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Car dependent practices: initial findings from a sequence pattern mining study of the 2000 British time use survey

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DEMAND DYNAMICS OF ENERGY, MOBILITY AND DEMAND

Energy

Abstract

There are three main understandings of the notion of 'car dependence' in transport research: a *micro*-social understanding (dependence as an attribute of individuals), a *macro* approach (attribute of societies or local areas as whole), and a *meso*-level understanding, where it refers to trips – or rather to the activities that people need to travel to. While the first two approaches have been dominant, in this paper I further develop the third. At the theoretical level, I build on theories of social practice to put forward the notion of 'car dependent practices', defined as those where the car is an essential element in the integration between different elements (materials, competences and meanings, as well as timing and location) and modal shift would entail substantial adjustments in their relationship. While a thorough study of practices requires qualitative methods, in this paper I explore the suitability of innovative sequence analysis techniques to further knowledge in this field. I apply the sequence pattern mining and clustering tools of the Visual-TimePAcTS software to the 2000 British Time Use Survey dataset, in order to bring to light traces of car dependent patterns of activities in daily life. The paper presents the preliminary results of this empirical study, carried out in the context of Theme 1 (*Trends and Patterns in Energy Demand*) of the DEMAND (*Dynamics of Energy, Mobility and Demand*) Research Centre.

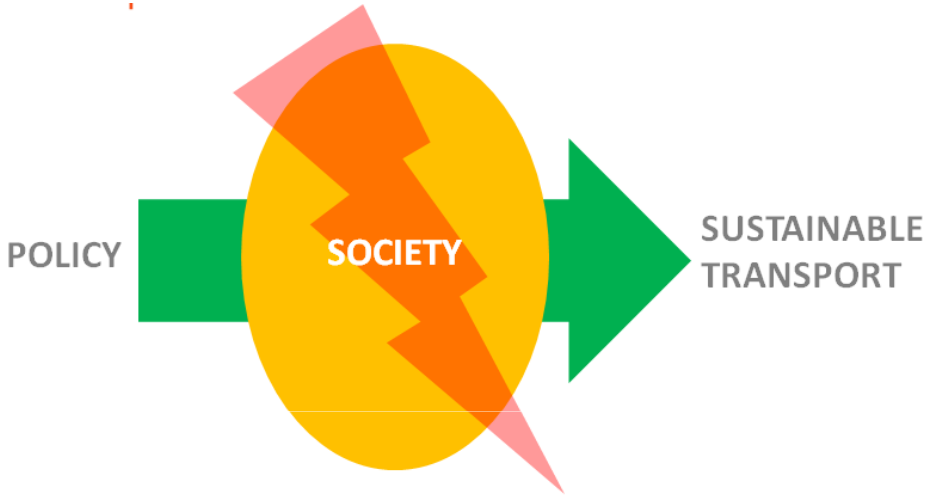
Structure of the presentation

1. Car dependence: a typology
2. The meso-understanding and social practices
3. Methods
4. Initial findings
5. Conclusions & future work

Car dependence

- *"**(a) testimony of the difficulty of moving away from the car system**, despite the increasing awareness of the negative externalities connected with its widely diffused uses"* (Martinotti, 2008, p.3)

- *"the term car dependence is **used in a multiplicity of ways** in the academic literature to describe a broad spectrum of quite different kinds of car use behaviours and dependencies – which is **confusing and unhelpful**"* (Lucas & Jones, 2009, p. 110)



My argument: variety of meanings can be better disentangled by drawing on basic sociological concepts (structure vs. agency, etc.)

MICRO

- **attribute of the individual**

- **agency** (or lack thereof)

Typical distinction (Farrington et al., 1998):

- **conscious dependence** "those who rely on their vehicle but could realistically undertake their journeys by alternative modes"
- **structural** dependence: "those who are dependent on the car because there are no viable alternatives"

- policy goal: **distinguish the two types, target the first**

- Ex. "Car addicts" in Anable (2005)

CRITICISM

- It makes sense to focus on individuals to study pro-car attitudes

- BUT **most 'contextual' factors behind the 'lack of alternatives' are not attributes of the individual**

- the notion of a 'structurally car dependent person' is confusing

- **needs to be complemented by alternative approaches**, more suited to shed light on structural constraints that are external to the individual

MACRO

- **Attribute of (local) society**
- **Structure**, rather than agency
- Mostly the **built environment**

