What is: time diary analysis of work?

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Research

Plan

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1. What is work?

2. A short history of time(use)

3. Time diary instruments

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About the UK Data Service

Who are we?

– Main repository of UK secondary social science data

– A provider of support, training and guidance

– Freely accessible, funded by the ESRC

- Who are we for?
  - Academic researchers and students
  - Government analysts
  - Charities and the voluntary sector
  - Business consultants
  - Independent research centres / think tanks

Data curated

- Surveys:
  - Large-scale cross-sectional UK government surveys
  - Major UK longitudinal surveys following individuals over time
  - Multinational aggregate databases and survey data
- Census data – modern and historic records
- Business and administrative microdata
- Deposited survey data and multimedia/qualitative data sources

User support and training

- Helpdesk for data-related queries
- Webinars and online workshops:
  - datasets, methods, and software focused
- Online learning materials: Data Skills Modules and pathways
- 'Traditional' survey-related and new forms of data ie computational social science.
- Supporting data literacy among undergraduate students

1. What is work?

Clarification

- Potentially huge topic: work is joy, effort, meaning, conflict, resources usage, earnings and wealth production

- … We are not therefore looking at it as 'Total Social Fact'

- … But rather at those aspects that can be measured, in a specific way:

  - Work as the time we dedicate to it together with some contextual information

Formal definitions of work according to the ILO

Intended destination of production	for own final use		for use by others					
Forms of work	Own-use production work		Employment (work for pay or profit)	Unpaid trainee work	Other work activities	Volunteer work		
	of services	of goods				in market and non-market units	in households producing	
							goods	services

... The third person criterion

- Reid (1934): *'Work is anything that you might ask a third party to do on your behalf without losing the direct utility that derives from it.'*

  - Cooking a meal, looking after children is work

  - Watching a film is not

  - ... Irrespective of whether the third party is actually paid for it

2. A short history of time use research

Prehistory of time use research

- Early 20th Century: peasant households in Russia & the Fabians (Women in London)

- Soviet economists: Time Budgets of Russian Workers in 1923–1924;

- Taylor's Scientific Organisation Work

- US Department for Agriculture time use in farms, towns, and later elite educated "college", women

- In the UK: Mass Observation

- Often linked to agenda for monitoring productivity, in particular household productivity

Post second world war

- Sandór Szalai's The Use of Time
  - Pioneering survey of urban households in 12 countries
  - First systematic time diary data collection: 'who does what, where, with whom, over 24h'
- Centre for Time Use Research (Jonathan Gershuny)
  - Multinational Time Use Study (MTUS): leading source for harmonised time use data
- ICATUS
- Harmonised European Time Use Study (HETUS);

3. Instruments

Time diaries are social surveys

- Traditional individual questions: *How old are you*?

- Time diaries proper:

  - 10 minutes time slots

  - 2 days (1 weekday/1 day at the weekend)

  - Unit of observation is the day rather than a person

- Example: the 2015 UK Time Use Survey

  - 16,550 days; 10,208 respondents; 4,238 households

  - Time Diaries for respondents aged 8 and above

  - Collected all year round
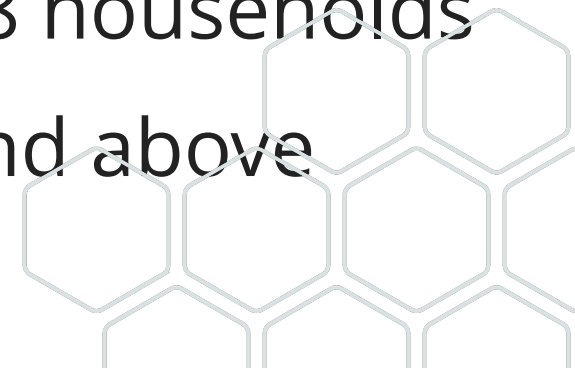
Time diaries

- The most common instrument is the 24h time diary
- A typical 24h time diary is made of at least 4 variables
  - What am I/was I doing?
  - What am I/was I also doing?
  - Where am I/was I?
  - Who else was present?
- 24h time diaries may also record:
  - Enjoyment
  - (IT) Device usage

Time diaries

- Record your main activity for each 10-minute period
- Only one main activity on each line!
- Distinguish between first and second job, if any.
- Distinguish between travel and the activity that is the reason for travelling.
- Don't forget the mode of transport or location and whether you were using a smartphone, tablet or computer.
- Please remember to record who you were with.

