New Bikes for the Old:
Materialisations of Active Ageing

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Abstract

In the last 15 years, STS has established a research programme focused on the sociotechnical reconfiguration of later life, particularly as new political programmes aim to deploy 'active ageing' in contemporary societies. In Denmark, the bicycle is a key technology in this aim, because of how it articulates sustainable living, health and social participation. Thus, two new 'inclusive cycling' initiatives for older people have been developed. Drawing on ethnographic data, we explore the ways the bikes differ, and how they explicitly mobilise active ageing as a form of 'good old age' in different ways. We argue that whereas 'Cycling without Age' rickshaws attempt to assemble social participation for older people, 'Duo-Bikes' aims to enable capacities through physical activity in later life. We further explore what happens when these two schemes meet, and suggest how searching for a compromise will be necessary to enhance opportunities to cycle in later life.

Keywords: Bicycles, enactments of old age, functional capacity, participation, co-existence, compromise

Introduction:
Bringing the bike back in

The bicycle has been an iconic technology in the establishment of STS as a field of research, serving as a lens to understand the mutual shaping of technology and society (Pinch and Bijker, 1984). Perhaps because of its relative technical simplicity, the bicycle enables exploring the relationship between a complex array of infrastructural, social, cultural and political components. However, possibly due to STS' peculiar captivation with 'new' technologies, the bicycle's 'old' character has made it recently a less attractive object. An emerging confluence of processes justifies a new look at the bicycle: First, the promotion of sustainable modes of transportation and liveable cities, where the extended use of the bicycle for city commuting is a consistent policy aim (Bae, 2004; Mapes, 2009; Lutz and Fernandez, 2010 Vivanco, 2013). Second, the consolidation of programmes that emphasise the role of physical activity in health maintenance, in which the bicycle has been reconfigured as a key health technology (Pucher et al., 2010; Vivanco, 2013). Third, this emphasis on health has been particularly directed to older people, where 'active ageing' programmes aim to extend healthy life expectancy (Fernández-

Ballesteros et al., 2013; Lassen and Moreira, 2014). However, the role of the bicycle in bringing to bear this complex social and technical assemblage in older people's everyday lives is only now starting to be explored. In this paper, we explore how two co-biking initiatives for older people in Denmark differently materialise active ageing, and how political and epistemic formats of the good are used to justify the specificities of their crafting.

In the last 15 years or so, STS scholars have established a programme of research that aims to understand how science and technology is both shaped by social and cultural enactments of the life course, and transforms the meaning and material practices of later life (Joyce and Mamo, 2006; Moreira, 2017; Joyce et al., 2017). In this, STS research has provided rich and detailed accounts of the imaginative ways in which older people interact with knowledge making institutions and technological processes, delivering innovative normative grounds for sociotechnical practice (e.g. Joyce and Loe, 2010; Peine and Moors, 2015; Mort et al., 2015). Many STS studies of later life have focused on new and digital technologies such as telecare (e.g. Hyysalo, 2004; Sanchez-Criado et al., 2014; Aceros et al., 2015), or service robots (Neven, 2010). In this research, a key aim has been to determine whether older people are being left behind – widening the technological or 'digital divide' (Jæger, 2004) -, or are able to engage with the new demands of technological use. Hinged on this aim, and in order to move beyond ageist representations of older people as passive recipients of new technologies, as well as to challenge "our concepts and metaphors on old people and ageing" (Östlund, 2004: 3)., terms such as 'technogenarians' (Joyce and Loe, 2010) or 'innosumers' (Peine et al., 2014) have been proposed to highlight the active and creative appropriation of technologies in the everyday life of older users. Drawing on this perspective, in their study of e-bikes, Peine and colleagues (2016) have suggested that older people have challenged age-based assumptions of innovation diffusion, not only becoming early adopters, creatively appropriating e-bikes in their everyday lives, but also ultimately shaping the design and specification of the technologies themselves.

In a similar vein, we investigate two Danish schemes aimed at promoting bicycling in later life (see Figure 1): a) Cycling without Age (CwA), a platform operating since 2013, which facilitates bike rides for older passengers on rickshaw bikes driven by volunteering 'pilots', and b) Duo-Bikes (DB), a side-by-side tricycle designed in Jutland, Denmark, which is frequently used in nursing homes by residents and volunteers. Both initiatives have been explicitly linked to the role bikes play in the Danish national self-understanding, and can be seen as embedded in Denmark's political investment in the bicycle as the technological articulation between economic growth, lived environment and population health (Larsen, 2017). They aim to extend this configuration to older people, contributing to the creation of an 'age-integrated society' (The Strategic Research Council, 2006). In this respect, approached superficially, CwA and DB resemble each other in many aspects. Both deploy two large and weighty bike designs acquired by municipalities, and are placed

Figure 1. On the CwA, the pilot is placed behind the passenger(s) and only the pilot pedals. On the DB, pilot and passenger are next to each other and both are able to pedal. Photo to the left: Cycling without Age, June 8 2016. Photo to the right: Lassen, August 17, 2017.

at or nearby nursing homes with the intent to get the residents out on the streets assisted by volunteers. Both aspire to transform residents' experience of old age by explicitly drawing on the concept of 'active ageing'.

Active ageing, however, is not a single, unitary techno-political assemblage, it being possible to identify two distinct co-existing models (Lassen and Moreira, 2014). The first of these, mostly associated with the World Health Organization (1999; 2002), focuses on the variability and malleability of the ageing process to design technological, social and political devices that support the enhancement of functional capacity across the life course. The second, proposed by the European Union (European Commission, 1999; 2011), emphasises the value of institutional inclusion to maximise the participation of older citizens in economic, social and cultural spheres. Our argument is that CwA and DB are best understood as materially assembling these different formats of active ageing.