- A car reliant location: "**Where it is virtually impossible to access a given location by any other mode of transport**, or where it is impossible to live in place without a car (e.g. deeply rural village with no local facilities)" (Lucas & Jones, 2009, p.116)

- **Empirical definition**: the inverse of the "availability and quality of public transport and the accessibility of critical facilities with non-motorized travel options" (Siedentop et al., 2013)

CRITICISM

- overlooks **differences within areas**

- assumption that **built environment determines behaviour**

- **no agency**: assumption that "people drive mostly because they have no alternative" (Newman et al., 2009, p. 84)

- Individual **agency has a role in reproducing** and sustaining existing car-oriented social and spatial structures (Gorham, 2002)

MESO

TYPICAL DEFINITION

- the **least developed**
- attribute of **trips or rather related activities**
- "Car dependent trips (as) **the type of trips that is seems it would be the most difficult to transfer away from the car"** (Stradling, 2003, p. 102)
- generally acknowledged that **certain trip purposes are less amenable to modal shift** (typical examples: heavy shopping, escorting children, etc..)
- but it has attracted **nowhere near the research attention** accorded to attitudes and the built environment

Social practices (Shove et al., 2012)

- **Vs individualistic "ABC"** (Attitude, Behaviour, Choice) approach to climate change policy and research (Shove, 2010)

- Change of perspective: the primary **unit of analysis** should be the '**practice**' ('routinized types of behaviour'), not be the individual,
- SP exist 'out there' ("P as *entity*") but are constantly enacted/reproduced ("P as *performances*")
- "**Individuals feature as the carriers or hosts of a practice**" - "to persist and survive, practices have to attract and activate practitioners and other constituent elements"
- "transcend the dualism of structure and agency, determination and voluntarism (..)"

Social practices (Shove et al., 2012)

P consist of **three types of elements**

- **material**
- **competences**
- **meanings**

.. that are integrated when practices are enacted

"P emerge, persist and disappear as **links** between their defining elements are made and broken"

Attention for time and space

Car dependent *practices*?

Working definition:

- practices where **the car has become an essential element** in the integration between the different elements (materials, competences and meanings + timing and location).

- **if car driving was subtracted** from the equation (and substituted with another transport mode), many other **elements would have to adapt substantially**

Meso-level approach to car dependence

It **allows us to 'see' things** overlooked in micro- and macro-approaches:

- **Materials**
  need to carry objects, 'portability' (Hui, 2012)
- **Competences**
  the need to learn new ways of doing (the same old) things
- **Meanings**
  negative meanings associated with some practices *when done with alternative modes?*
  Notions such as comfort and convenience should not be reified (Shove, 2003)
- **Timing**
  practices that would need to be carried out at another time of day, or with different frequency if the car was not available

Methods

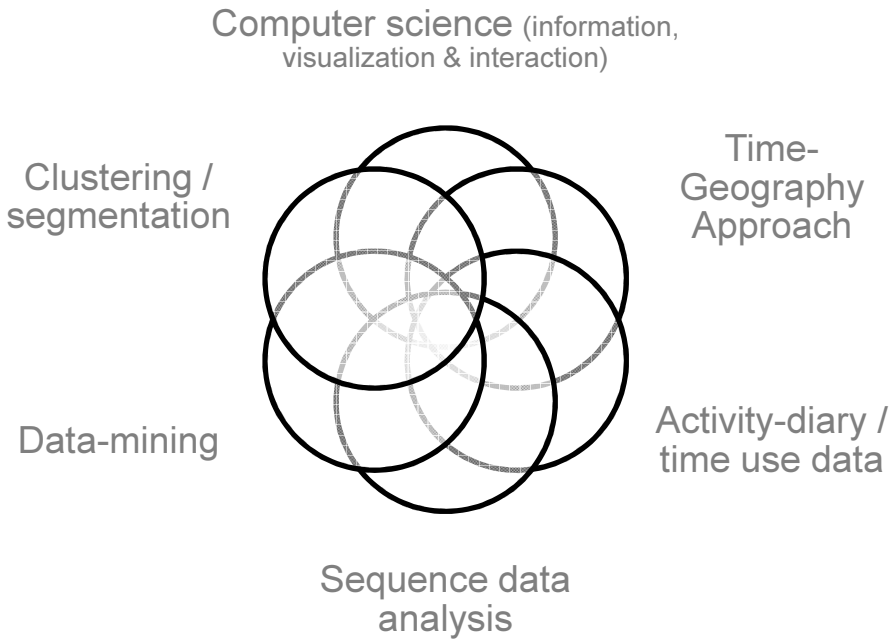
- Concepts that **call for in-depth, qualitative studies** focused on **specific** practices (interviews, participant observation)

