

Ein **multi-** und **intermodal**es Erreichbarkeitsmodell für **Arbeitsstandorte** (EMMA)

*Empowering **multi-** and **intermodal** workplace **accessibility** analysis*

The Impact of Workplace Location on Commuting Mode Choice and Car Ownership

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Outline

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2. Background
3. Hypothesis
4. Methodology
5. Results
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1. Project Context: EMMA's goals

„Development, application, and assessment of a model to optimize the accessibility of workplace locations in terms of multimodal and intermodal mobility“

- (1) Identification and quantification of relevant impact factors on workers' mobility behavior
- (2) Development of an accessibility model that enables sustainable development of workplace locations
- (3) Application of the model in the metropolitan region (regional scale) as well as on a smaller scale on selected cases studies in order to develop and assess scenarios for future development
- (4) Contribution to a better understanding of multimodal and intermodal accessibility analysis for workplace location development

2. Background: the impacts of the workplace location

How does the location of a workplace influence mobility behavior and car ownership of its workers?

Some selected findings from the literature:

- the built environment impacts mobility behaviour through the 4 D's: *density, diversity, design, distance to public transport* (Cervero and Kockelman, 1997; van Wee, 2002)
- Levinson (1998): *"living in an area with relatively high accessibility to jobs is associated with shorter commutes"*

So far, the focus has been the residential location. **What about the workplace as a destination?**

- if a workplace is relocated from a central area to a non-central area, car use increases (Bell, 1991; Hanssen, 1995; Naess and Sandberg, 1996; Aarhus, 2000; Vale, 2013; Sprumont et al., 2014; Zhao, 2017)

2. Background: the impacts of the workplace location

How does the location of a workplace influence mobility behavior and car ownership of its workers?

Vale (2018:) *"(the) built environment of destinations has been pointed out as more important than the built environment of origins in explaining mobility patterns for several travel modes (...), especially if the destination is a regular, consistent destination such as the workplace".*

Problem: If we observe relocations, there are other socio-economic, attitudinal, but also practical factors that impact the ex-post commuting behavior.

Solution: We look at data where the workplace is changing, but other factors stay stable.

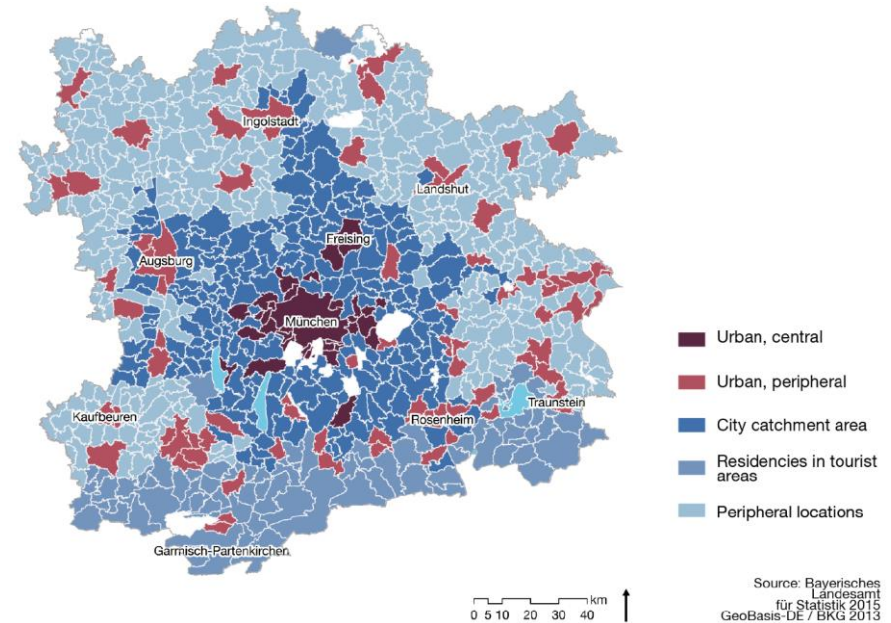
3. Hypotheses

Based on the literature, the following hypotheses for workers changing their workplace location while maintaining the residential locations are formulated:

1. The new workplace location has a significant impact on the **mode choice** of the workers.
2. The new workplace location has a significant impact on the **car ownership** of the workers.

