e-scooter smiles and moves on an e-scooter on an empty lane, safe from other bicyclists and drivers. The lane has no turns, which suggests that she can speed. The smile on her face, shows that the activity is fun, the space around her shows her freedom to move, and the speed shows the adrenalin that the activity can produce.

The male in the middle is placed away from the city in the open space and nature. He wears a fresh haircut, white sneakers, and nice clothes which suggests that he is not out in the nature

³ Image 5:
https://images.ctfassets.net/f107dq97zt0a/ty4FNkx2uKcxHPjBFL6WT/c0ab83a47ce8d909ac25e10c13cef3c8/Mask_Group-3.jpg?w=640&q=40

image 6:
https://images.ctfassets.net/f107dq97zt0a/6txVW2by5T5EoiestudDKd/24d6983d129fb9031aed88ca05be4803/Mask_Group.jpg?w=640&q=40

image 7:
https://images.ctfassets.net/f107dq97zt0a/7yXSJbBbTJODuNJ5FXd2S/a7a8ae9aea2e992d3facad4085ced610/Mask_Group_7_1.jpg?w=1024&q=80

to work – he is there to experience. He is looking towards some buildings on the other side of the water, which could be a city from where he drove. He looks out at the open water. The image expresses calm, as he is standing with his hands in his pockets. The bike is placed next to him, and the helmet is placed in the basket. This calm expression could mean that he has been standing there for some time, and that this moment is a valuable experience. The image too expresses freedom, as he is there alone far from everything.

In the image to the right appears three young persons, two women and one man. Each person has his/ her own vehicle, and though the persons are placed next to each other, their bodies are in a position, where they could move on their vehicle at any minute. They smile at each other. The woman at the right and the man in the middle both look and smile at the woman at the left. The woman at the left presses her lips together, so that it looks like she is laughing. The smiles and the expressive body language suggest that the young persons are joking. Behind the small group can be found big buildings with surfaces in different forms and material, and as well grey concrete stairs behind them, matching the grey front on the circular building behind them. The background looks like a bigger city, but there are no persons surrounding the group. The expression of the users of the vehicles is that they are untroubled using the scooter, e-scooter and bike at any time, illustrating capable users.

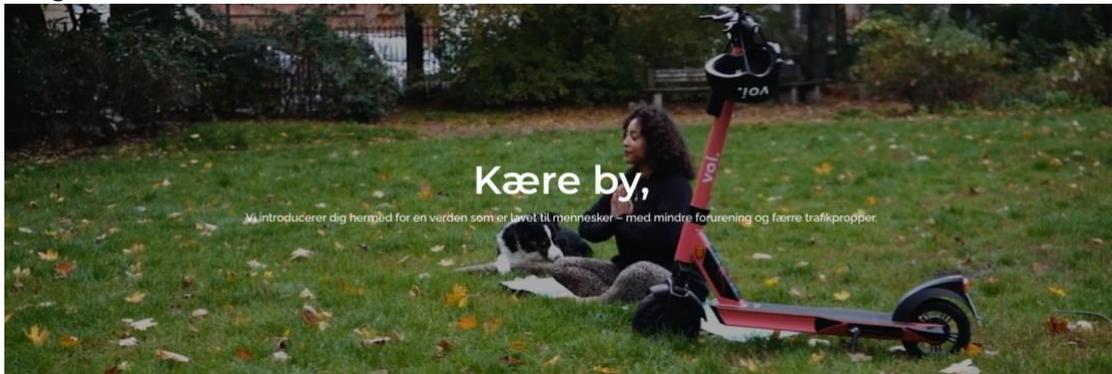
The images above relate to youth and gives an atmosphere of freedom, adrenalin, and fun. The images are diverse as they represent both men and women, and a variety of ethnicities among their users. The images are however also strikingly characterized by their non-users. A forthcoming article by Breengaard et. al. stresses, that biking is not a spontaneous idea for everyone, but can be an activity that needs planning (Breengaard, Henriksson, and Wallsten 2021:9, forthcoming). The freedom to go anywhere may not apply to families with young children, who have strict routines and would further need a child's seat, just as speed and adrenalin may not comply with elderly's mobility, who may not feel safe using such a vehicle. The marketing on youth and freedom is indeed appealing, but it is also blind for the need to include other age groups.

Donkey Republic also draws on the fun, light and joyful. Below is shown two photos of the creators behind the bike sharing scheme. They are all male in their 30s. The colours are very lively, possibly representing both youth, and giving associations to diversity, playfulness, and possibly also inclusiveness as it can make associations to LGBT+. On the right, we see a man with a coffee mug, smiling, possibly doing a presentation. On the left we see a group of four men setting around a table, laughing. The associations are now rather attached to male bonding, and the colours instead entail a city vibe, and representing something fun, light and joyful.

Image 8 & 9: Photos, Donkey Republic.



Image 10: Photo, VOI.