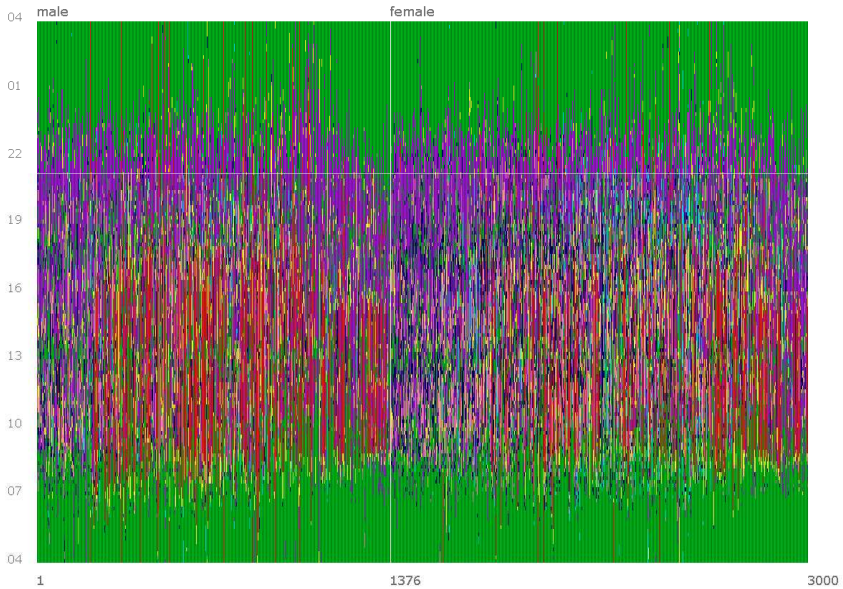
- **What role for quantitative analysis?** (division of labour)
  Identify areas of interest for further qualitative studies

- Need a rather **detailed classification** of trip purposes / activities between trips
- **Time-Use Surveys**: British TUS 2000