4. Methodology

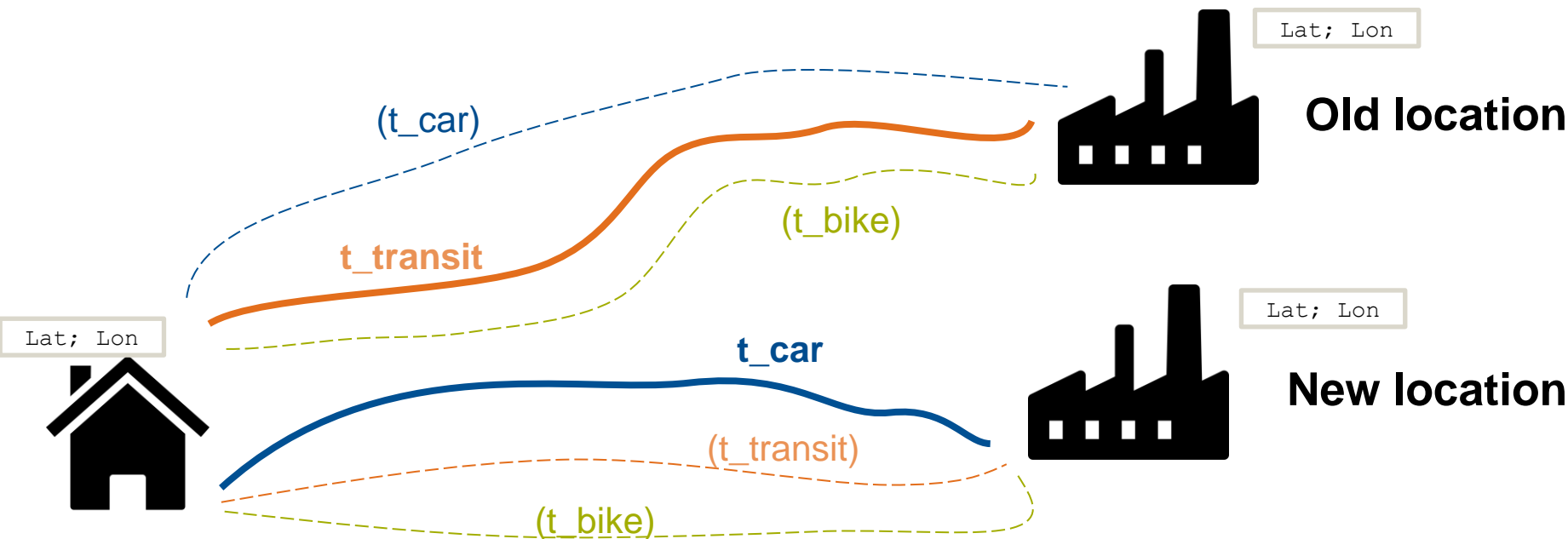
- Statistical analysis of survey data:
 - "Wohnen-Arbeiten-Mobilität" in the Munich Metropolitan Region: >7000 pers., 1000 have changed their job location, but not the residency
 - Thierstein et al. have clustered the MMR into 5 spatial clusters, which are used in this analysis
 - Key variables: Coordinates of home location, old workplace, new workplace, actual mode choice for both locations, multimodal travel times and distances for both workplaces, spatial cluster of home/work locations, demographics.



Spatial Clusters in the MMR (Thierstein et al., 2016)

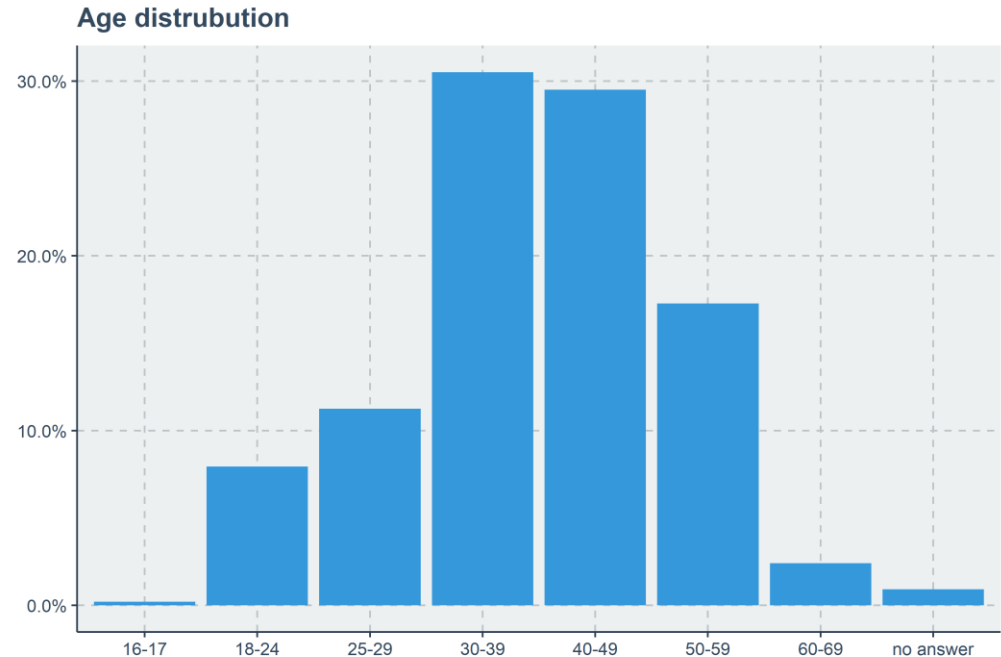
Longitudinal Analysis of Commuting Behaviour

What is the **isolated** impact of the workplace location on commuting behaviour?



5. Results - Sample Description

- filtered N = 996 persons
- 53% male, 47% female
- >50% have a university degree, 5% PhD!