If we look at one of the user representations at Voi, this company also represents freedom, though a different kind of freedom than Lime. As an image of a video suggests: “Dear City” [Kære by]. “We introduce you to a world which is made for people – with less pollution and less traffic jams”. That the city is “dear” suggests that the vehicle do not wish to disrupt the city life and people living it – the city is dear, and one wishes to adjust. The woman in the image has taken an e-scooter to go the park and do yoga with her dog, though it is not clear how she got to the park with both a dog and an e-scooter. The image though suggests that the city is a place, where one would like to reside. Yoga indicates a kind of harmony, and the dog indicates love or care. Where Lime suggests adrenalin and speed, Voi suggests ease and health. Both represent a certain kind of freedom. If we turn our eyes towards NextBike, we will see representation that also illustrate how bike-sharing also can be a solution or activity that make ends meet.

Image 11 & 12: Photos, NextBike.



The photo on the left stands out, as neither rain nor snow is illustrated in any of the other images across all selected bike-sharing scheme companies. If we look closer at the image, we see that cars are parked, but none are moving. The absence of other vehicles, and the sun that shines brightly on the cold snow gives the expression of a fresh, early morning within the city. The road however seems bumpy to bike on, and the photo has been taken from the back, which could indicate that there is a car coming from that direction. It does not seem safe to bike there in the combination of snow and sharing lane with cars. This image does however show an ordinary day on a bike in winter, at least in Northern Europe, and though this transport journey may seem neither attractive, safe, or spontaneous, it does relate more to everyday life than many other joy trips. On the right we see a woman finding a bicycle on a train station in the baking sun. She is wearing jeans though still feminine clothes, and represents the working class rather than the business class travelling. Though the context in the two images are rather different, they both show some of the potential that the bike-share scheme has, as it can link transport modes in everyday life, for example through multimodal trips.

Summary

Statistics of the images from the four bike-sharing scheme companies showed us that more women were represented in graphics, that the companies varied in their representation of non-white persons, and that young adults dominated the representation of bike users. This means that some of the excluded groups in the representation of imagined bike tours are elderly persons, or people travelling with a depended. A qualitative interpretation of selected images showed that the represented users at LIME, Donkey Republic, and NextBike often were young, slim, and enabled. This representation of bodies was challenged by VOI that included spacious graphics of bodies, including the fat body to be a healthy, biking body too. Especially LIME, but also Donkey Republic and VOI appealed to amusement, youth, and freedom, and though this may be attractive, the service may not reach its full potential, as it is still being marketed towards early adopters, who have freedom of choice. Transport is not a spontaneous idea for all, but requires planning for example reasoned to different family constellations (Breengaard, Henriksson, and Wallsten 2021:9, forthcoming).

Case: Female Entrepreneurs within Biking



Case study 2: Female Entrepreneurs and social innovation

The following case study explores how female entrepreneurs contribute to gender smart mobility through an analysis of the visualization of the entrepreneur's products and users. The analysis draws on visual analysis and commercial text from three different bike entrepreneurs in Europe, respectively Hövding, Påhoj, and Safe+Sound. We have collected 83 images, covering graphics and photos, through a manual image scraping from the three webpages. The images were collected from the entrepreneur's Danish webpage, when available (Hövding, Påhoj) and English when not (Safe+Sound). If an image appeared more times, it is counted as many times as it appears on the webpage, if it is not the logo. Images sampled from videos are included. Before presenting our findings, we will briefly introduce and describe the three selected female entrepreneurs for this case study:

Hövding: The Swedish brand Hövding designs innovative bicycle helmets, which combines airbag technology with an "invisible design". That is, the helmet is hidden as a collar, and is only activated in accident situations. More than 300.000 Hövding helmets have been sold in over 15 countries (Hövding.com/dk.vores-vision). The Hövding helmet is ranked in the top three of the World's safest head protection.

Påhoj: Påhoj is a Malmö based company founded by parent and industrial designer Lycke von Schantz. Påhoj is a new bike seat that turns into a stroller quickly, combining biking and walking with children. The concept has been nominated and received several of rewards, among others: *Baby product of the year, Sweden 2020*, and *European Product Design Award 2019*.

Safe+Sound: Safe+Sound is a pair of modular headphones designed for cyclists that transmits audio using bone conduction (gemmaroper.com/safe-sound). The concept is developed by the British designer Gemma Roper, who creates interactive works that span hardware and software.

