

M.Sc. in 'Transportation Systems'



Applied Statistics in Transport Travel Surveys, Your Paper

Prof. Regine Gerike
Technische Universität München, mobil.TUM
regine.gerike@tum.de

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Plan for Today's Lecture

- Rest Hypothesis Testing
- Information project work
- Overview German travel surveys
- Your data set: Mobility in Germany / MiD / Mobilität in Deutschland
- Hints for your paper

General Procedure for Hypotheses Tests: Example

For a sample of 50 passenger cars we got $\bar{x} = 76 \frac{km}{h}$; $s^2 = 120 km^2/h$.
Does this result differ significantly from $\mu = 80 km/h$?

- a) Assume that we know the population variance from comprehensive pre-studies with $\sigma^2 = 100 km^2/h^2$.
- b) Check the assumption that the speed at this section is lower than 80 km/h. Assume that we know the population variance from comprehensive pre-studies with $\sigma^2 = 100 km^2/h^2$.
- c) Assume that the population variance is unknown:
Instead of σ^2 we have to use $s^2 = 120 km^2/h$,
instead of the normal distribution we have to use the t-distribution:
- d) What would be the result for a reduced sample size of $n=30$?

Project Work

- Data Set: "Mobilität in Deutschland 2008" (MiD 2008) (Mobility in Germany)
- 6/7 groups à max. 6 students
- Task: Write one paper per group
- Max. 7,000 words
- Deadline: 13/03/2011
- One note per group
- Paper (30%) + exam (70%) = Note Applied Statistics in Transport

Project Work



Steps for project:

- Data Preparation, validation
- Descriptive statistics, visualization
- Research questions
- T-tests
- Optional: other tests, ANOVA, regression analysis

- No literature research!

Main Goals:

- Work with real data (read and prepare the data)
- Get familiar with exploratory data analysis (descriptive measures, graphics)
- Formulate research questions
- Write a paper: with a clear line of argument, a consistent layout, an introduction and conclusions



German Travel Surveys: Overview

Two diary day surveys:

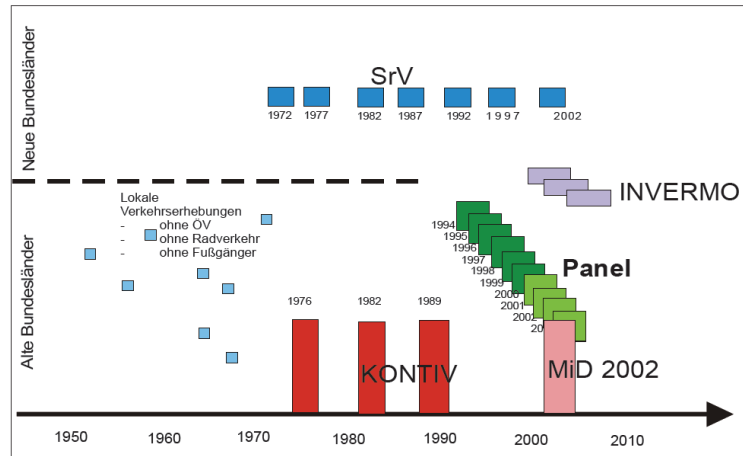
- Mobilität in Deutschland: <http://www.mobilitaet-in-deutschland.de/>
- System repräsentativer Verkehrsbefragungen:
http://www.tu-dresden.de/srv/SrV_Web/

One panel survey:

- Deutsches Mobilitätspanel: <http://mobilitaetspanel.ifv.uni-karlsruhe.de/>

Data as basis for transport planning and for research

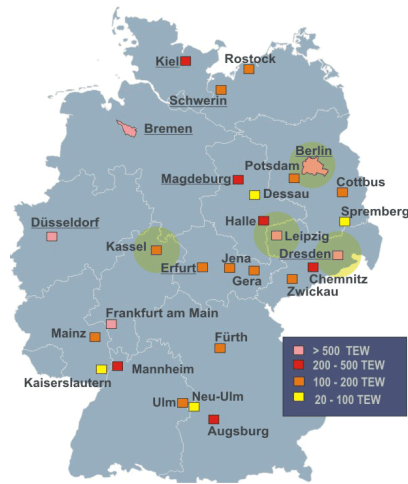
German Travel Surveys: Overview



German Travel Surveys: Mobilität in Deutschland

- Size of random sample net 25,000 households based on registries of residents (covering the whole Germany)
- States or regions add-on by app. another 25,000 households, 100,000 individuals, 300,000 trips
- Collection of information of the whole household
- Survey guided by fixed diary-dates and lasting 12 months (weekdays and weekend-days)
- Non-response-study
- Written questionnaires, telephone interviews, online questionnaires
- Years 2002, 2008
- Similar surveys: 1976, 1982, 1989 "KONTIV" (Kontinuierliche Erhebung zum Verkehrsverhalten)