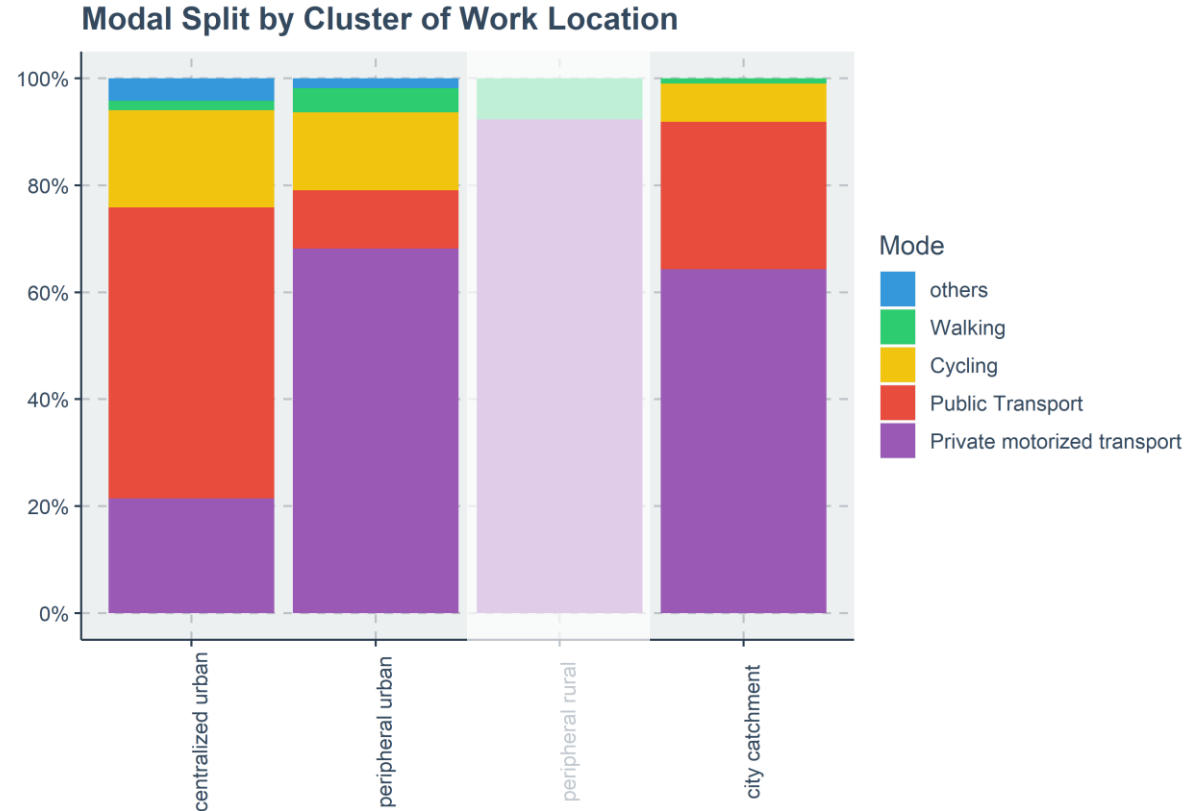


N = 996

**The trip to
work is
different in
each spatial
cluster.**

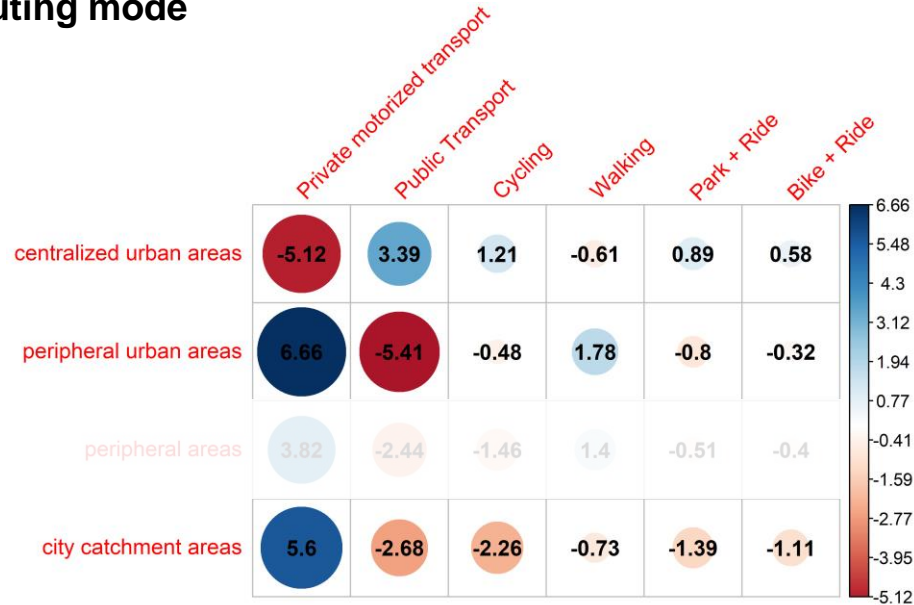


**The trip to
work is
different in
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Impact of workplace location on commuting behaviour

A Chi-squared test revealed the significant ($p < 0.001$) impact **of the spatial cluster of the current workplace** on the **commuting mode**