- For each 10-minute period, please write in how much you enjoyed this time on a scale of 1 to 7, with 1 meaning you didn't enjoy it at all and 7 meaning that you enjoyed it very much.
- For example, if you didn't enjoy an activity at all then you would write 1 in the box.

This includes children aged 8 and over

Day 1
Time: 7am – 10am
Morning

Day 1
Time: 7am – 10am

Were you alone or with somebody you know?
Mark all relevant boxes
People who live with you

Time: 7am–10am Morning (am)	What were you doing? Please write down one main activity.	If you did something else at the same time, what else did you do?	Did you use a smartphone tablet, or computer?	Where were you? Location, or mode of transport	Alone	Spouse / partner	Mother	Father	Child aged 0–7	Other person	Others you know	How much did you enjoy this time? 1 =not at all 7 =very much
7am-7.10	Woke up the children		☐	At home	☐	☐	☐	☐	■	☐	☐	5
7.10-7.20	Had breakfast	checked emails	☑		☐	■	☐	☐	■	☐	☐	6
7.20-7.30	" "	Talked with my family	☐		☐	☐	☐	☐	■	☐	☐	5
7.30-7.40	Cleared the table	Listened to the radio	■		☐	■	☐	☐	☐	☐	☐	4
7.40-7.50	↓	↓	■		☑	☐	☐	☐	☐	☐	☐	
7.50-8am	Helped the children dressing	Talked with my children	☐		☐	☐	☐	☐	■	☐	☐	
8am-8.10	" "	↓	☐		☐	☐	☐	☐	■	☐	☐	
8.10-8.20	Went to the day care centre		☐	on foot	☐	☐	☐	☐	■	☐	☐	1

Use an arrow or quote marks to record that an activity lasted longer than 10 minutes.

Work schedule

- Since the early 2000s

- Paid work and full-time education only diary

- Seven day diary

- 15 minute resolution

- Better suited to capture the daily variations in the rhythms of paid work

- Unfortunately, not widely available in the EU; UK 2000,2015

Work schedule

Weekly schedule of paid work time

- The aim of this schedule is to get an overview of your working week.

- You should complete this schedule if any of the following apply to you over the week starting with your first diary day:
  - you do any paid work
  - you work on your own account (self-employed)
  - you provide support for a family business (family worker)

- The first day of this schedule should be the same as your first diary day.

- Put a line through each 15 minute interval when you were working. See the example at the bottom of this page.

- If you did not work on any particular day, tick the 'Did not work' box. ✔

- Include second, part-time and one-off jobs, however small (such as paid babysitting). Also include time in self-employment or working for a family business.

- Include any paid work brought home from any paid job and done at home.

- Do not include unpaid breaks, such as lunch or tea breaks, or time travelling to/from work.

Example: on Wednesday, 11 June, you worked from 7.15am to 6.00pm with a lunch break between 1.15pm and 2.15pm.

Day	Month	Day of the week	Did not work
1st day (day when you fill in your first diary)			
1 1	0 6	Wednesday	☐

Example: on Thursday, 12 June, after you returned home from college, you delivered newspapers for pay from 4.30pm to 5.15pm, then did paid babysitting for a neighbour from 7.00pm to 8.30pm.

Day	Month	Day of the week	Did not work
3rd day			
1 2	0 6	Thursday	☐

Work schedule

Nomenclatures

- Historically time diaries were collected via pen and paper methods, then subsequently recoded.

- Standardised nomenclature:

  - International Classification of Activities for Time-use Statistics (ICATUS)

  - Harmonised European Time-Use Study (HETUS)

  - Multinational Time Use Study (MTUS)

- Worth looking at the alternative nomenclatures used in larger national studies: Indian Time Use Study, American Time Use Study
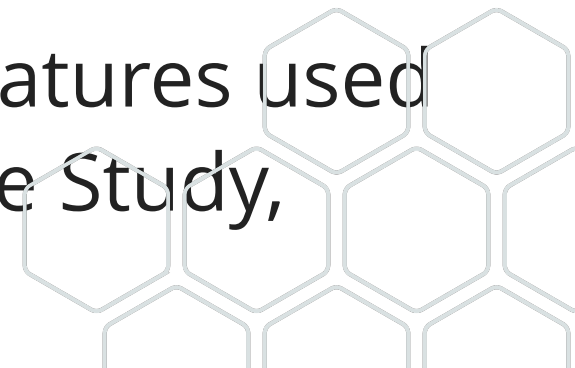
From the Indian Time Use Survey