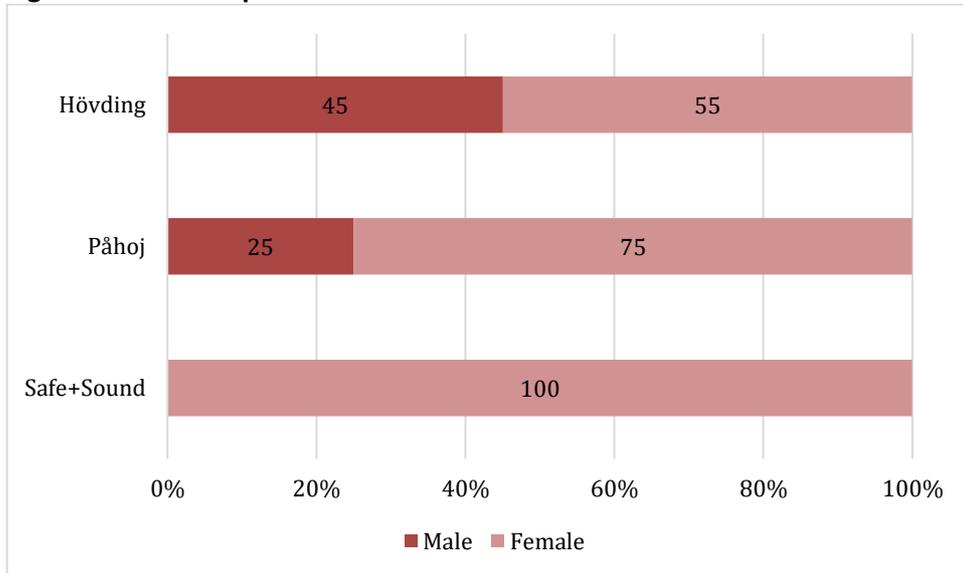
An overview: The Visual Images in Numbers

In the following section, we will briefly present an overview of our empirical findings with focus on intersectional representation within the collected images from webpages.

By focusing on gender, we can identify an overrepresentation of female users across the three case examples, with men only represented in 25-45 % of the collected images. Females are particularly represented at Safe+Sound and Påhoj. The predominance of female users suggests a new turn in transportation entrepreneurship and marketing, which are otherwise commonly recognized for its male perspective and gender bias. The visual presence of female users challenges the visual expression of transportation as "a guy thing" and adds a broader user perspective on transportation and mobility.

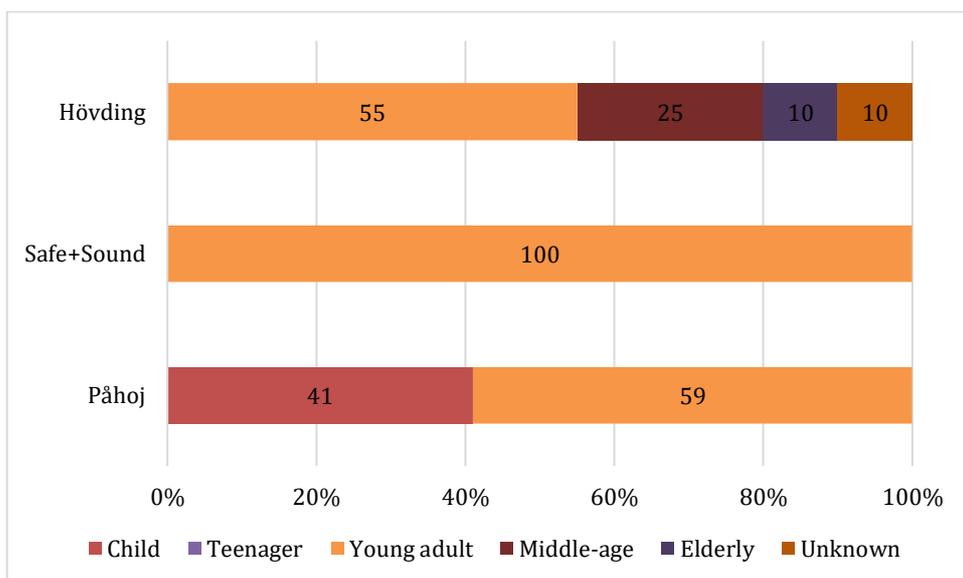


Figure 1: Gender representation



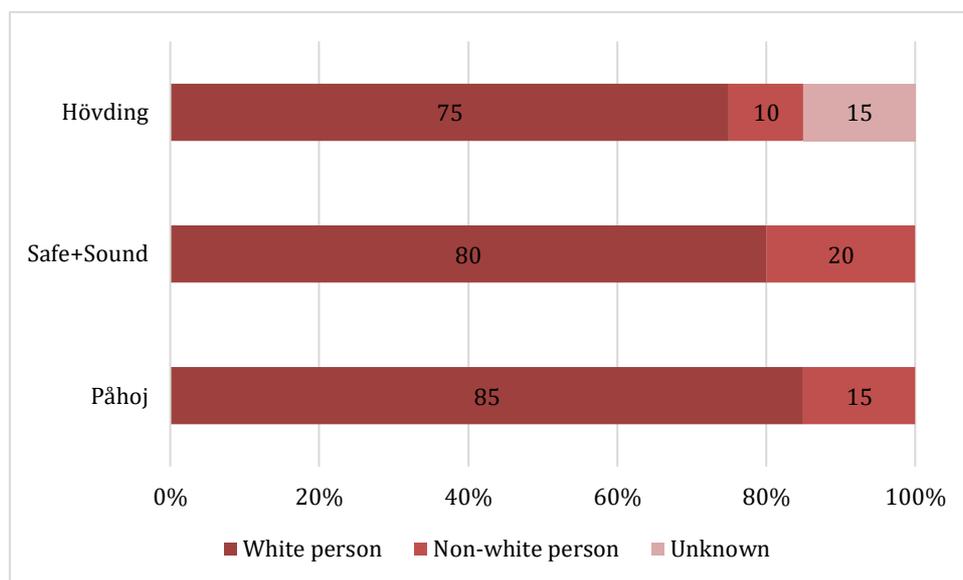
Besides gender, we have looked into how age is represented visually in the three cases of entrepreneurship. Our coding of the material illustrates that especially young adults are represented within the images. These findings suggest a tendency of *age blindness*, where large groups of potential customers are overlooked. Research has for example shown that elderly women cycle (Aldred et al. 2015), but this age group is more or less absent within the material (only one picture in total).