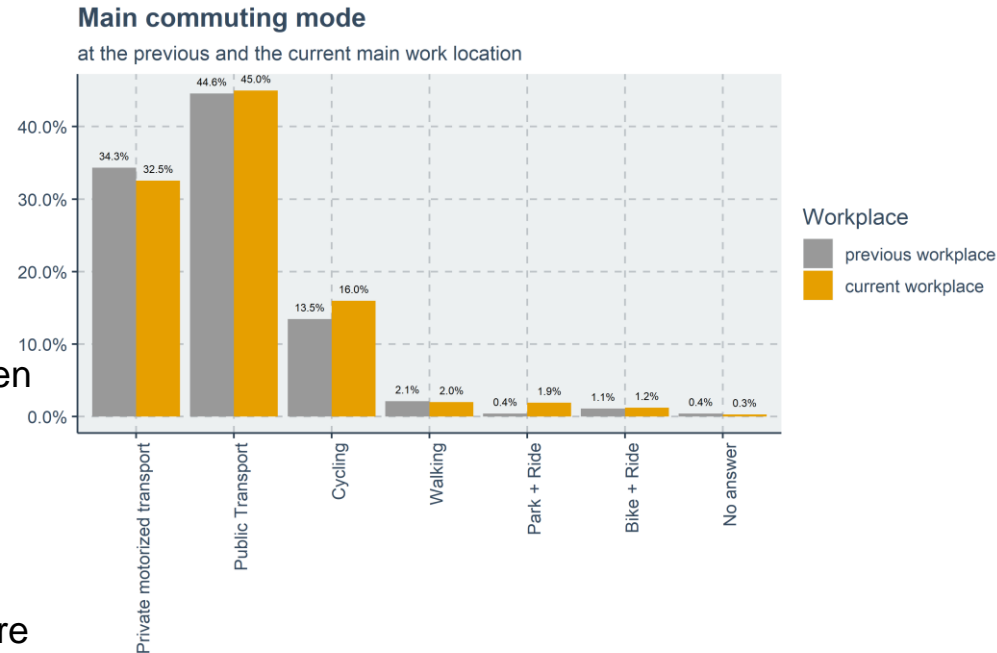


...focusing on the "workplace location changers"

- 33% of the filtered sample (N = 330) have changed their commuting mode with the new workplace location

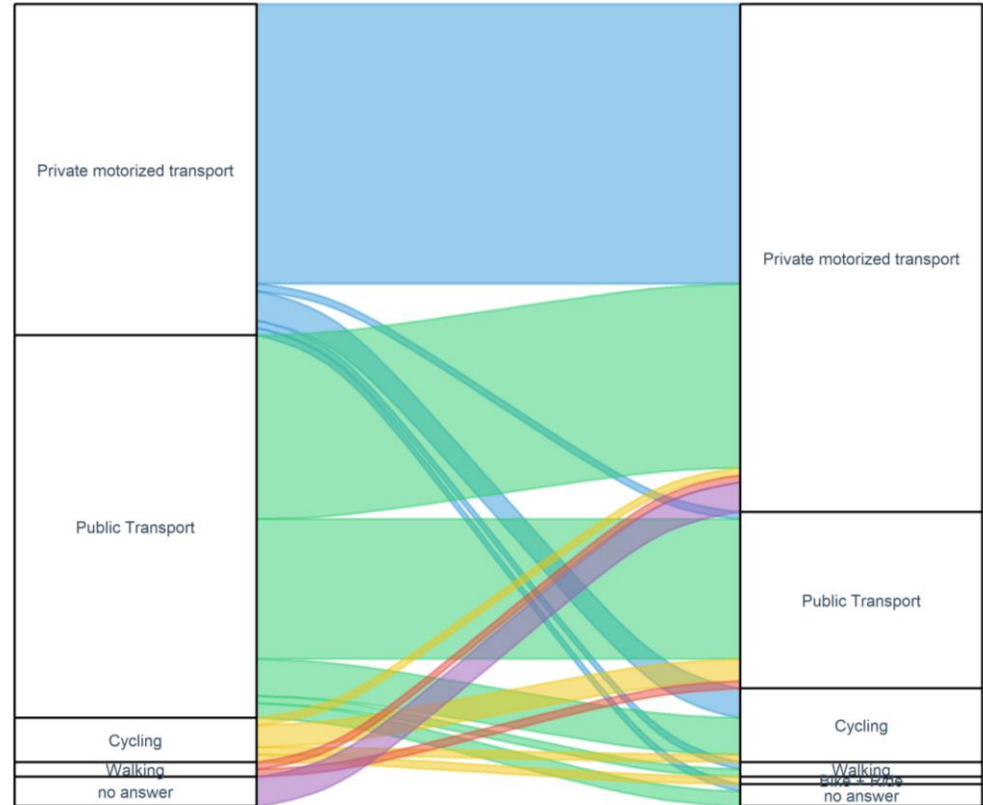
→ **high relevance for policy!**

- **but:** at first sight no significant changes between old and new locations...
- How do people change modes?
- Chi-Squared Test: "centralized urban areas" are different than all other areas