Denmark is an ideal site for studying cycling in old age for various reasons. The capital Copenhagen is often emphasised as an ideal space for everyday biking (Larsen, 2017) and its biking infrastructure is used as a model for inclusive design internationally (Clayton et al., 2017). The infrastructure and commuting habits of Danes have become export commodities and used as tourist branding (Visit Copenhagen, 2019). On average, Danes bike 1,63 km per day, and only from 75+ years does this drop below 1 km per day (Center for Transport Analytics, 2018). The Danish Cyclist's Federation (2015) argues that bikes increase mobility and prevent loneliness and functional decline among older people, and works to instigate more measures ensuring safety for older bikers. In their recommendations for physical activity targeted to older people, the Danish Health Authorities draw on the Cyclist Federation recommendation to inspire to ways of being physically active (Danish Health Authorities, 2019). As such, cycling is seen as a key element in public health in Denmark, and the cycling culture and infrastructure has been used as a model to follow in countries such as Canada, France, Spain and The United States (Copenhagenize, 2019).

Because the CwA and DB bikes in question are not 'new' designs but instead adaptations of existing models – the famous Christiania bike (CwA) and a disability tricycle (DB) – conceptual frameworks in STS such as ANT do not fully capture the process of tinkering, adjusting and re-qualifying these artefacts for new uses. In order to do analytical justice to our empirical data, it is necessary to attend both to the making of contingent relationships between technology, social practices and relations (Latour, 2005) and to the mobilisation of moral and cognitive frames that qualify objects and persons "for a certain mode of coordination" or format of the good (Thévenot, 2006: 112). We thus explore both the mundane ways in which building new uses for each of the bikes entailed establishing specific combinations of heterogeneous elements such as local volunteering practices, care home procedures or national imaginaries (see below) but also how those combinations significantly differed in how they explicitly mobilised 'active ageing' as a format for the 'good old age'.

Thus, in the first and second analytical sections of the paper, we carve out the differences between the two bike initiatives. We argue that while CwA draws on a format of active ageing that emphasises the benefits of social participation in later life, DB is more closely aligned with implementing active ageing through the functional health benefits of physical activity. In the former, wellbeing is realised through the opportunity to remain an involved member of society, through being able, as CwA's publicity often puts it, to 'get wind in the hair' and tell their life-story where it happened. By contrast, in DB, the 'wind in the hair' is a means to a different end: the maintenance and/or 'optimisation' of individual functional capacities.

In the third section of the paper, we ask: what happens when the two assemblages meet. We have identified three ways in which these assemblages can be related. The first possibility is that of mutual critique, a situation where actors strive for equivalence drawing on different formats of the good (Boltanski and Thévenot, 2006: 215-236), thereby emphasising and reinforcing the divergent political and epistemic commitments. On the ground, this results in the creation of rigid boundaries between the two schemes, where mutual learning is next to impossible. The

second possibility can be described as pacific co-existence, where diverse uses and qualities are distributed across different sets of actors (Mol, 2002). This however results in the emergence of asymmetries and imbalances between to two schemes, reducing the possibilities of engagement with cycling in older age.

In the conclusion, we thus suggest a third possibility that entails the creation of a compromise. This speculative intervention would require the crafting of composite objects that can bring together different worlds (Boltanski and Thévenot, 2006: 277-92) While this is speculative analysis, we suggest that such compromises are key to the ways the material specificities of the ageing society are crafted, and to the reformulation of the good old age that such specificities attend to.

Setting and fieldwork

We draw on ethnographic data collected mainly by Lassen between 2015 and 2017. The fieldwork was conducted as part of a collaboration between the Centre for Healthy Aging and the municipalities Ishøj and Vordingborg, focusing on researching the links between the everyday life of older citizens, civil society and the municipal policies of old age and health. The two municipalities are ideal case studies because of their explicit engagement in promoting 'inclusive cycling' for older people, but their socioeconomic and geographic differences enhanced our analysis. Ishøj is a suburban municipality with just more than 20.000 citizens, located 20 km south of Copenhagen. Most citizens live close to the centre, and there are bike lanes connecting the city with the local beach, parks and marina. Vordingborg is a rural municipality with a low population density, located 100 km south of Copenhagen. The land consists of many farms, and the small towns in Vordingborg Municipality generally have scarce bicycling infrastructure.

Ethnographic fieldwork entailed a diverse set of data collecting/analysis activities. Principally, Lassen volunteered both as a CwA 'pilot' in Ishøj and as a DB rider in Vordingborg. As a volunteer he conducted participant observations and engaged in conversations with passengers, and has taken extensive field notes from these observations

and conversations. He has also participated in workshops with municipal officers and citizens on each municipality on the issues of health and participation for older people. He participated in a variety of public events promoting biking in both municipalities, collecting photographic documents of these. Fieldwork also included following the local controversy regarding the implementation of CwA in Vordingborg. Lassen has conducted interviews with municipal officers in both sites (N=12), including managers of the old age sector, nursing home managers, community nurses and internal consultants. Interviews were also conducted with 5 CwA pilots and 6 DB pilots, one manager from the central body of CwA and one representative of the manufacturer of DB. All quotes have been translated from Danish, and all informant names have been changed due to confidentiality.

Our approach to data collection and analysis is ethnographic. Ethnography is uniquely adequate to investigate situated and emergent constituents of cycling practices, and to identify and understand their fragile and contingent character. In this, we build on an ethnographic and STS tradition of studying practices and technologies on the ground (Latour, 2005), as the ways policies are materialised and practiced – the ways stories 'perform themselves onto the material world' (Law, 2000: 2) - can only be studied by inquiring into local specificities. While current regimes of innovation often include user-perspectives in the crafting of needs (Jensen, 2012) they often do so in superficial manners (Lassen et al., 2015) not accounting for their often contingent changes in direction (Akrich et al., 2002), and usually oversee the tinkering (Mol et al., 2010) and adjustments of technologies once they become practiced. Ethnography enables a performative account (Law, 2004) of how policies are materialised locally, and how innovations 'in the wild' (Callon, 2007) are negotiated and justified.