Figure 2: Age representation



Finally, our initial coding of the material displays an overrepresentation of white people on the images. It should here be noted that the three entrepreneurships are respectively Swedish (Hövding and Påhøj) and British (Safe+Sound), where the population are overall white. However, both Sweden and Great Britain are recognized for their diversity and multi-ethnic cultures in the urban areas, such as in Malmö and London, which suggest an ethnicity gap within the marketing of these products. Of the none white persons presented were Afros and Asians, but no persons represented from the Middle East or Latin America.

Figure 3: Ethnic representation



Female entrepreneurship and innovation

The following section explores the gendered implications of female entrepreneurships on transportation, more specifically on bicycle innovation. Firstly, we will dive into the innovative concept of 'Påhøj' and address how it contributes to gender smart mobility through a focus on motherhood. Then follows an exploration of 'Hövding' and 'Safe+Sound' use of invisible design in combination with traffic safety.

Motherhood on two wheels: Expanded mobility

The innovative concept was born out of a master thesis of parent and industrial designer Lycke von Schantz during her studies at the School of Industrial Design in Lund, Sweden. The concept integrates the design of bike seats and baby strollers, creating new mobilities for parents to walk and bike with their children in an easy-going and accessible way. Bicycling is for many urban citizens an integral part of their everyday life, and as Lycke Von Schantz states: *"Why should becoming a parent put an end to that?"*.

As a mean of transportation, Påhøj accommodate a hitherto neglected business opportunity through its attention towards urban family patterns and lifestyle, and contribute with an innovative invention, which enables especially women to maintain/gain a high level of mobility and freedom. Research on transportation and transit patterns has documented

gender differences on in everyday life, with women, who have family responsibility or who practice a more complicated transit pattern, employing cheaper-commuter-travel alternatives (Singh 2017). In addition, women and mothers often travel with passengers, such as children, thus emphasising the need for accessible and multiple-passenger transportation opportunities.

Our visual analysis of the images from Påhoj demonstrated how motherhood, as a theme, is strongly depicted within the images. We identified motherly representations in at least seven images, and fatherly representations in three images. Within the images, women are displayed together with toddlers, imitating everyday life events such as walking or biking. The images display positive social interactions between parents and children, e.g., smiling faces, closeness, or eye contact.

The images generate an atmosphere of solicitude and attentiveness, and illustrate how parents can create intimate bonding moments with their children through experiences of biking and walking.



Source: www.pahoj.com

Furthermore, these accessible experiences build upon everyday practices, and are to be seen as a recurring traveling pattern. From a climate and health perspective, biking is a pollution friendly activity, and using the bike in companionship with children when exploring the city, underlines a sustainable way to learn and acquire healthy habits from early childhood into adulthood. Following this perspective, the stroller combination with bike seat additionally accommodates back issues; parents are not forced to carry their children around from A to B, but can instead place and push them within the stroller, thereby protecting their backs from carrying heavy weight.

Innovation gaps

Taking a more critical stance, these images can also be understood as reproducing sociocultural norms of “doing family”. The images preserve a prevailing narrative of the mother as the primary caregiver, for example through the skewed representations of mothers and fathers.

Another dimension is the economic one. To purchase a Påhøj cost around 3.500 DDK, which is to be considered as an expensive product for most families. The product is primarily available for middle class households, which also are those, who choose to live in urban areas.

Invisible design: Aesthetic and traffic safety

The story of Hövding began in 2005 after the Swedish government passed a law requiring those under 15 to wear a bicycle helmet ([Hövding.com/dk](http://Hovding.com/dk)). This initiated a public debate on mandatory helmet use and whether the requirement should be extended to adult cyclists. The two industrial design students, Anna Haupt and Terese Alstin, began discussing this, and returned to the same crucial question over and over again: Would it be possible to design a bicycle helmet that everyone would want to wear? And if so, what would it look like? Maybe the most attractive helmet was the one you couldn't see.