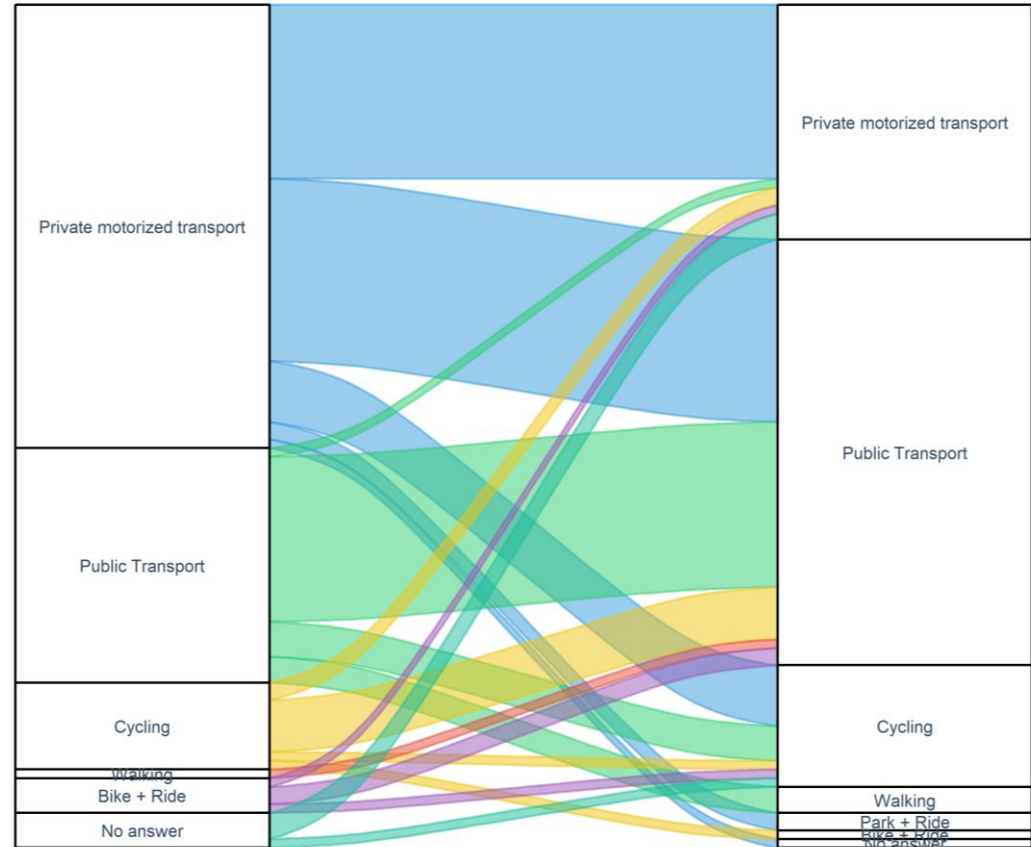


N = 996

What happens if
the new workplace
is in an "other"
location, and was
before centralized
urban?



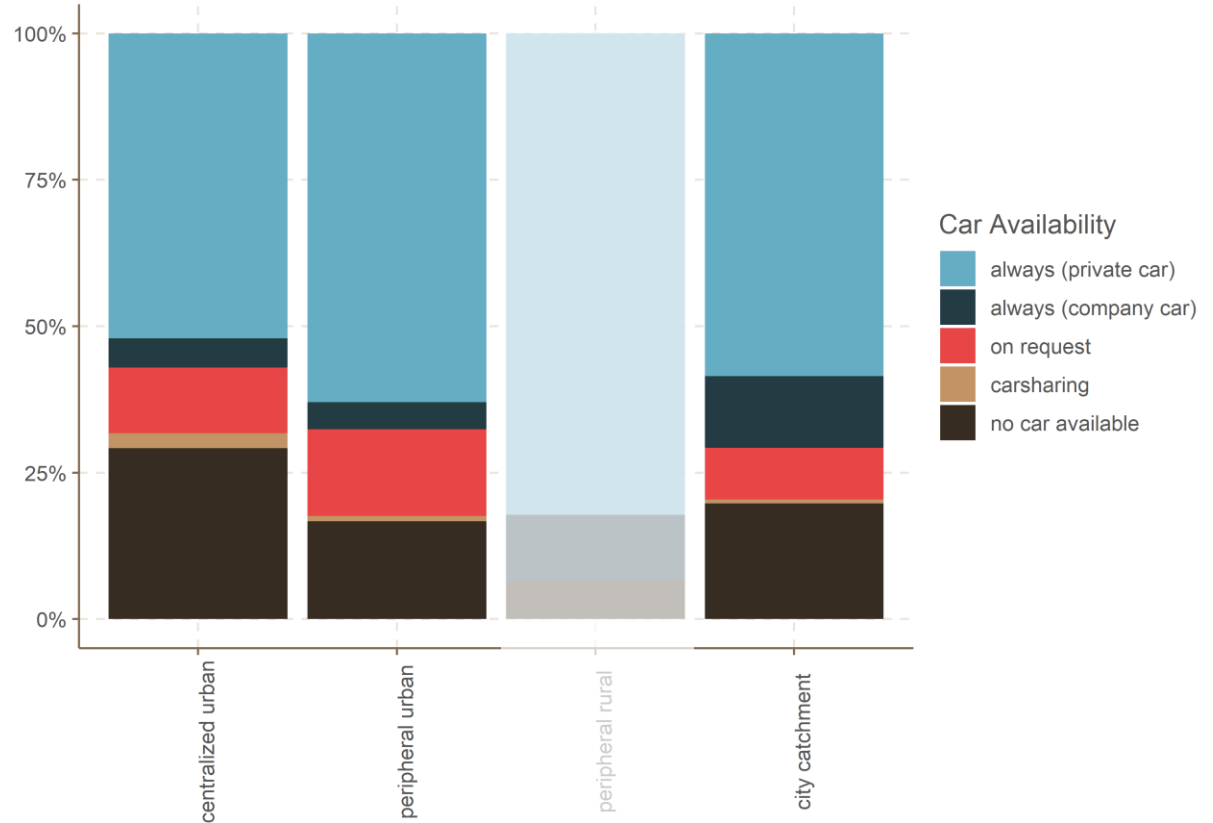
When it changes
in the **opposite**
direction ("other"
→ "urban"), we
observe the
opposite effect:



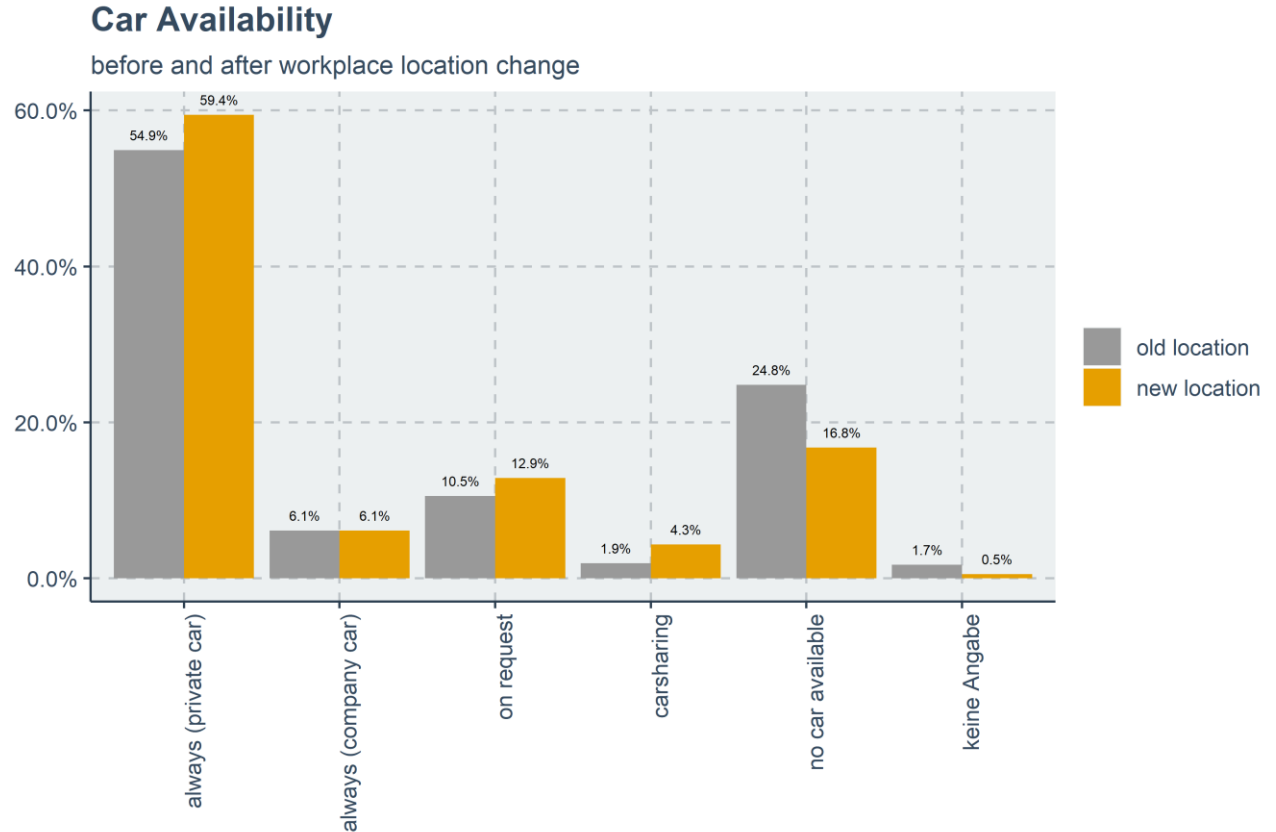
Discussion: What do we learn from this?

- strong **inter-dependence** of the workplace location and the mode to work!
- relatively strong **elasticity** in the mobility behaviour of workers: the workplace relocation is a tipping point in life and the mobility routines are re-evaluated.
- For policy and practice, this hints at a potential for **behavioural change**:
 - "workplace location changers" should be addressed in **targeted mobility management programs**
- The high impact of the workplace location calls for strategic regional workplace development with attention to the workplace locations' accessibility.

What about car ownership?