Also aligned with the ethnographic tradition, the analysis of the data was synchronous with its collection. Fieldwork was punctuated by a series of data analysis sessions conducted by both authors, which shaped the direction of subsequent fieldwork, and the analytical model presented in the next section. The analytical

model is proposed as a device to attain symmetry in our analysis of the two assemblages and their justifications, and not as a comparative exercise, as we are not aiming to identify the causal configuration of dimensions leading to different outcomes.

Differences

In order to symmetrically explore sociotechnical differences between the bicycle initiatives, we identify 10 key dimensions of analysis (see Table 1), which structure the data presented in the subsections below. *Background* refers to the social and technological setting from which the initiative emerged. *Technology* focuses on the technical specifications of the bicycle used in the initiatives. *Scale/Networks* characterises the size and dynamics of the initiatives, and the means through which those dynamics are sustained. *Matching* identifies the typical ways in which participants in the initiatives are matched together. *Value* categorises how the worth of each initiative is enacted in particular forms of technoeconomic organisation. *Volunteering* distinguishes the two modes of justification used by unpaid participants in the initiatives. *National imaginary* aims to identify how characteristics in the imaginary of Danish national identity are drawn upon in the initiatives. *Gifting* pays attention to how the contribution of unpaid volunteers is enacted in the technologies used in the initiatives. *Attachment* refers to the emotions that are practically articulated in the initiatives. Finally, *politics of old age* differentiates the two models of

active ageing materialised in the initiatives. We flesh out the ethnographic details of these dimensions in the two sections below.

Cycling without Age: Brokering active citizenship and effervescence

> Every morning I cycle to work, because I love cycling. And one morning I noticed an old man sitting on a bench on a sunny spot with his walking frame next to him. He sat there the next morning and for the following two weeks. (…) I realised that he too, must have been cycling his bike every single day too, and most likely enjoyed it as much as I do. (Kassow, 2014)

Thus begins the origin story of CwA as told by founder Ole Kassow in a Ted Talk in 2014. The scene that Kassow describes above concerns Thorkild, a 97-year nursing home resident. Moved by the vision of Thorkild's past as cycle commuter, Kassow rented a rickshaw bike and offered to take the residents from Thorkild's nursing home on bike-rides. It was a success, which prompted him to suggest that his own municipality should acquire a rickshaw bike. This, in turn, received a positive response from the 'co-creation consultant' of the municipality, telling Kassow that this was exactly the kind of 'active citizenship' that they were keen on supporting. They offered to acquire five bikes. When launching these bikes, Kassow and the municipality managed to stir a lot of media attention. The scheme soon spread

Table 1. Key dimension of the bicycles' sociotechnical arrangements.

	CwA	DB
Background	Active citizenship turned into worldwide association	Local company with a specific bike design
Technology	Christiania rickshaw bikes	Disability duo-bikes
Scale/networks	Expansive and digital	Small and analogue
Matching	Platforms and booking systems	Nursing homes and activity centres
Value	Brokering, network economy	Capital investment, commodity
Volunteering	New public governance, co-creation, active citizenship	Traditional, individually organised
National imaginary	Social entrepreneurship	Engineering
Gifting	Clear	Blurred
Affect	Effervescence	Strained familiarity
Politics of old age	EU, dementia, participation, local engagement	WHO, disability politics, functional capacity

across the country, and, at the time of writing, there are more than 4.000 volunteers, in more than 70 out of Denmark's 98 municipalities. CwA has thus been described as a national movement aiming to enhance quality of life in old age (Cycling Embassy of Denmark, 2014; Aged Care Guide, 2017). Further, CwA has at the time of writing been exported to 40 countries on 5 continents.

CwA mobilises a particular format of the good old age centring on participation and well-being, and envisions the rickshaws as key due to its abilities to support mobility, fresh air and social relations. From this perspective, the good old age embedded in the CwA assemblage is much in line with the format of active ageing promoted by the European Union since the 1990s (e.g. European Commission, 1999, 2011; Walker, 2008). So, for example, when asked about the desired effects of the CwA scheme, volunteers and care personnel refer its capacity to increase quality of life amongst the passengers, exemplifying this with stories about passengers who have regained the ability to talk and engage in social relations, or people with severe degrees of dementia who have momentarily regained memories.

The bike most commonly used by CwA is a slightly modified version of the Christiania-bike, an iconic boxbike-type of cargo tricycle. The name of the bike is linked to its origins in Christiania, a so-called freetown at the heart of Copenhagen. Placed on a 10-acre property previously owned by the Ministry of Defence, the area was squatted in 1971, its inhabitants aiming to build a commune, prompting a series of disputes about land use and

attempts to close or 'normalise' it over the years (Amoroux, 2009). Currently, Christiania is one of Denmark's most visited tourist attractions, as the freetown is seen to embody a peculiarly Danish open-minded, progressive and experimental way of living. It was in this setting that the Christiania-bike was developed in 1984, aimed at transporting goods around the car-free freetown. As Copenhagen experienced the transition towards bike friendliness, Christiania-bikes spread to the surrounding city, where it is mostly used by families to carry children and goods. CwA uses a modified version of the original design, where a bench, a backrest, a metal footrest and a folding cover for wind and rain replace the box in front of the bike. It also includes a battery to assist the pilot with propulsion (see Figure 2).