The concept of Hövding combines airbag technology with a collar-like design, creating an innovative and invisible design at the same time. Anna Haupt and Terese Alstin's helmet design distinguish itself from more mainstream helmet designs, both in terms of design and safety. Accordingly, their unique airbag system provides up to eight times better protection than traditional bicycle helmets (Hovding.com/dk/vores-vision).

Another design for traffic safety is Gemma Roper's Safe+Sound headphones. Gemma Roper is a British designer, who created a pair of modular headphones that transmits audio using bone conduction. The bone conduction modules clip into the straps on any cycling helmet, and sends audio through the cheekbone whilst leaving the ears free to hear the road (gemma-roper.com/Safe-sound). Cyclists listening to music are to a larger degree at risk of accidents compared to those, who does not listening to music while bicycling (www.foerstehjaelp.dk). The danger of listening to music while biking is that the bicyclist cannot hear the traffic. When not cycling, the modules slot into an ear pad for typical over-ear immersive listening.

What is interesting about these two innovative designs, Hövding and Safe+Sound, is their integration of an everyday bicycle need with aesthetic and traffic safety. Both integrate elements of an invisible design into their concepts, while maintaining a high degree of safety for the individual bicyclist.

In addition to this, when analysing both brands visual representations, we identify a strong tendency of addressing female users. Gadgets and features related to transportation are in the mainstream advertisement often associated with male users. However, both of these concepts employ an overrepresentation of female end-users, which invites and includes a broader audience than mainstream.



Source: www.hovding.com/dk

An interesting dimension of the gender representations at Hövding is that both male and female users are depicted in situations of accidents and non-accidents. The brand does not gender-distinguish in accident situations but demonstrate that both genders are at risk of experiencing an accident when riding a bike.



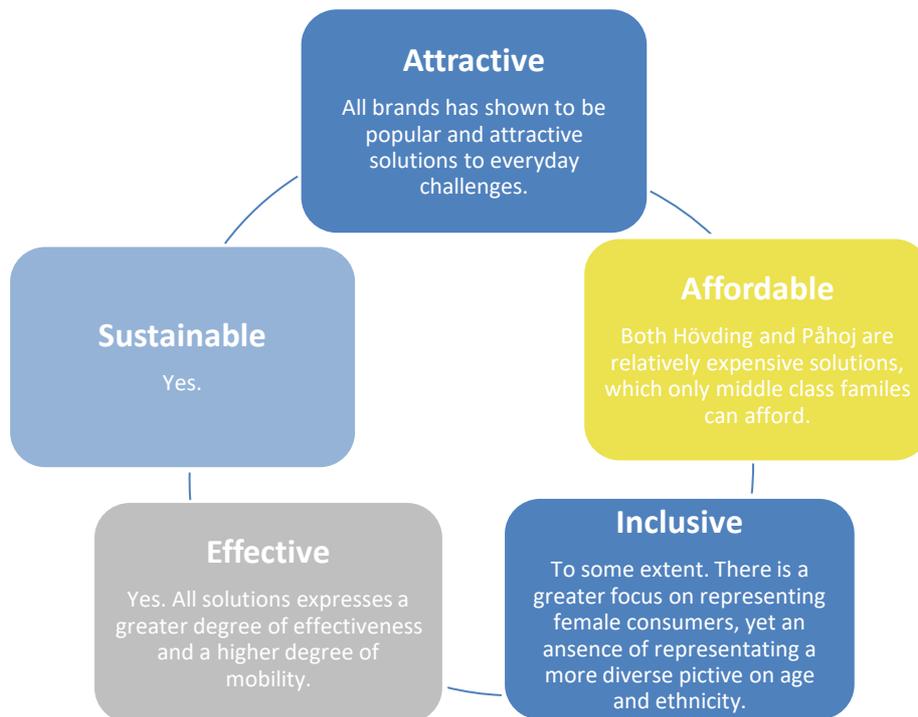
Source: www.hovding.com/dk

This non-gendered distinction between male and female users suggests an equal perception of male and female bicyclist. Female users are not depicted as sensitive and fragile users, but as active and adventurous actors, who might experience traffic accidents. However, despite the inclusiveness in both brands, there seems to be an overwhelming tendency to over represent both youth and white users. Both include diversity in relation to ethnicity, and Hövding manage to represent both elderly and middle-aged users in their images. Though, these are only a minority of the total images.

Summary

To summarize, our visual analysis of Hövding, Safe+Sound, and Påhøj illustrate a great contribution to gender smart mobility. All three cases of female entrepreneurship has developed innovative solutions to everyday challenges, including a high degree of safety in traffic. These innovative solutions strengthen mobility and smart transportation - especially for women and mothers - and illustrate a greater focus on diversity when it comes to navigating easily in traffic. Traffic and transportation are commonly associated as a masculine domain but are within all three cases challenged on this assumption through the innovative contribution from women and through the inclusion of female consumers within the design and images.