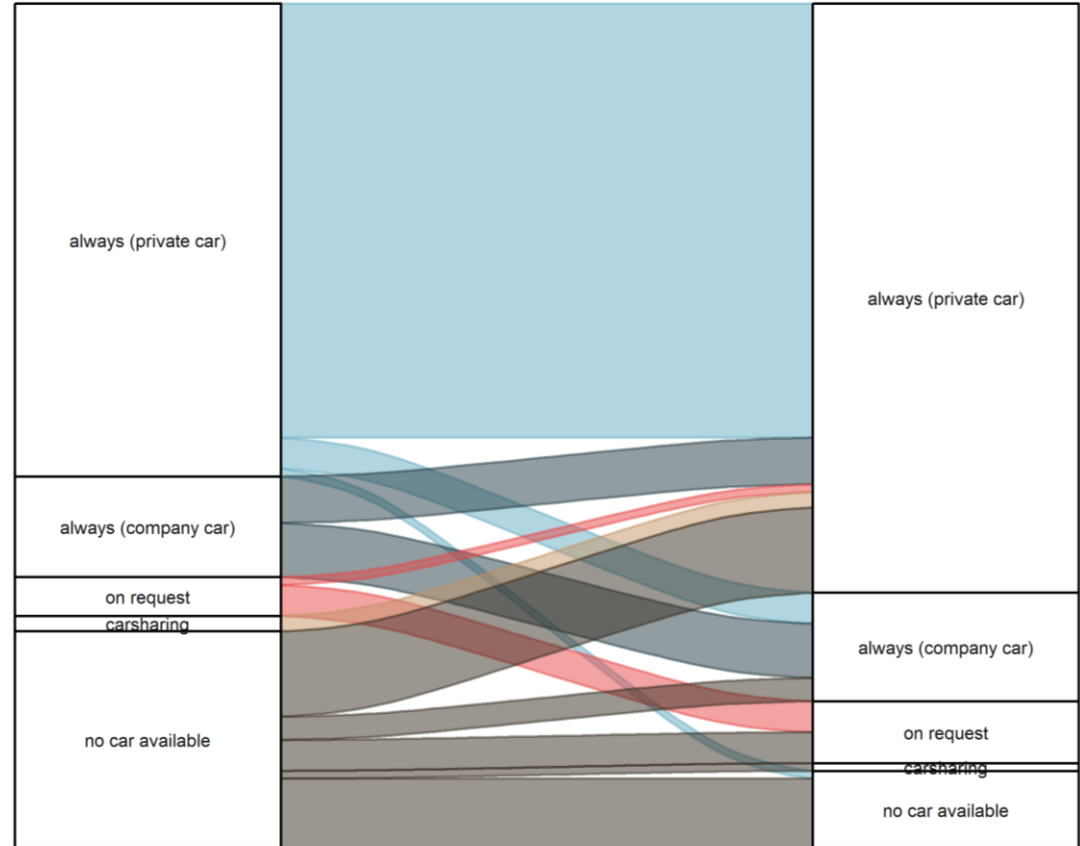


What about car ownership?



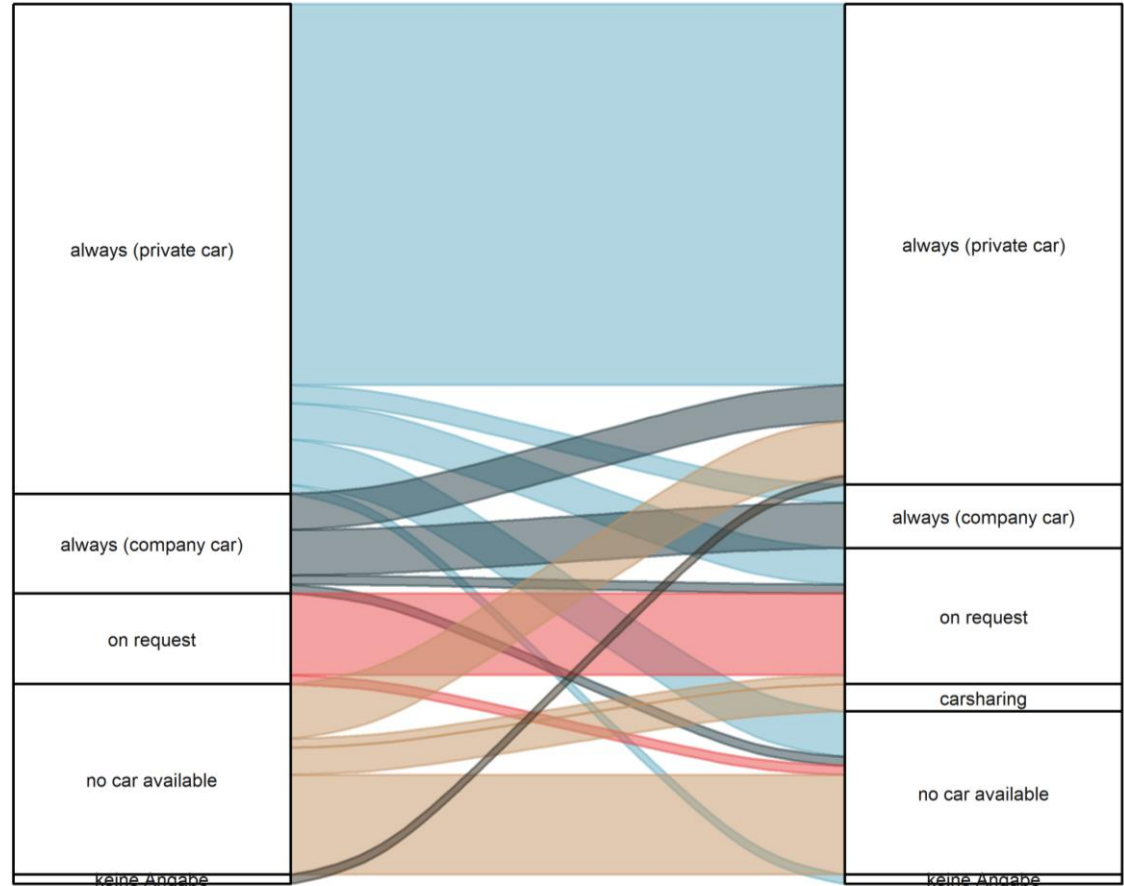
Car Ownership: Flows

Change from "urban" to "other"