Key in the growth of the CwA network was the deployment of a digital platform to organise bike rides. Similarly to other app-based service platforms, CwA's booking system matches pilots with passengers. This technologically innovative aspect facilitates easy implementation across municipalities (Torfing, 2015). Further, the CwA team are experienced in brand and media management, understanding that the sustainability of the initiative relies upon suggesting it embodied a different way of organising nursing home activities in Denmark. The platform is supported through member municipalities's payment of a monthly subscription, comprising of insurance costs and a fee to use the online booking system.

Figure 2. The original Christiania bike to the left and the slightly adjusted bike for CwA to the right. Photo to the left: Lassen. Photo to the right: Lassen, March 23, 2016.

Data from our participant observation in Ishøj suggests, however, that care personnel are also essential to the sustainability of the enterprise, as they arrange and fit rides around the work-schedules and care-practices at the nursing home. Care workers organise it so that the passenger is suitably dressed and prepared on time for the ride, having often to physically transport the resident in wheelchairs to the outside and secure them on the seat. As one of our informants, Jørgen, stated on a CwA-trip, this means that CwA constitutes a new load on the work schedule of care workers. As a result, there are often more pilots offering trips than there are passengers. To circumvent this gatekeeping, Jørgen explained how he had written a list of potential passengers who lived independently or in protected housing and could be contacted directly, as he was tired of waiting for the nursing homes to find him passengers. The municipality took Jørgen's list as a sign of 'active citizenship', and a coordinator from the municipality ended up sharing the list among the pilots.

This list points to a deeper issue within CwA. Enabling pilots to ride passengers without setting foot in care environments, the list also supported pilots in avoiding what some perceived to be uncomfortable and anxiety-provoking meetings with "the severely demented, the drooling and the aggressive" (Bent, CwA pilot) residents at nursing homes. This distance from the more unpleasant aspects of the ageing process was, to some extent, as suggested above, already facilitated by the online booking system, care workers taking the burden of preparing and 'making presentable' nursing home residents. CwA thus attracts volunteers who find the bike-rides more enjoyable than engaging in care, and who like the flexibility provided by the booking system.

CwA's strength is underpinned by its brokering between the so-called 3 P's: pilots, passengers and personnel. But this brokering is more than just the matching of preferences, it is a reconfiguration of agential capacities and identities. Through the process, the volunteer becomes a pilot, via a composite system that includes training certification and documented abidance by 'rules of conduct' in ride logs. Similarly, the resident becomes a passenger through an embodied investment of CwA symbols such as helmets,

flyers for passers-by, etc, and of CwA endorsed, insurance-backed behaviour such as not incurring in economic exchange behaviour by paying the pilot in money or kind (a coffee or lunch). As for the personnel, they become identified as facilitators of the volunteering relation. Indeed, the character of CwA is defined by how the value of volunteering depends upon the infrastructural interconnectedness of a variety of actors, which include the 3Ps but also municipal officers, system designers and maintainers, etc. Thus, it is not a surprise that CwA's narrative often draws on models of the network economy and the importance of brokering therein.

In this, there is also a crucial role played by brokering in the transformation of the Welfare State towards a co-created endeavour (Jensen and Krogstrup, 2017). Part of a turn towards new public governance, co-creation policies stress the importance of active citizenship, and aim to establish strong collaborations between citizens, governing bodies and the private and voluntary sector in what has been termed a 'plural state' (Osborne and McLaughlin, 2002) or 'welfare mix' (Evers, 2005). With the term co-creation, the Danish municipalities seek new ways to tap into the strengths and expertise of voluntary citizens and organisations. CwA is often seen as the 'gold standard' of co-creation in Denmark, as it combines active citizenship with technological innovation and the 'entrepreneurial spirit' to challenge care-systems.

For CwA members, the key objective of co-creation is to replace a one-sided provision of help or assistance to older citizens by one of reciprocity. As one of the central organisers of CwA explained,

> For us, it is important to stress that it is not just the pilots that provide a service. The talks with the residents give so much back to the pilots. It is life-affirming. (Interview with organiser of CwA, 2015)

The reference to the value of 'talk' in the reciprocal relation is of crucial importance here. It is materialised in the bike design: the pilots give the gift of pedalling; they provide the force that enables the bike to move around in the city- or landscape – and the passengers provide the gift of talk, often in the form of reminiscing about places previously inhabited by the passengers. On a bike ride, the passenger requested the pilot, Jørgen,

to be driven to a forest 15 km away, in which he had played as a kid and not seen since. Although Jørgen was anxious about the effects of the ride on his knees, and whether the batteries would last long enough, he said that he wanted to give this experience to the passenger, he himself gaining from this by relating the forest to someone's life story. Indeed, CwA pilots recognise that revisiting biographically meaningful places - incident places (Rowles, 1983) - is an important aspect of the ride, because it is often through the evocative powers of place that the passengers are inspired to provide accounts of their life and experiences. As the CwA website states: "Older people have so many life histories, tales and wisdom, which will be forgotten, if we do not reach out and listen to them" (Cycling without Age, 2018).

CwA enacts a form of intergenerational relationship whereby the gift of physical propulsion by the younger 'pilot' prompts the gift of wisdom and transfer of knowledge from the older person. This is particularly obvious in the events organised by local departments of CwA, where piloting is part of the activities in history classes in high school, or where pilots and passengers are brought into home economics classes in mid-school to teach traditional Danish cookery (see Figure 3). CwA further engages volunteers in many local and national events, transporting senior citizens to elections, and organising group tour rides abroad. Underpinned by this intergenerational dynamic, these events are caught by a sense of collective effervescence (Durkheim, 1912). This is further reinforced by an overwhelming presence of Danish flags, linking the CwA initiative to a national imaginary of participation, active citizenship and social entrepreneurship. By drawing on this configuration, CwA explicitly makes the case for re-assembling old age through more civic participation and well being.