1. **ECONOMIC ACTIVITIES IN THE PRIMARY SECTOR (AGRICULTURE, HUNTING, FORESTRY AND FISHING, MINING AND QUARRYING)**
    _ **CROP AND ANIMAL PRODUCTION, HUNTING AND RELATED SERVICE ACTIVITIES (NIC'08 DIV-01)**
        _ _ **CULTIVATION OF CROPS IN THE FIELD OTHER THAN PLANTATION, HORTICULTURE AND FLORICULTURE**

Abridged Classification

Land preparation and planting in the field

- 100. Ploughing/tilling, preparing land for cultivation
- 101. Sowing, planting and transplanting, in the field
- 109. Land preparation and planting activities in the field n.e.c.

Raising crops/cultivation in the field

- 110. Applying fertilizer, manure etc in the field
- 111. Applying pesticides/insecticides/rodenticides etc. in the field
- 112. Watering of plants/irrigation operations in the field
- 113. Weeding, cutting of undergrowths/shrubs etc. in the field
- 114. Grass cutting, tree/plant pruning in the field
- 115. Plant propagation activities
- 119. Crop raising/cultivation activities n.e.c.

Harvesting and reaping in the field

- 120. Harvesting and related works
- 121. Threshing and winnowing of crops and related works, including collection of stalks and stems

The HETUS

1		**EMPLOYMENT**

Note: According to ILO actual hours worked should include[44]:

1. Productive time (hours actually worked during normal periods of work and time worked in addition to hours worked during normal periods of work, and generally paid at higher rates than normal rates (overtime);

2. Time spent on ancillary activities (time spent at the place of work on work such as the preparation of the workplace, repairs and maintenance, preparation and cleaning of tools and the preparation of receipts, time sheets and reports);

3. Unproductive time spent in the course of the production process (time spent at the place of work waiting or standing-by for such reasons as lack of supply of work, breakdown of machinery or accidents, or time spent at the place of work during which no work is done but for which payment is made under a guaranteed employment contract);

4. Resting time (time corresponding to short rest periods at the workplace, including tea and coffee breaks).

Note: The definition explicitly excludes time not worked, even if paid, such as paid annual leave, paid public holidays, paid sick leave, meal breaks and time spent on travel from home to work and vice versa.

Note: Working time applies to work done in paid jobs and in a family business or property, also as "unpaid family member". It also applies to work done by people who do not regard themselves as employed, e.g. children and elderly people.

11		**MAIN JOB AND SECOND JOB**
	111	**Working time in main and second job (including short breaks and travel at work)**

Definition: Time spent on main and second job, including: working overtime, work brought home, paid practical training, training during work and travelling due to work,

… The MTUS

| Activity code	Description
MAIN/SEC 1	Imputed personal or household care
MAIN/SEC 2	Sleep and naps
MAIN/SEC 3	Imputed sleep
MAIN/SEC 4	Wash, dress, care for self
MAIN/SEC 5	Meals at work or school
MAIN/SEC 6	Other meals or snacks
MAIN/SEC 7	Paid work - main job (not at home)
MAIN/SEC 8	Paid work at home
MAIN/SEC 9	Second or other job not at home
MAIN/SEC 10	Unpaid work to generate household income
MAIN/SEC 11	Travel as a part of work
MAIN/SEC 12	Work breaks
MAIN/SEC 13	Other time at workplace
MAIN/SEC 14	Look for work
MAIN/SEC 15	Regular schooling, education
MAIN/SEC 16	Homework
MAIN/SEC 17	Leisure/other education or training
MAIN/SEC 18	Food preparation, cooking
MAIN/SEC 19	Set table, wash/put away dishes
MAIN/SEC 20	Cleaning
MAIN/SEC 21	Laundry, ironing, clothing repair
MAIN/SEC 22	Home/vehicle maintenance/improvement
MAIN/SEC 23	Other domestic work
MAIN/SEC 24	Purchase goods