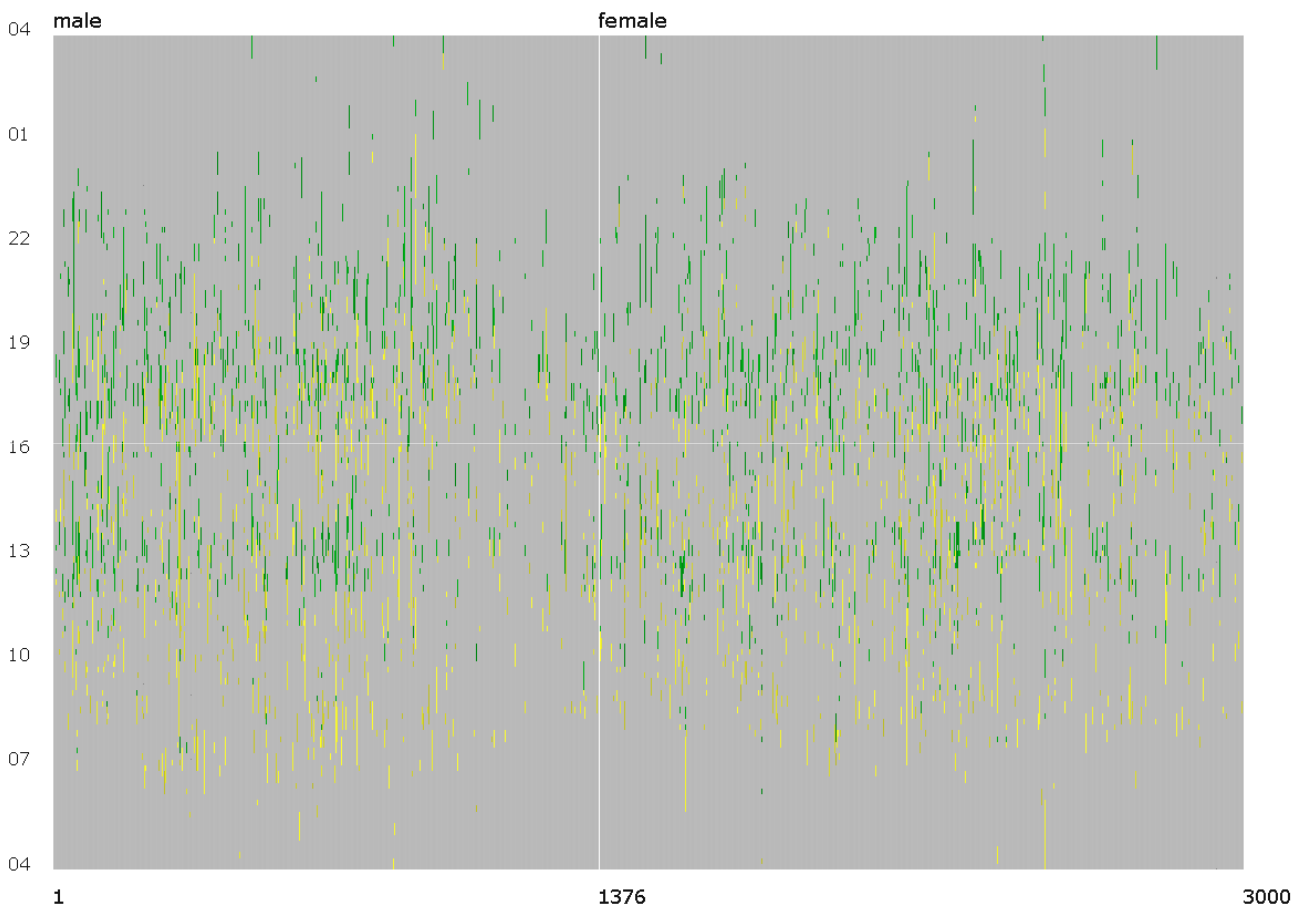
Visual-TimePAcTS

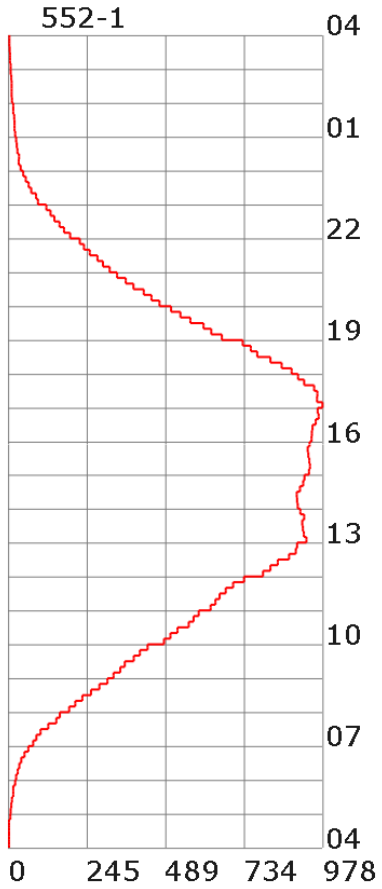
Linköping University, Vrotsou et al. (Ellegård & Cooper, 2004; Vrotsou, 2010; Vrotsou, Ellegård & Cooper, 2009; Vrotsou, Johansson, & Cooper, 2009)