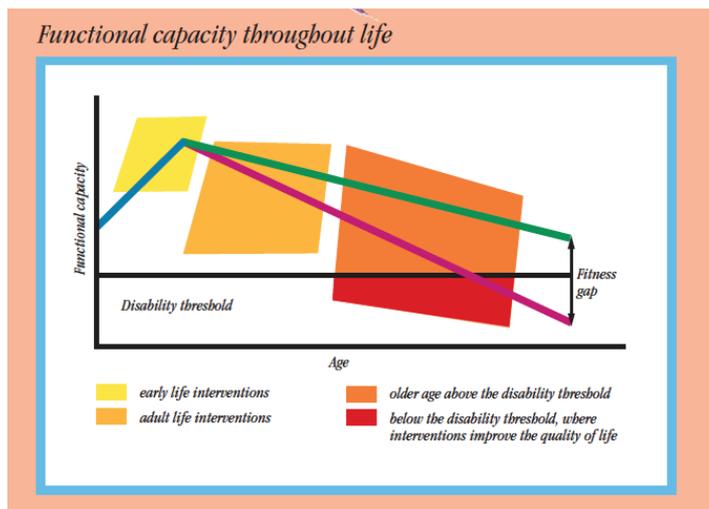## Duo-bikes: Exercise for older people through solid engineering and fragile networks

All people in Denmark start out on a 3-wheeled bike [as kids](…) and everybody ends on a 3-wheeled bike. It makes perfect sense. I think that we can really sense that people basically still want to cycle [in old age]. And all it needs is a gentle push from their doctors, to say 'listen to me: it is no good for you to sit in the couch, because then we get old, then it goes too quickly'. We need to get out and get some exercise. Then they say, 'well what can I do? I can cycle'. It might be that the balance is no longer there, but then we can come with this 3-wheeled bike, so they won't fall. (Neil, salesman from PF Mobility, June 2017)

This extract, from an interview with an employee of the designers and manufacturers of DB – PF Mobility -, is striking in how it relates Denmark, an idea of the life course with a natural decline in functional capacity (the arch of life), health maintenance and bicycling. For Neil, the market demand for a tricycle for older people 'makes perfect sense' because bicycling is the most obvious form of exercise for a Dane who wants to keep active physically despite some age-related

Figure 3. Children at Vallensbæk Skole welcoming pilots and passengers with flags to the left. Pilots and passengers engaged in cooking and teaching at home economics class on Vallensbæk Skole. Photos by Lassen, November 25, 2015.

Figure 4. Functional capacity linked to interventions throughout life (World Health Organization, 1999: 14).

functional decline. The tricycle design makes this co-productive relationship possible, because it recognises that functional capacity declines with age but also that what the World Health Organization has called the 'fitness gap' (see Figure 4) can be bridged by engaging in physical activity. Further, the tricycle is intended to lock into older Danes familiarity with the bicycle thus facilitating this engagement by avoiding the age barriers that might be experienced in other forms of exercise.

As Neil also suggests, the tricycle is nowadays mostly associated with early childhood, but this was not always the case, them being especially popular in the 1870-1890s among elites as a form of genteel leisure pursuit (Herlihy, 2004). During the 20th century, a new association between tricycles and particular groups developed, linking the specific design – with or without engine - with the disability of 'the extreme ends of life'

(Vivanco, 2013: 38). It is from within this socio-technical configuration that the DB tricycles emerged: in 1985, two craft engineer brothers in the small town of Haderup, in central Jutland, designed a tricycle solo-bike for adults. The design interested a local businessman who bought the drawings, and started producing the tricycles on a small-scale. This company eventually merged with another local small-scale bike-producer to form what is now PF Mobility. The company´s main market and product is solo-bikes for private customers with different kinds of disabilities, expanding beyond Denmark towards Germany, Netherlands and other European countries.

The DB design has two independent drive trains connected to two autonomous hub gear systems, both pilots and co-riders being able to contribute to propulsion. However, only the pilot has a steering handle bar. PF Mobility has decided

Figure 5. The solo-bike to the left and the DB to the right. Both bikes are marketed as disability bikes and stress the regaining of freedom. Photos from PF Mobility (2019).

to build the DB out of steel, as it is designed to carry two persons of up to 125 kg. Steel's robustness is also preferred to a lighter aluminium frame, because the tricycle is aimed at affording intensive, multi-rider usage in varying road conditions. As a consequence, the DB comprises a battery connected to the hub gear system. Its robustness, endurance, comfort and safety makes, according to PF Mobility, the DB a competitive model in the market for 'inclusive mobility', along with solo-bikes, mobility scooters and wheelchairs. What makes DB distinctive is its ability to support physical activity for people who can no longer ride a bike on their own, based on what they promote as solid and local Danish engineering.

Contrasting with CwA reliance on digital platforms and networked business models, the DB is mostly sold through traditional sales practices: personal face-to-face networks, long-lasting relations with retailers and municipalities, or Danish flag ornamented exhibitions on trade fairs. This is reinforced by an emphasis on a bespoke service. Sold and distributed through old-fashioned methods, DB is especially dependent on the charisma and trustworthiness of salesmen like Neil, for whom the Jutlandic saying "a handshake is a handshake" is a key business rule. This local rootedness is important to PF Mobility, guaranteeing the quality of their product and service. While such 'analogue' sales-methods and retailer/customer network might impede a quick and global spread, in the eyes of PF Mobility, it ensures a sound business model with good values and satisfied customers. DBs are designed as the embodiment of a local, small, knowledge- and engineering-based manufacturing economy.