However, it should be noted that despite of the greater degree of inclusion, our visual analysis did show a tendency to neglect representations of elderly and non-white users. Only few images depicted such, indicating an inclusion gap and potential for greater diversity representation in the future. Though, it should be emphasised that the images in general illustrate great diversity when it comes to gender – both in terms of consumption, use and safety.



The gender smart indicators illustrated above are used in the TinnGO conceptual framework gender smart mobility that incorporates gender and diversity in smart transport research (TinnGO 2020).



Case: Rollers as Gendered and Social Innovation

Case study 3: Rollers as Gendered and Social Innovation

Smart is (not) always digital. Within in our third visual analysis, we look into how rollers can be understood as gendered and social innovation. Rollers, or four-wheeled rollers, do not exactly constitute a sexy or cutting-edge research topic – not even when it comes to studies of elderly and mobility of those conducted in fields of design and assistive technologies (Christensen 2021). By using the theoretical notion of scripts in combination with visual analysis and interviews, it is demonstrated how rollers, and their users are intertwined in everyday practices and how these relationships intersect with notions of age and social welfare provision (see Christensen 2021). One can argue that the roller can be seen as a simple, disruptive innovation emerging from the bottom up with contradictory scripts of gender and age.

The Roller as Gendered and Disruptive Innovation

The roller was invented in 1978 by a woman, a Swedish nurse and later social scientist, Aina Wifalk – motivated by her own walking impairment. The roller can be seen as a disruptive innovation due to its revolution of old age as moving from being passive to being mobile. As a material device, it provided a simple solution to a walking impairment and was invented by an outsider of the established gerontechnical circles. The roller spurred a social change, a revolution in the lives of the elderly and walking impaired people.

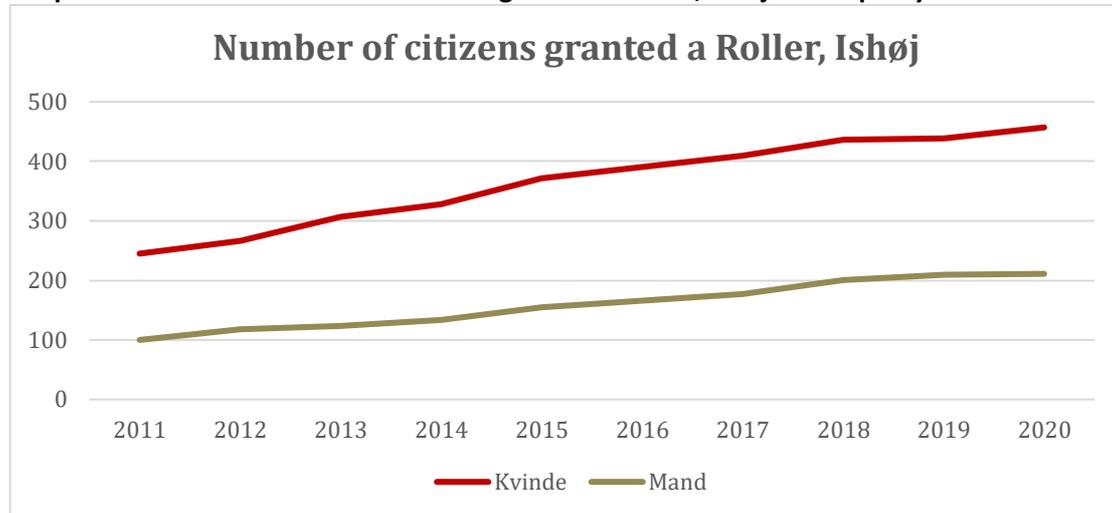
The Roller as Gendered Innovation

As a concept, gendered innovation is a flexible term that implies gendered user proximity in both methodological and material practices. *Gender Innovation* is born out of the groundbreaking *Gendered innovations* project, Stanford University, and addresses the unfortunate consequences of gender blind research. It claims that the lack of gender perspective, and more profoundly, the gendered dimensions of technological development and design, is to be considered as reasons behind the failure of many start-ups and why they and their products are not as successful in “changing the world” (Christensen 2021).

According to Christensen, the roller also provides an example case here. What qualifies the roller as a gendered innovation is its interactive and user-driven innovation process as well as the social impact of this simple device.