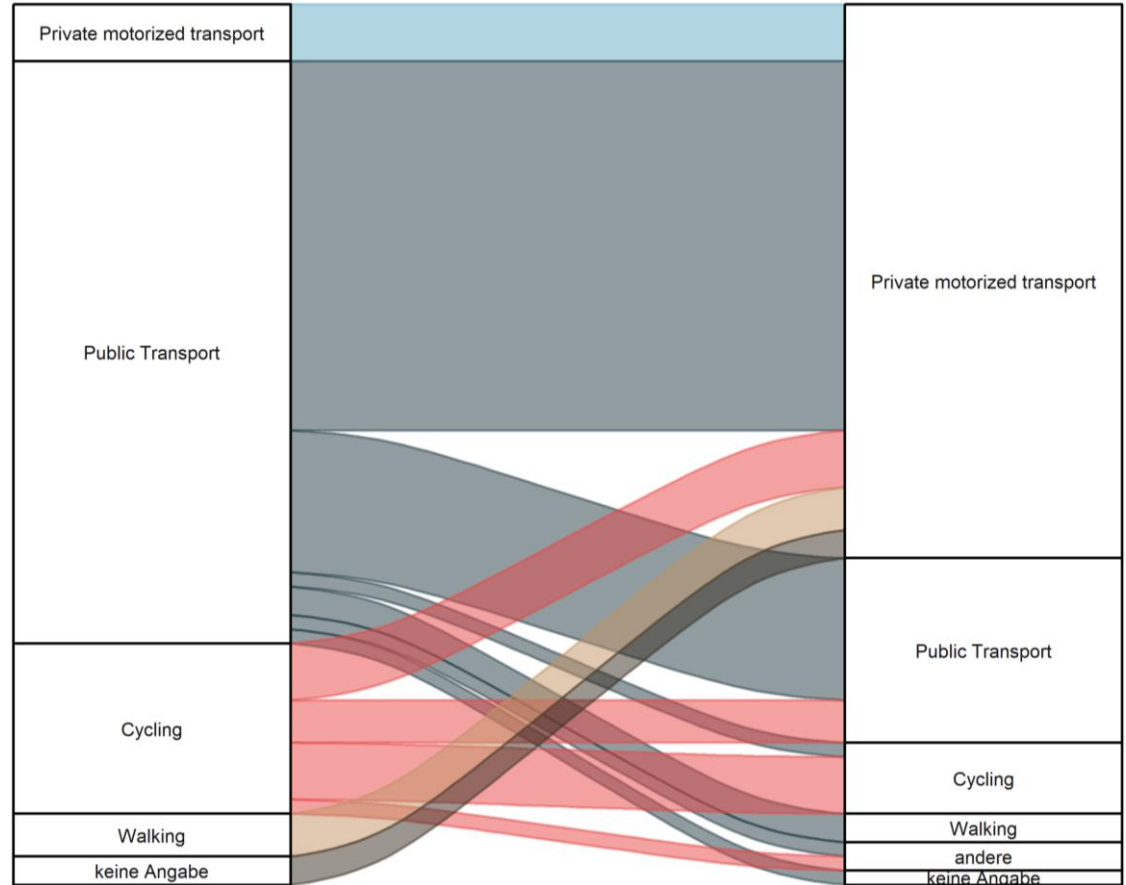
Car Ownership: Flows

Change from "other" to "urban"



Car Ownership: Flows

What happens after increasing car ownership?



Discussion: What do we learn from this?

- The **elasticity** of car ownership is very low when it comes to **reducing car ownership**
 - "If people feel they need a car, they will get one" – **workplace locations** should not be responsible for this perceived necessity!
- **Preventing car ownership** is easier (and more realistic?) than reducing car ownership
 - We need to reconsider the viability of this KPI in some projects
- Reducing the **negative impacts** of "passive car ownership" becomes relevant
 - Reduce / increase prices for on-street parking

6. Further discussion

- Hypothesis 1 is accepted with limitations: the impact is dependent on the location being either *centralized urban* or not.
- Hypothesis 2 is accepted with limitations: the elasticity is mainly observed for increases in car ownership
- Short 3-year observation period helps to isolate the effect of the workplace location, but there is still some uncertainty around...
 - Family structure
 - Household income
 - Self-selection effects (both in the sample as well as residential self-selection)
- A regression analysis (multivariate for mode choice, binary for mode change?) could strengthen the results further
- Within the EMMA project, we will replace the spatial clusters with new accessibility metrics and repeat the analysis

Thank you for your attention!

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Let's stay in touch!

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