In Vordingborg, DBs have been placed at several of the nursing homes for a number of years, although nobody knows exactly when they were purchased. In there, they have lived a quiet life with little usage until 2016, when the local division of Dane Age, the main Danish association representing older people, discovered the un-used bikes, and made a call for volunteering pilots. A small group of pilots gathered, and some of those have since driven both residents at the local nursing home and non-residential users of the activity centre connected to the nursing home. Working on a set time and place, the

matching required for DB rides is minimal. It is also much easier for care workers to organise the rides and prepare the co-riders, the rides becoming part of the routine and work schedule. Finally, this seemingly fragile process is also ideal for pilots, who fit the bike rides into their own weekly schedule.

The scheme is simple: municipalities buy a bike for nursing homes, and rides take place at set times and places. This said, this simplicity is underpinned by a wider sociotechnical arrangement linked to each individual tricycle, which only became visible during fieldwork. This arrangement includes important maintenance work not only of the tricycles themselves – bike sheds, recharging stations, repairing kits and expertise – but also of the personal relations between pilots, co-riders and care personnel. Indeed, the sustainability of the scheme depends on this maintenance work, performed and negotiated locally on fragile relations: if a pilot falls ill, if the bike is damaged, if the key for the shed is gone or if the bike is not charged, all of which happens occasionally, DBs are immobile. In the nursing homes, DBs networks are in constant risk of falling apart. Once, when one of the tires got punctured during the first ride of the spring season, Arne, the pilot, was quick to express concern that it might be his last, as he could not see management finding money for another season of constant repairs. He considered repairing the tire himself, but decided not to because as he put it, 'I have been organising and fixing things my entire life. Now I just want to bike'. The work of maintaining DBs small networks is so complex that, as a result, the pilots at Brænderigården (the main municipal senior centre in the city of Vordingborg) do not look to expand the scheme or amount of pilots.

But Arne's hesitation about whether or not to fix the tire reveals another aspect of the DB networks. Whereas in CwA actors adopt stable identities and roles in the intergenerational relations it performs, in DB, identities are more blurred and fluid. This is most acute in relation to the role of the two riders. On a particular ride, Lassen followed Søren and Jenna, an older non-resident user of the activity centre. During the ride, Jenna talked a lot, but was not be seen to pedal much. At one point, Søren intervened:

Søren: My wife says that women are able to multitask.
Jenna: Yes, yes.
Søren: Then you can pedal and talk at the same time!

Jokingly drawing on a gender stereotype, Søren's remark aimed to re-establish the normative order of the co-riding situation, and it made Jenna pedal dutifully for the rest of the trip. The most obvious normative expectation of the DB rides is that both riders are expected to pedal. More exactly, they are expected to be seen to pedal. That is to say that, while the design of the DB suggests an equal relationship – two persons pedalling sitting side by side –, the independent hub gear system enables differential contribution to the tricycle's propulsion. Both Jenna and Søren, as all other DB rider pairs, contribute to the conversation and the pedalling, but on rather unequal terms. This is a tacitly accepted feature of the DB arrangement, which means that on top of his co-rider role, Søren becomes an enforcer of compliance with the physical activity aims of the initiative, the conversation being a means for Jenna to exercise her legs. The design of the DB supports this complex and fluid configuration of roles, whereby Søren's actions blur between co-participation in a conversation, co-riding and health maintenance coaching.

The exchange of gifts deployed in DB rides is not specifically intergenerational, because the key difference between co-riders is in the relative gradient of functional capacity. In this respect, DB are in line with proposals aiming to reconstruct social relations by replacing chronological age markers with 'functional age' (Moreira, 2016). Thus co-riders value conversations on DBs because of how they bring shared, often locally-based topics or concerns to bear, a feature enhanced by the side-by-side seating arrangement. Equally, conversations tend to be present-based rather than reminiscent, deploying a version of place actualised and renewed by the ride. It is this combination of familiarity with the struggle of physical activity that makes up the affective and socio-technical arrangement of DB. As Neil put it, in the extract presented at the beginning of this section, DB tricycles enable older people to remain within their habitual ways of being while doing "some exercise".

Co-existence and critique

As it is clear, the format of active ageing enacted in DB differs considerably from that in CwA. Above, we have suggested how CwA deploys a politics of active citizenship and participation in later life, while DB is linked to a techno-politics of enablement that aims to incite older people to engage in physical exercise. We have also explained how these are scaffolded on different, alternate normative formats of 'good old age'. In this section, we ask: what happens when the two assemblages meet? While not ignoring that this question is associated with the key STS problem of coordination, for which a number of concepts have been developed (e.g. Latour, 1987; Keating and Cambrosio, 2003), we want instead to identify the actual justifications qualifying the active ageing formats in practice, as well as the possible compromises between the bicycling schemes. Our point of departure for this analysis is situations where the two bicycling assemblages come to co-exist in the municipalities we have followed.

In Vordingborg, the push for CwA by local grassroot volunteers has been controversial, mostly because the municipality already uses DBs to implement its policies on active ageing. In Ishøj, on the contrary, the introduction of CwA has been driven by municipal ambitions of co-creation and participation of older citizens. There, the two bike schemes have been running alongside each other. In the following, we will explore these two modes of co-existence and how they lead to unsatisfactory outcomes.

When the rumour of a possible local chapter of CwA reached the DB riders in Vordingborg, it was met with resistance, as exemplified in the following fieldnote:

> When I came to Brænderigården, Stig and Elisabeth were about to drive away, as they were done biking for the day. Stig was the man who had had a blood cloth, with whom I had ridden the DB back in March. Elisabeth, his wife, stopped the car when she saw me. She said she didn't think it was possible to compare the DBs with the [CwA] rickshaws. For her, it was absolutely central to get the "venous pump mechanism going". She added that in rickshaw bikes "you might as well drive in a wheel chair or drive in a car". There was no other solution, she argued, but to exclude rickshaws in

the municipality, because it was important to get older people moving. "The older one gets, the more important it is", she concluded. (Excerpt from fieldnotes, Brænderigården, August 2017)

As the fieldnote above shows, the differences between the bikes are obvious and crucial to Elisabeth. Since Stig had the blood cloth, physical activity had become an important aspect of their life together, using DBs regularly. This seemed in some way challenged by CwA's growth in national popularity, and her argument – and fury – was directed at the possibility of seeing so many people who could still pedal themselves, ending up sitting inactive in rickshaw bikes. As it happens, the managers in Elisabeth's municipality agreed with her, as did the manager at Brænderigården, who stated that "the entire idea with the bikes is to get people out and moving. The users should pedal".