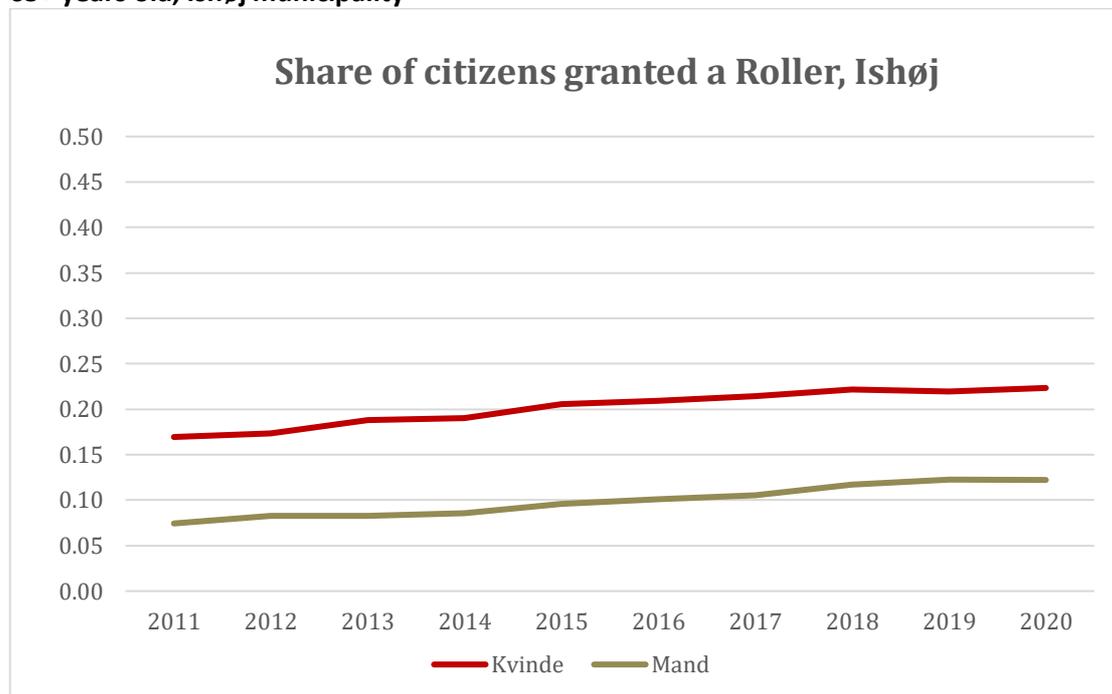
Although there hardly exist any statistics of roller users, including demographic information about users, such as gender, age, and geography. However, Ishøj municipality, a low income and multi-ethnic suburban municipality located on the outskirts of Copenhagen, provided an updated chart of granted rollers related to gender for this study, showing that women make up a considerable majority of roller users in the years of 2011-2020:

Graph 1: Gender distribution of citizens granted a Roller, Ishøj municipality



**Total number of citizens granted a roller (all ages) provided by Ishøj municipality.*

Graph 2: Gender distribution of citizens granted a roller distributed on gender composition 65+ years old, Ishøj municipality



**Total number of citizens (all ages) provided by Ishøj municipality, and gender composition of persons 65+ years old in Ishøj Municipality retrieved from Danmarks Statistik the 29th of June 2021. The graph illustrates the total number of citizens (all age groups) granted a roller divided on the gender composition of men and women 65+ years old. In reality the share of men and women granted a roller will be lower, as persons who are younger than 65 years old can too be granted a roller.*

One could argue that the unequal distribution of rollers between men and women could be simply related to women living longer than men, but if we distribute the number of citizens granted a roller (all ages) to the share of men and women 65+ years old in Ishøj municipality, it still appears that twice as many women than men are granted at least one roller.

The roller seems to meet the needs of elderly women with walking impairments in particular. This is likely due to the fact that many women with impairments do not have other alternatives to mobility inside and outside of their homes. They lack driver's license. Another dimension is the demographic and health factors; women typically live longer than men and are more likely to suffer from osteoporosis. Furthermore, rollers are part of the welfare states' and municipalities' budgets since they can prevent or reduce the prevalence of falls and hip operations, which are very costly (Christensen forthcoming).

Gendered and Contrasting Images of the Roller

In recent years, public images of roller users have demonstrated gendered and contrasting images of the roller. For example, the image of Harvey Weinstein using a walker, symbolizing the fallen and deprived masculinity (jf. Sisak, Hays, and Pelitz 2020) . The walker conveys an image, accurate or not, of physical weakness and dependence. Whether he needs assistance or not, the image can influence jurors and reinforce harmful stereotypes of people with disabilities. Another, and more radical example, is the image of Queen Ingrid of Denmark using a loaned roller for the first time in public (jf. Gøttler 2020). The image is as a powerful image, encouraging others not to be ashamed of their rollators, but to embrace it.

Pictures can make data collection more creative – photo elicitation.

In addition to the use and analysis of iconic photos, we also used images as part of the qualitative data collection. Photo elicitation is a method where pictures are used for collecting and assessing values, practices and preferences. Photo elicitation can be a useful method to encourage vocal opinions of norms and practices among respondents; images evokes feelings and an immediate responses and invites to express likes and dislikes in a more spontaneous manner compared to the method of data collection solely based on written questions and oral communication and exchanges.

Where possible in this case study of rollers, respondents were asked to react to and comment on a small collection of visuals showing roller users in various context and both as individual users and as users located in various social contexts with others. The location of the users were everyday situations in - streets, public transit, walking in the park and attending social events in roller clubs etc. Moreover, the images implicitly accentuated gender and class, and various forms of life styles and of socializing as a senior person. The sample of pictures derived from targeted google searches web based images as well as private photos, where faces were blinded/ made non recognizable.