System repräsentativer Verkehrsbefragungen

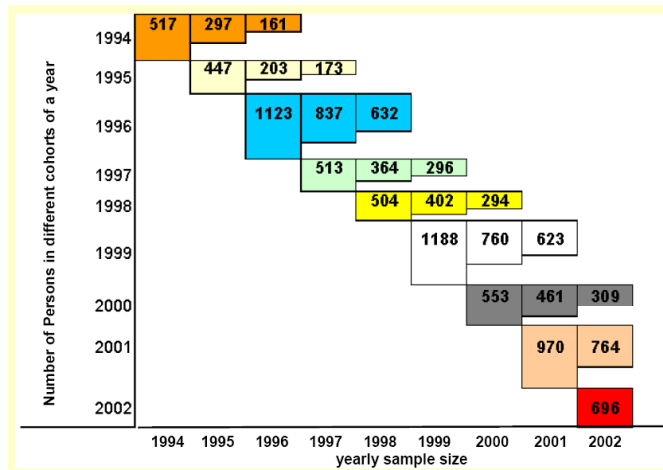


Participating cities in 2008,
http://www.tu-dresden.de/srv/SrV_Web/

German Mobility Panel, Deutsches Mobilitätspanel

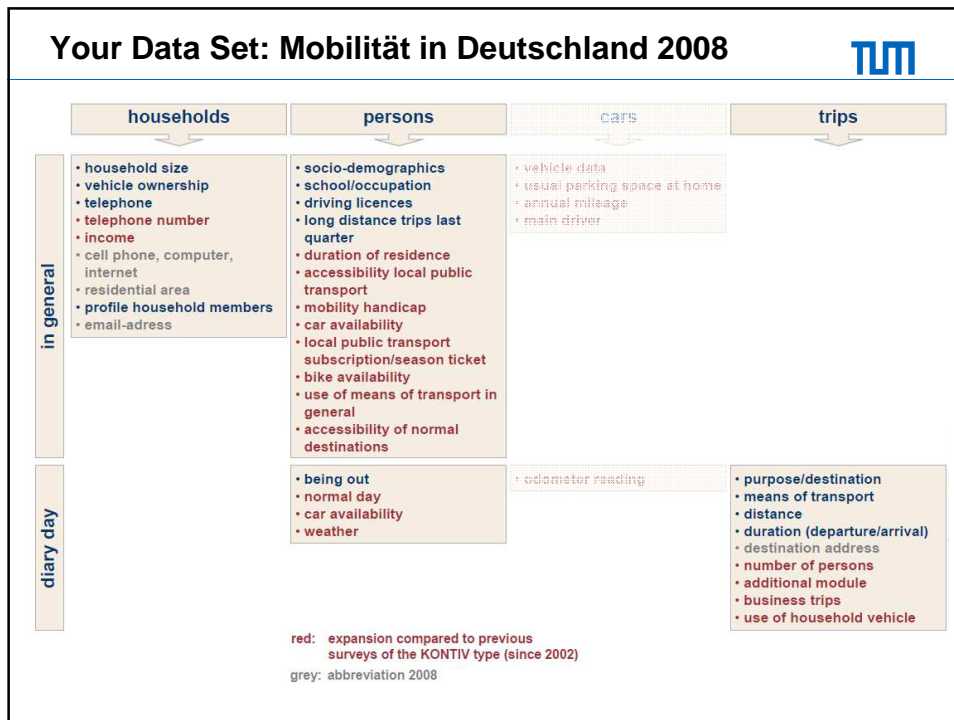
- Mobility behaviour of one complete week (longitudinal continuous approach) - diary for one week
- Yearly repetition (one week in autumn)
- Mobility of complete households
- Rotating sample (3 years of participation)
- No geocoding of destinations


German Mobility Panel



Your Data Set: Mobilität in Deutschland 2008

- One diary day
- Weekdays and weekend days during a whole year
- All region types
- Covering the whole household (including children, complete households in 81% of the cases)





Your Data Set: Mobilität in Deutschland 2008

- You get:

Rdata-files:

- H2008.Rdata, P2008.Rdata, W2008.Rdata
- load("...\\w2008.Rdata")
- save(w2008, file="...\\W2008.Rdata")

Textfiles:

- MiD2008_PUF_Wege.dat, MiD2008_PUF_Personen.dat, MiD2008_PUF_Haushalte.dat
- Each of the data sets contains information from other data sets

Codeplan:

- MiD2008 English Codeplan_20100521.xlsx

Your Data Set: Mobilität in Deutschland 2008

- Relevant variables:
- Number of trips on the diary day: wege1
- Travel time diary day: anzmin
- Travel distances diary day: anzkm
- Yearly distances travelled by car [km/year]: fahrhj_h
- CO₂-Emissions: co2tag_h (Household, diary day), co2tag_p (Person, diary day), co2weg (per trip)
- Household income: hheink
- Household variables: household type and household size, number of employed household members, number of driving licences, number of cars/bikes/motor cycles, reasons for not owning a car, type of region
- Person variables: car/bike availability, frequency usage car/bike/PT/airplane, gender, age, distances to and accessibility of facilities, employment status, education, type of PT-tickets, driving licence, availability handies/computers, mobility restrictions, type of region