From this perspective, CwA is criticised as missed opportunity, engaging older people only to reinforce received and ageist ideas about the limited possibilities of physical ability associated with age. In addition, DB supporters point to the potential ephemeral quality of CwA, not having the local rootedness to provide sustainability to the scheme. Finally, this ephemerality is reinforced by PF Mobility's claim that the CwA rickshaws are brittle, PF Mobility expecting them to break (and hence a lot of orders on DBs) when the first CwA bikes have been on the roads for three to four years. As result, the local supporters of the DB bikes reinforce their commitment to a particular format of the good old age wherein functional capacity is improved by physical activity, supported by robust local networks and bikes that endure.

Challenging this epistemic and normative commitment causes local controversy. When Morten, a CwA enthusiast in Vordingborg, was interviewed in March 2017, he had been engaged in organising CwA in the municipality for two years. It started well and smoothly in 2015, when he promoted the initiative at the local summer festival, and consequently received a private donation for a CwA bike. However, the municipality would not subscribe to CwA. Convinced of the opportunities for active citizenship afforded

by CwA, Morten continued his quest, and during the summer festival of 2016 a local businessman donated a second rickshaw. Morten found housing for one of the bikes at a nursing home, but as the municipality is not a member of CwA, pilots and passengers were not insured, making it almost unusable.

Morten became increasingly annoyed by the difficulties and did not accept the political stance that the CwA bikes were ageist, with which he was received at meetings with municipal officers. Eventually, he was so frustrated that he locked the second (homeless) bike with a large lock to the railing in the city council during Christmas, with a note stating that this was a Christmas present to the municipality that needed housing. He added his telephone number and signed the letter as Santa Claus. Approximately 10 days after new years' eve, a municipal manager scheduled a meeting with Morten, and the municipality agreed to house the second bike in one of their nursing homes. However, the municipality still did not subscribe to CwA. The CwA-founder, who attended the meeting with the municipality, ended up offering Morten a discount for the subscription, if he could find local donors.

Eventually, Morten convinced the mayoral candidate from the social democratic party to promote CwA, in a promise to enhance co-creation and old age participation in the municipality. This mayoral candidate was eventually elected as mayor, but the CwA was introduced prior to elections, apparently partly because the old administration did not wish for the bikes to become part of the campaign. As result, the bikes now co-exist in Vordingborg, but the local controversy about the ideal bike for older age only seems to have intensified, and the integration of CwA in Vordingborg is experiencing difficulties, as the bikes are still seen as ageist amongst personnel and DB-pilots. Despite some publicity in local and social media, Morten is struggling to find co-volunteers and support amongst the care personnel, and the introduction of CwA in Vordingborg only seems to have reinforced that the municipality is committed to the DB as implements of a good old age focused on the enhancement of functional capacity.

The situation in Vordingborg exemplifies the first possibility of co-existence, that of mutual critique and controversy. In this situation, the two initiatives and their ambassadors mutually argue that the other bike is flawed by drawing on different justifications: because it is inherently ageist (CwA), or conversely because it poses a normative ideal of good old age that is narrowly focused on functional capacity (DB); because it takes older people to be passive, or alternatively because it excludes older people who might not be able to engage in physical activity; because it takes volunteering closer to the organisation of the 'gig economy' or because it relies on 'old', obsolete ways of volunteering; because it is inflexible in its scheduling, or because it is more suited to those living independently; because it is – socio-materially - too 'light' or too 'heavy'. This situation generates neat spatial and cognitive boundaries between the assemblages and the identities therein, reinforcing their internal coherence, epistemic difference and hindering mobility of actors – human and non-human – across the bike initiatives.

The second possibility of co-existence can be exemplified through the way the bike initiatives are coordinated in Ishøj, where they are seen as having different qualities and users. Ishøj became a member of CwA in early 2015. This coincided with the local Old Age Administration's push for more co-creation initiatives in the sector. Municipal officers were employed to start the Older People's Network which, through peer to peer contact, social media and their website, promoted Ishøj as a good place to grow old within a closely knit community. The network established lunch clubs, where older citizens could gather weekly in different parts of the municipality to buy and eat lunch for a small amount. Volunteers set the tables, and local musicians or other types of entertainment would sometime come to perform. The municipal officers were mindful not to call the participants 'guests', and organised people to actively participate in food preparation and other chores. A pool of money was set aside for municipal home care assistants to transport immobile older citizens to and from the club.

As part of this network, and in this atmosphere of co-creation, CwA was launched as an oppor-

tunity to do something good for the community. The initiative received much local attention, and was integrated in a range of events (see section "Cycling without Age: Brokering active citizenship and effervescence"). Many volunteered (although the majority only volunteered for a couple of bike-rides and afterwards disappeared) and local kiosks and cafes supported the initiative with free coffee for pilots and passengers. Soon, the bikes were used by pilots to transport older citizens to the cafés, as the funds for municipal home care assistants to transport the older citizens ran out. The older citizens got to meet new people and engage in conversation during the ride and at the lunch clubs.