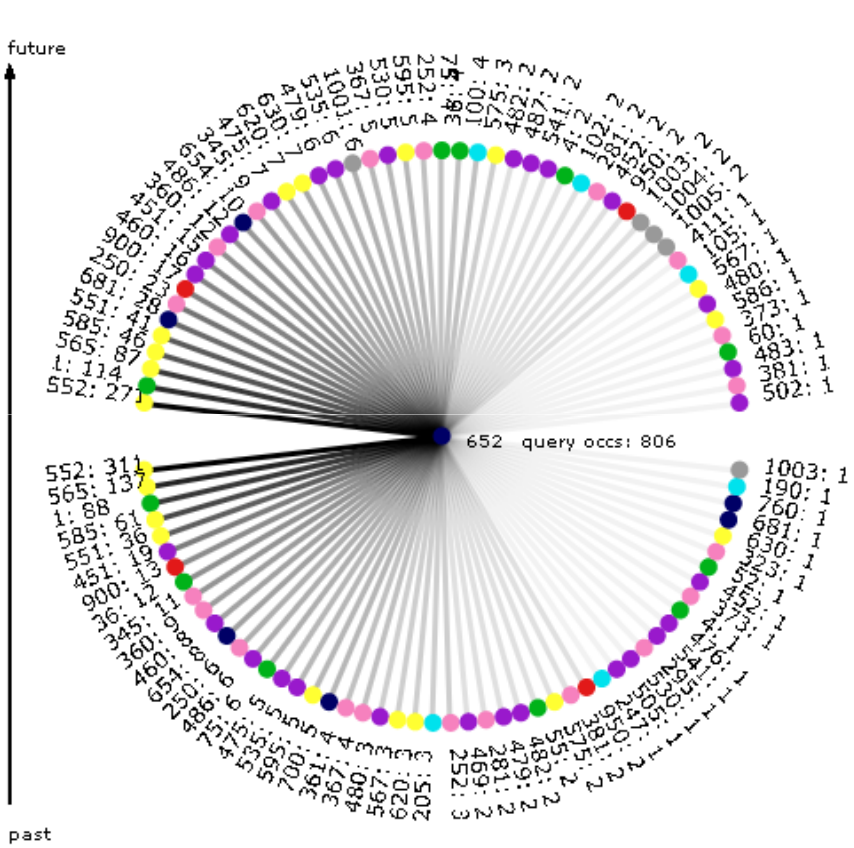


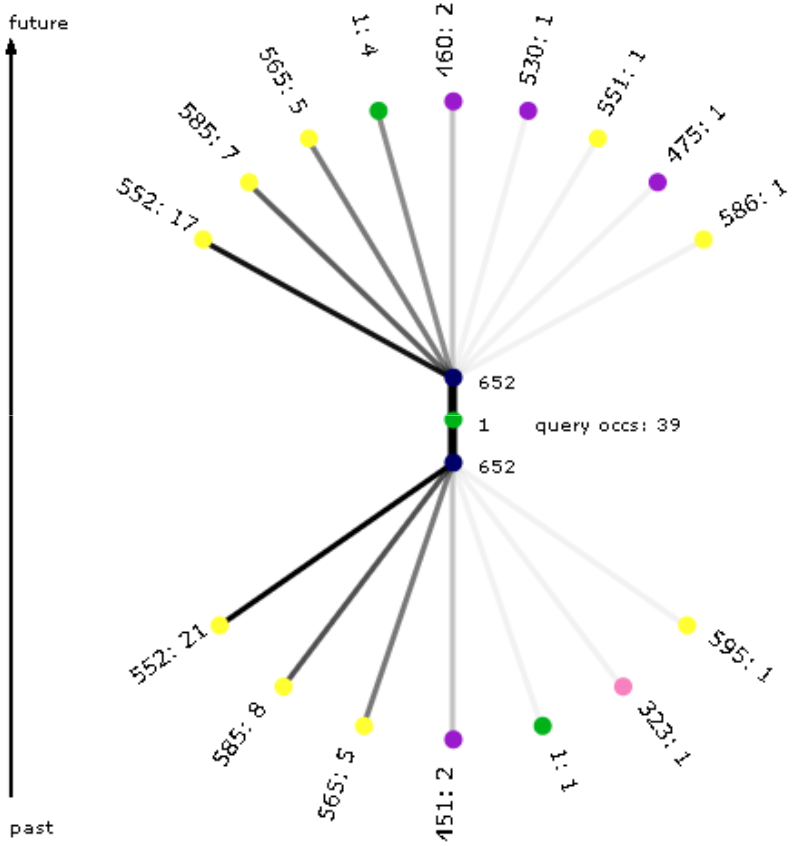
Visual-TimePAcTS – sequence pattern mining