Examples for research questions from last year

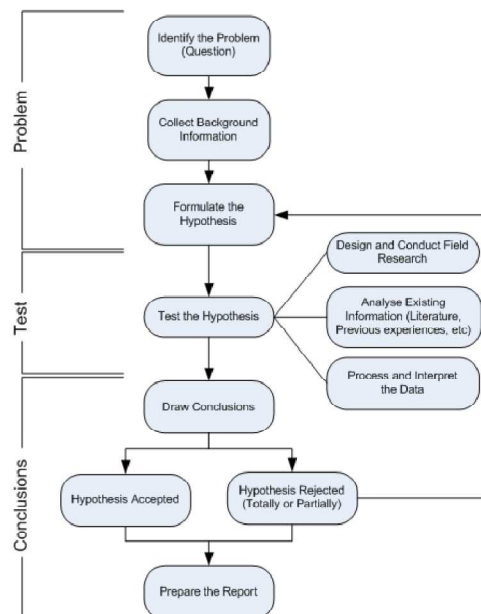
- Does the number of kilometers driven depend on the accessibility of specific facilities?
- Does the number of cars in a household depend on ...
- Does the satisfaction with public transport affect the km driven?
- Does the distance travelled depend on the household income?

Project Work



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- Structure of the paper:
 - Title, abstract, introduction, main part, conclusions, R-code

Hints for your paper - Introduction



Source: adapted from Jorge Espinoza,
course "Scientific Paper Writing", SS 2009

Hints for your paper - 9 Steps for Writing an Assignment

- Clarify the task
- Collect information
- Organize and plan
- Reflect and evaluate
- Write an outline plan and first draft
- Work on your first draft
- Discuss with someone
- Let it settle
- Prepare your final draft

Source: adapted from Jorge Espinoza, course "Scientific Paper Writing", SS 2009

Hints for your paper – Example, Structuring Reports

- Title
- (Acknowledgements, Abstract)
- List of contents
- List of tables and illustrations
- Introduction
- Methodology
- (Review of the literature)
- Presentation and discussion of results
- Conclusions, recommendations
- (References, Appendices)

Source: adapted from Jorge Espinoza, course "Scientific Paper Writing", SS 2009

Hints for your paper – General remarks

- Use clear criteria to evaluate and analyse
 - Show awareness of complexities
 - Follow a line of argumentation and a clear structure
 - Make decisions and acknowledge them explicitly
 - Use a formal language
 - Be impersonal, do not use first person
 - Be cautious
 - Be emotionally neutral/objective
 - Avoid apologies
 - Be concise and as simple as possible
-
- Find your own style!

Source: adapted from Jorge Espinoza, course "Scientific Paper Writing", SS 2009

Hints for your paper - Writing introductions

- Try to grab your reader's attention right from the beginning
- Establish a position (the particular line that you intend to take)
- Identify the subject and state the problem as clearly as possible
- Formulate your hypothesis and research questions
- Signpost the shape and content of the argument ("Roadmap")
- Highlight the major debates that lie behind the question or problem
- Define terms (key concepts, terms that are contested, etc.)

Source: adapted from Jorge Espinoza, course "Scientific Paper Writing", SS 2009

Hints for your paper - main section

- Writing the main section:
- Explain methodology – What have you done why?
- Build your argument - make each point follow from the previous one (logical progression)
- Provide theoretical and empirical evidence to support your argument

- Communicating your argument:
- Think about the audience
- Write clear sentences and paragraphs
- Explain your ideas as clearly as possible
- Give a direction to your report
- Introduce and summarize the main sections - Flow
- Refer back to the subject of the research

Source: adapted from Jorge Espinoza, course "Scientific Paper Writing", SS 2009

Hints for your paper - Literature review

- Provides a theoretical background to the study
- Broadens the knowledge base of the researcher in the subject area
- Brings clarity and focus to the research problem
- Helps to refine the research methodology
- It allows for contextualizing the findings

Source: adapted from Jorge Espinoza, course "Scientific Paper Writing", SS 2009

Hints for your paper - Developing a theoretical and conceptual framework

- Examining the literature can be a never-ending task
- As time is limited, setting parameters in relation to the research topic is crucial
- After an initial review of the literature a preliminary theoretical framework should be developed and enhanced progressively later on
- The theoretical framework may change during the research process
- After developing a Theoretical Framework, a Conceptual Framework should be developed.
- This specifies the aspects of the Theoretical Framework which have been selected by the researcher as basis for addressing the research problem.

Source: adapted from Jorge Espinoza, course "Scientific Paper Writing", SS 2009

Hints for your paper - Writing Conclusions

- Aim: Recap/synthesize the key points in your argument
- Provide a final condensed version of the research's core argument that restates your position on the question/topic
- Acknowledge the need for further research - limitations of your research
- Provide answer to the research questions
- Make reference to the hypothesis (accepted –rejected)
- Formulate recommendations
- Make reference to the objectives (where they achieved?)

Source: adapted from Jorge Espinoza, course "Scientific Paper Writing", SS 2009