At this time, Ishøj already owned DB bikes, and had done so for 12 years. As in other DB local schemes, these were used once weekly by few volunteers – three so-called bike-men – with no publicity or fuss. This co-existence is somewhat working. There appears to be a distributive arrangement whereby the different initiatives are engaging with different actors and institutions, with different narratives and justifications supporting each of them. Nursing home residents, or those coming to their day care centre, use DBs through its regular, rooted networks and procedures. The three volunteers come every Monday and have a list of passengers from which they agree with the personnel (who dress and prepare the passengers) who should have a ride. The local nursing home manager is pleased with the DB and the bike-men, as she "like[s] the equality between the riders" and finds it problematic that so few residents get outside and exercise. While she justifies the DB with how it performs equality and enables exercise, she does not contrast this to the CwA initiative. Between the assemblages, there is not so much as a boundary, but a mutual indifference. The bikes are placed in different bike sheds, are used by different volunteers and passengers, and are organised by different actors from the same old age administration.

Our fieldwork data suggests that this pacific co-existence is, however, fragile. As we have proposed above, the dynamic of CwA is sprawling and proselytist, its sustainability being supported by an ever extensive range of pilots and passengers. In Ishøj, this was reinforced through linkages

to social media and political networks that cemented the format of active ageing as participation and inclusion through bicycling enacted by CwA. While the physical activity embedded in DB was not resisted, physical activity and functional capacity was not used to justify biking in old age. This meant that the CwA network would inevitably come in contact with DB if only to make it increasingly invisible. Established through an expansive mode, CwA comes to stand as the exclusive cycling for 'active ageing' approach. As a result, DB's distinctive approach comes to lose some of its legitimacy, detached from the wider networks of old age programmes and their politics. A temporal frame of explanation emerges, where the old DB bikes are silenced at the margins of local old age policies. The DB justification is supporting a different format of active ageing than the one being politically supported in Ishøj. In this setting, DB becomes increasingly 'obsolete' in the face of CwA.

Above, we have unfolded two different possible modes of co-existence. In both cases, the local administration favours a specific format for active ageing and the good old age. In the case of Vordingborg, the format is challenged thereby causing explicit controversy. The different actors justify 'their' bike scheme with arguments of functional capacity or participation respectively. They do not attempt to argue by borrowing from the 'other's' way of justifying, but stick to their own political and epistemic commitments. In the case of Ishøj, the format promoted by the local old age administration makes the already-existing bike scheme increasingly obsolete. But as the bike-men are not engaging politically in attempts to justify the format of the good old age embedded in the DBs, the co-existence is more pacific, albeit fragile for the silenced bike scheme, as they become increasingly invisible.

In search of a compromise

In this paper, we have shown that CwA and DB are best understood as different materialisations of 'active ageing', the former assembling social participation and the latter configuring bodies towards functional health. We examined how such enactments of bicycling-as-active-ageing

are related to differing arrangements with specific scaling effects – CwA relying on a dynamics of growth, while DB being linked to configuring use as 'locally' rooted. We explored how these divergent scaling effects are linked to practices of valuation of things, attachments and bodies, and how they are linked to national technopolitical imaginaries of old age. In this, we have detailed how CwA on the one hand deploys a digital politics of active citizenship and participation in later life, and how DB on the other hand is linked to a local politics of enablement that aims to incite older people to engage in physical exercise. While these initiatives are locally rooted in Danish cycling culture and old age policies, they also entail a larger story about the ways practices embody policies, and how such practices rely on political and cognitive formats to justify their specific configuration of an active old age.

Our analysis suggests that existing attempts to articulate between the two assemblages create either conflict or dominance of the 'light' over the 'heavy', reducing passages between initiatives and diversity of opportunities to cycle in later life. Compromise, then, appears as the route towards enhancing those opportunities. Although we have not observed this form of co-existence in our fieldwork, we think it should be possible for the two initiatives to learn from each other, creating a socio-technical compromise that is neither territorially based or relying on 'waves of innovation' and their technoscientific promises.

Compromises require the establishment of a composite object that transcend differing orders of worth (Boltanski and Thévenot, 2006). Based on our fieldwork and analysis, we suggest that finding a compromise in this situation entails local experimentation and actors willing to challenge their practices and ways of justifying their specific bike schemes. We propose that a possible compromise could rely on the building of passages (Moser and Law, 1999), i.e. transient and fragile routes that support the transference of objects and actors, between the two assemblages, as a possible way to form and experiment with composite objects. Unlike trading zones (Galison, 1997) passages are not institutionalised communication platforms. The concept of passages attends to the specificities of not just objects, but

also of the passages between them, and the ways such specificities form the abilities or disabilities of persons. This is needed because of the assemblages' uneven power and access to resources. Thus, the co-learning between them would be based on specific issues and items, to avoid one being incorporated into the other. Searching for a compromise would address questions such as: Could the seeming equivalence between pilot and passenger enacted through DBs, which enables better conversation, be used in the technical design of the CwA? Could digital platforms be used in expanding the use of DBs? Could CwA's politics of participation and local engagement be supplemented by DB's politics of inclusion and enablement?

Exploring these and other questions would establish, we propose, passages between the objects (bikes, sheds, booking systems, etc.), capacities (pedalling, physical activity, community, participation) and human actors (volunteers, passengers, care personnel, repairmen, etc.) of the two assemblages. We submit that their exploration can only be done in practice, through local experimentation. This would be best done without policy co-ordination, avoiding the desire to build a composite out of the 'best features' of both initiatives. Instead, our proposal is that specific arrangements need to be worked through the material contingencies of everyday co-cycling

in later life, a form of 'distributed innovation' where designers and users, in collaboration with social scientists, attempt to adjust and enhance the articulations between existing practices of active ageing, creating 'passages' across assemblages. These would inevitably be transient and fragile routes that support the transference of objects and actors between the two assemblages, and serve as a possible way to form and experiment with composite objects. We hope this paper might serve as point of departure in such collective exploration.

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