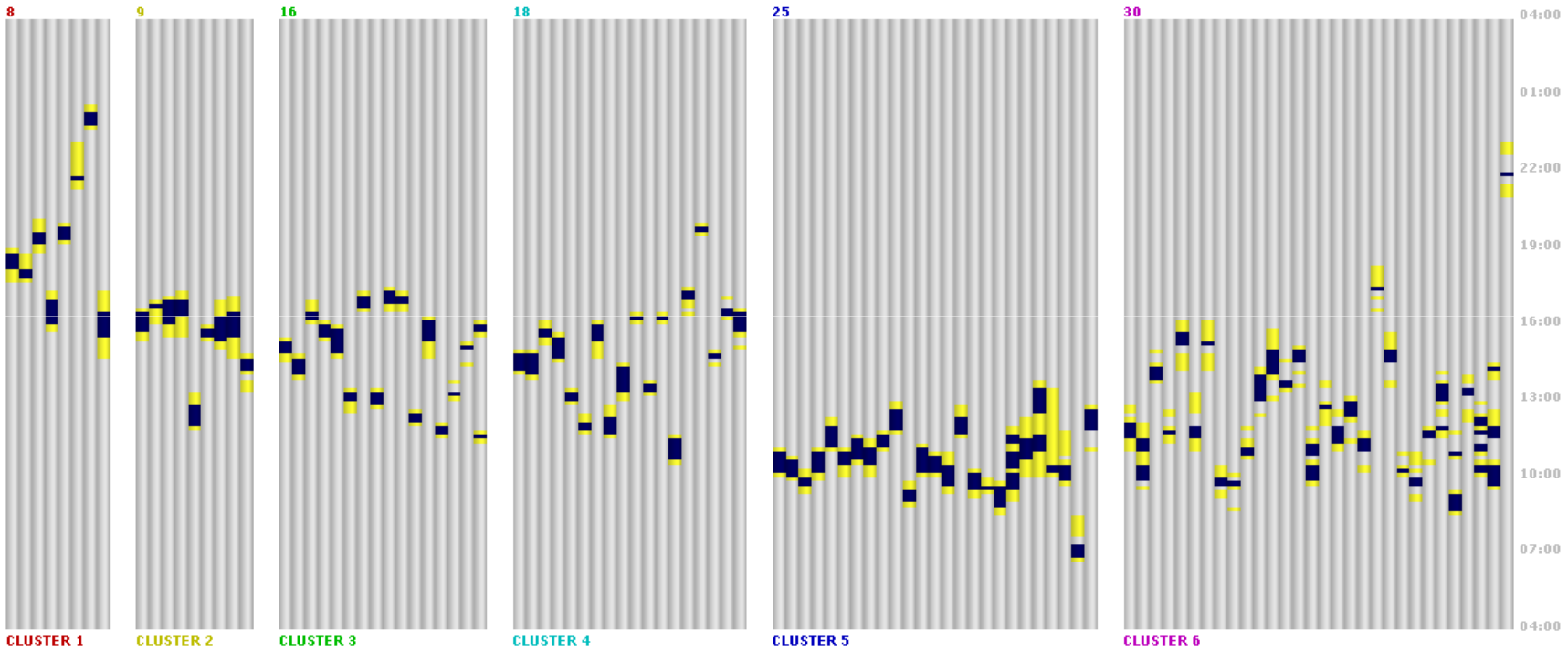


Visual-TimePAcTS - ActiviTree

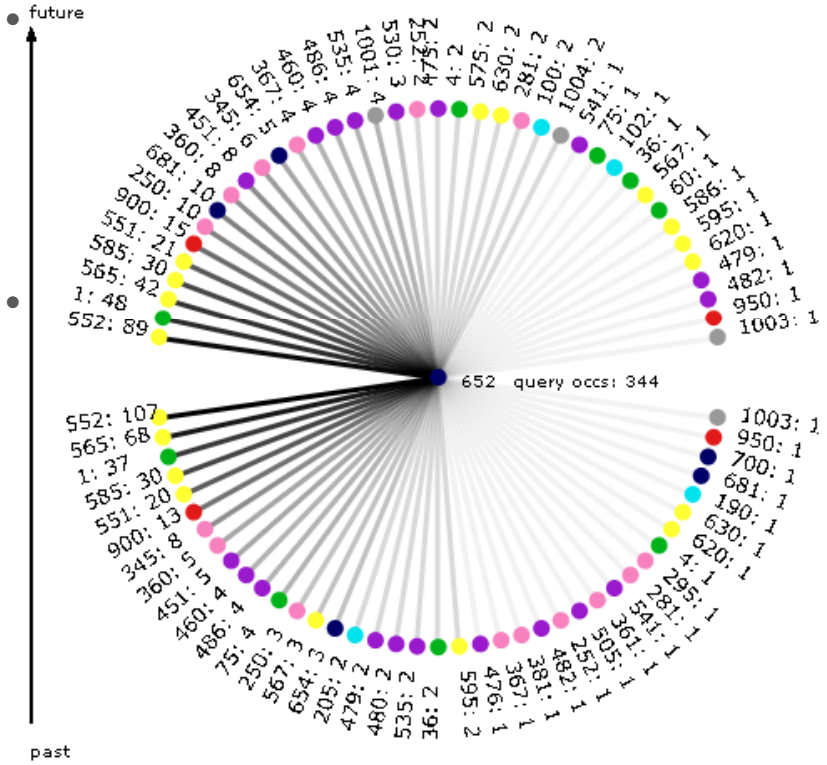




Visual-TimePAcTS - Clustering



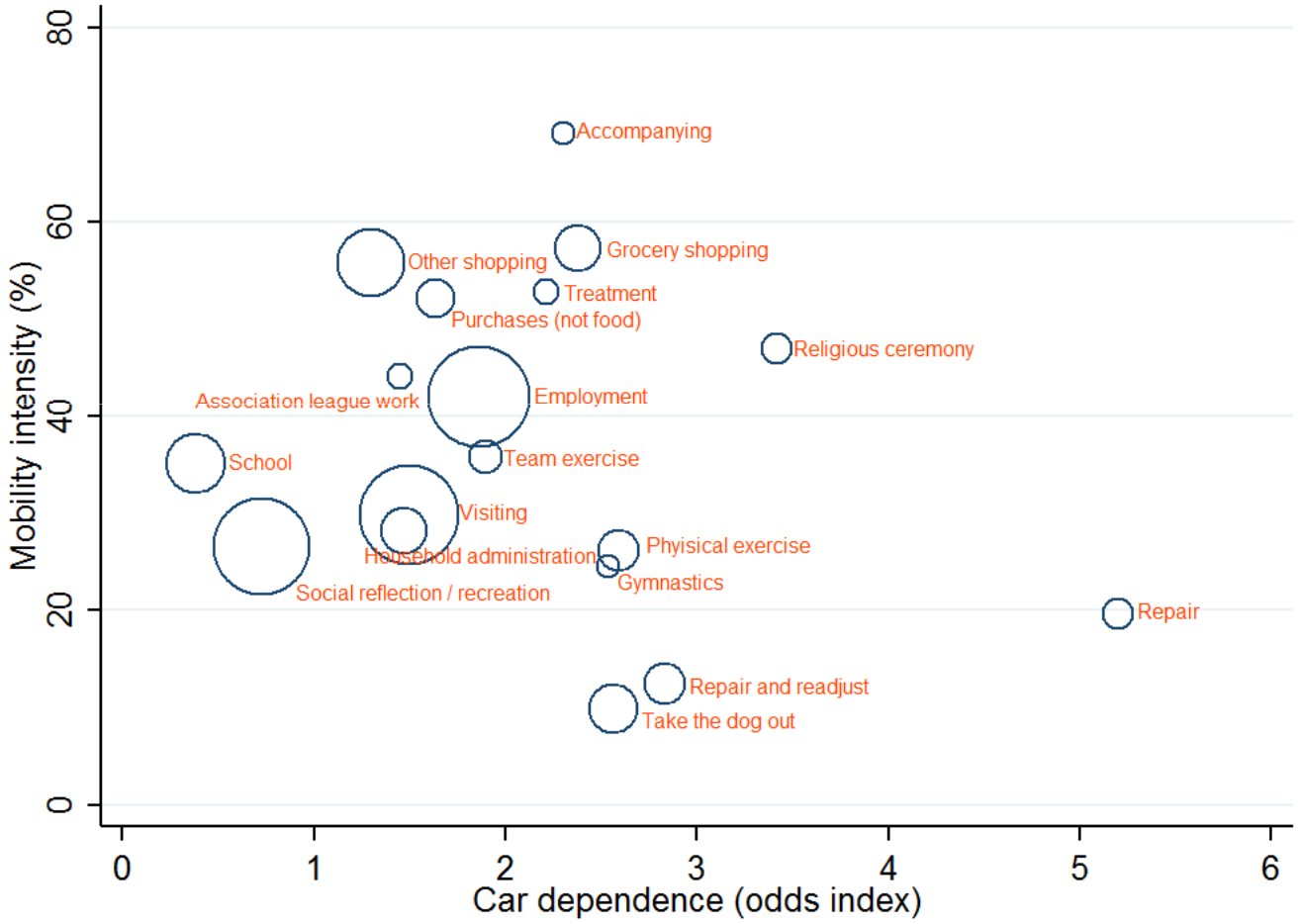
Data analysis approach



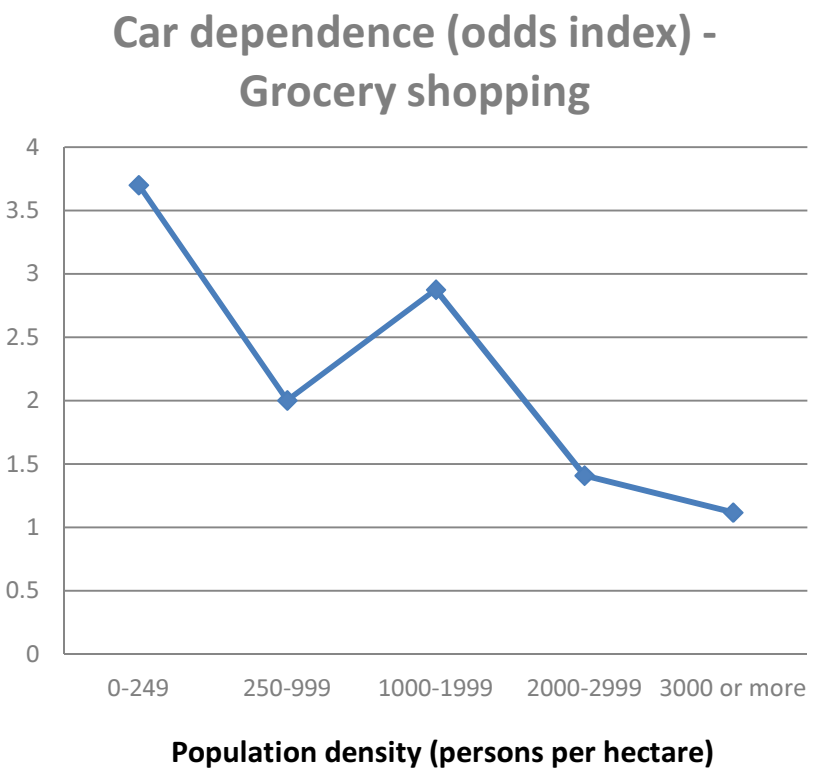
$$CD = \frac{(C_b/A_b) + (C_a/A_a)}{2}$$

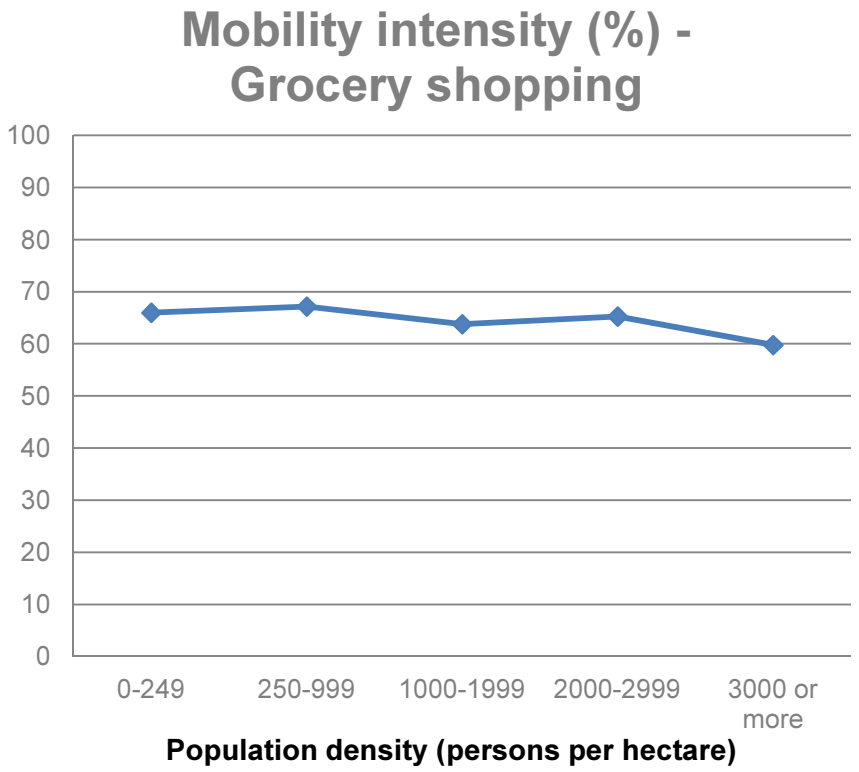
$$MI = \frac{(C_b + A_b)/N + (C_a + A_a)/N}{2} * 100$$

Initial findings



Initial findings





Conclusions

- variety of approaches to CD makes sense when **interpreted in light of basic sociological concepts** (structure vs. agency)
- well-established macro- and micro- approaches **need to be complemented by a meso-approach** based on theories of (sustainable) social practices
- **TUS can be exploited with innovative sequence pattern mining techniques** to single out (sequences of) activities strongly associated with car travel= areas of interest for further (qualitative) research

Extensions of the empirical work

- explore sequences of >1 activities
- Differences between types of area
- Investigate typical car-free patterns

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Thank you for your attention!

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