Two of more images that the respondents were asked to comment on.

The respondents were asked to pick the images, which they liked the most, and also to tell why they liked the particular image. They were asked to explain their choice and to related it to their own visions/ ideas of becoming old and walking impaired. The situations and choices were made according to the current situation of respondents as roller users – or as an elicitor for future imagined situation as an old person using a roller.

Hence comments on the sample of images covered a broad field or opinions, ranging from pure resistance to commenting on and picking favourite images. One comment in the negative end went like this: “I do not like any of the pictures, because I would like to get rid of the roller”. An image of an upright/rank male figure, and the image above of the the woman with the white jeans were among the most popular and were picked by several of the respondents with comments like: “ This is how I would like to see myself in old age.” Another image of two women walking with rollers in a park were picked by the ones who appreciated private socializing – and who were reluctant towards the idea of creating a social club around the rollers (yet another image). Some of the photos also spurred negative feelings: The couple in a working class area/lower middle class area/ low-end area walking with curved backs and the visuals of persons who looked as if they did not feel well were turned down as role models by the viewers.

Moreover, the images effected comments on the norms and ideas of being a “correct” roller user. Respondents were aware of the norms and guidelines presented by the municipal physiotherapist who in some cases instructed the roller users. One respondent when confronted with the images said realized her own appearance: “I do not walk with the roller in the correct way and I am afraid that it does not look very elegant.” All in all the reaction to the pictures revealed variations in the use and views of roller users and the strategies they applied to keep fit and mobile in old age.

Summary and practical guidelines:

Images and the method of photo elicitation can be used as a simple way of opening up new fields of knowledge about perceptions of transport and mobility. Since images are not neutral but located and depicts the topic from somewhere, the researcher needs to be aware of the aim and composition of the sample of pictures/ images, which they applied. Therefore, before selecting the images the researcher should consider the following questions:

1. What is the aim of using pictures?
2. What kind of reactions will be useful for the study?
3. Should the pictures call on recognition or provocation?

In the case of the roller, the use of images was to stimulate memory, and to invite the respondents to recall experiences of everyday life with a roller. Besides the aim was to widen the perspective and to create evidence on how stereotypes of age and roller users are handled.

Moreover, the following matters related to the selection of images should be considered:

1. The social profile of the persons, cloth and particular activity.
2. The dimensions of gender, age, and ethnicity.
3. The design of the roller/ assistive technology
4. The health profile of the person – how is age, bodies, and rollers presented.
5. The location context: city/ countryside/ nature, street scene, weather, time of day.

Discussion

This report has given three examples on how to approach digital images in analyses of transport and mobility. It includes an analysis of a) Bike-Sharing Schemes, b) Female Entrepreneurs within Biking, and c) Rollers as Gendered and Social Innovation. The three analyses have in each their way shown that available digital images are never neutral, but represents stories and conceptions that its viewers respond to. The three case studies were approached respectively: 1) With a focus on who images represent, address, encourage and exclude, 2) how representation connects with gender smart mobility indicators such as affordability, effectiveness, attractiveness, sustainability, and inclusivity, and 3) how users interpret and value images of rollers and roller users. In the analysis of Bike-Sharing Schemes, and in the analysis of Female Entrepreneurs, images as data material were both approached quantitatively (distant) and qualitatively (close), in questioning *who* were represented, *how* were they represented, and importantly: *Who were not* represented. These questions of diversity help us to map, perhaps not acknowledged excluded groups, and challenge areas to include bodies that are not slim, young, and abled, but also fat bodies, older persons, and persons who travel with a dependent. The report too includes an analysis of Rollers as gendered and social innovation, and here we suggested yet another approach to use digital images as starting point for analysis. Where the two first analyses picked out images illustrating a company's overall representation, the third analysis chooses images of persons, who can illustrate barriers for the roller as innovation, as well as challenge the narrative of a roller user on a larger scale.

Digital images provide a huge amount of material for the researcher to investigate, and it provides a material that is especially suitable for examining representation, dominating narratives, imagined realities and to engage with what implications certain representation may have. The images are at the same time representing and recreating conceptions and narratives, and therefore hold a great potential for change. These three examples do not include how users and viewers interpret and respond to the images, or how the narratives shown in the images interweave with the users' understanding, but future research could do so. The analyses shown in this report have examined cases that contribute to sustainable and effective mobility solutions, and representation is important to understand who gets onboard. By illuminating groups that are not represented in the images, we encourage the varies companies to consider whether these groups are considered in product development, or if the varies product may need to be reconsidered too? The analysis of how the groups are represented among the entrepreneurs, companies, and social innovations further inspire future mobility and open solutions through imagined realities. At last the case study on rollers showed that photo elicitation can be used as a simple way of opening up new fields of knowledge about perceptions of transport and mobility.

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www.tinn.go.eu

www.transportgenderobservatory.eu



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