Data structure of diary files

- Typically in 'long' format

- Each line in the dataset records an episode

- On average 15 episodes per day per person

- Episodes are embedded within days within person within diaries

- Requires episode number, duration, start and end time

A glimpse into a diary file

	country	survey	hldid	persid	day	epnum	time	main	
1	ES	2009	1	1	Sunday	1	240	sleep and naps	no recorded activit
2	ES	2009	1	1	Sunday	2	20	meals or snacks in other places	no recorded activit
3	ES	2009	1	1	Sunday	3	10	wash, dress, care for self	no recorded activit
4	ES	2009	1	1	Sunday	4	30	wash, dress, care for self	no recorded activit
5	ES	2009	1	1	Sunday	5	30	cleaning	no recorded activit
6	ES	2009	1	1	Sunday	6	90	walking	no activity, impute
7	ES	2009	1	1	Sunday	7	30	other travel	no recorded activit
8	ES	2009	1	1	Sunday	8	30	food preparation, cooking	receive or visit fr
9	ES	2009	1	1	Sunday	9	30	meals or snacks in other places	receive or visit fr
10	ES	2009	1	1	Sunday	10	30	watch TV, video, DVD, streamed film	receive or visit fr
11	ES	2009	1	1	Sunday	11	60	sleep and naps	no recorded activit
12	ES	2009	1	1	Sunday	12	120	watch TV, video, DVD, streamed film	receive or visit fr
13	ES	2009	1	1	Sunday	13	10	watch TV, video, DVD, streamed film	no recorded activit
14	ES	2009	1	1	Sunday	14	140	walking	no activity, impute
15	ES	2009	1	1	Sunday	15	10	other travel	no recorded activit
16	ES	2009	1	1	Sunday	16	40	food preparation, cooking	receive or visit fr
17	ES	2009	1	1	Sunday	17	50	meals or snacks in other places	receive or visit fr
18	ES	2009	1	1	Sunday	18	100	watch TV, video, DVD, streamed film	receive or visit fr
19	ES	2009	1	1	Sunday	19	370	sleep and naps	no recorded activit
20	ES	2009	1	2	Sunday	1	240	sleep and naps	no recorded activit
21	ES	2009	1	2	Sunday	2	20	meals or snacks in other places	receive or visit fr
22	ES	2009	1	2	Sunday	3	40	wash, dress, care for self	receive or visit fr
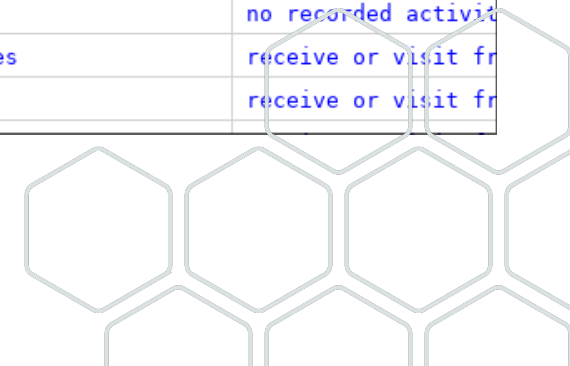
4. Paid work estimates with time diaries

Estimating durations

Let's compute the daily amount of time spent in paid work

We need to flag work episodes: - We will be using a broad definition: any of the work-related tasks described below carried out either at home or outside home (but not commute).

```
7  --  paid work-main job (not at home)
8  --  paid work at home
9  --  second or other job not at home
10 -- unpaid work to generate household income
11 -- travel as a part of work
12 -- work breaks
13 -- other time at workplace
```

- The first thing to do consist in flagging work in the episode dataset. In R, I will use the `ifelse()` function (`case_when()` from the `dplyr` package would also work)

- Let's have `wk.t` record the duration of any work related episode. (0 if no episode were recorded)

```
ep$wk.t<-ifelse(ep$main>=7 & ep$main<=13,ep$time,0)
```

Let's have a look at the variable

```
   Min.  1st Qu.   Median      Mean  3rd Qu.      Max.
  0.000    0.000    0.000     6.296    0.000  1340.000

  Min. 1st Qu.  Median     Mean 3rd Qu.     Max.
   1.0    20.0    90.0    131.2   210.0   1340.0
```

- The mean seems rather low

... In order to produce valid estimates, we need to first compute the amount of time spent on paid work ... for each day of each respondent

```
ep<-ep%>%group_by(study,hldid,persid,id)%>%
    mutate(wk.b=sum(wk.t))%>%ungroup()
```

We can now compute our first set of estimates...

```
# A tibble: 5 × 2
  study      All
  <chr>    <dbl>
1 ES 2009  126.
2 FR 2009  124.
3 NL 2000  137.
4 UK 2014  116.
5 US 2012  151.
```

We can even plot the results easily

Daily working time in selected countries
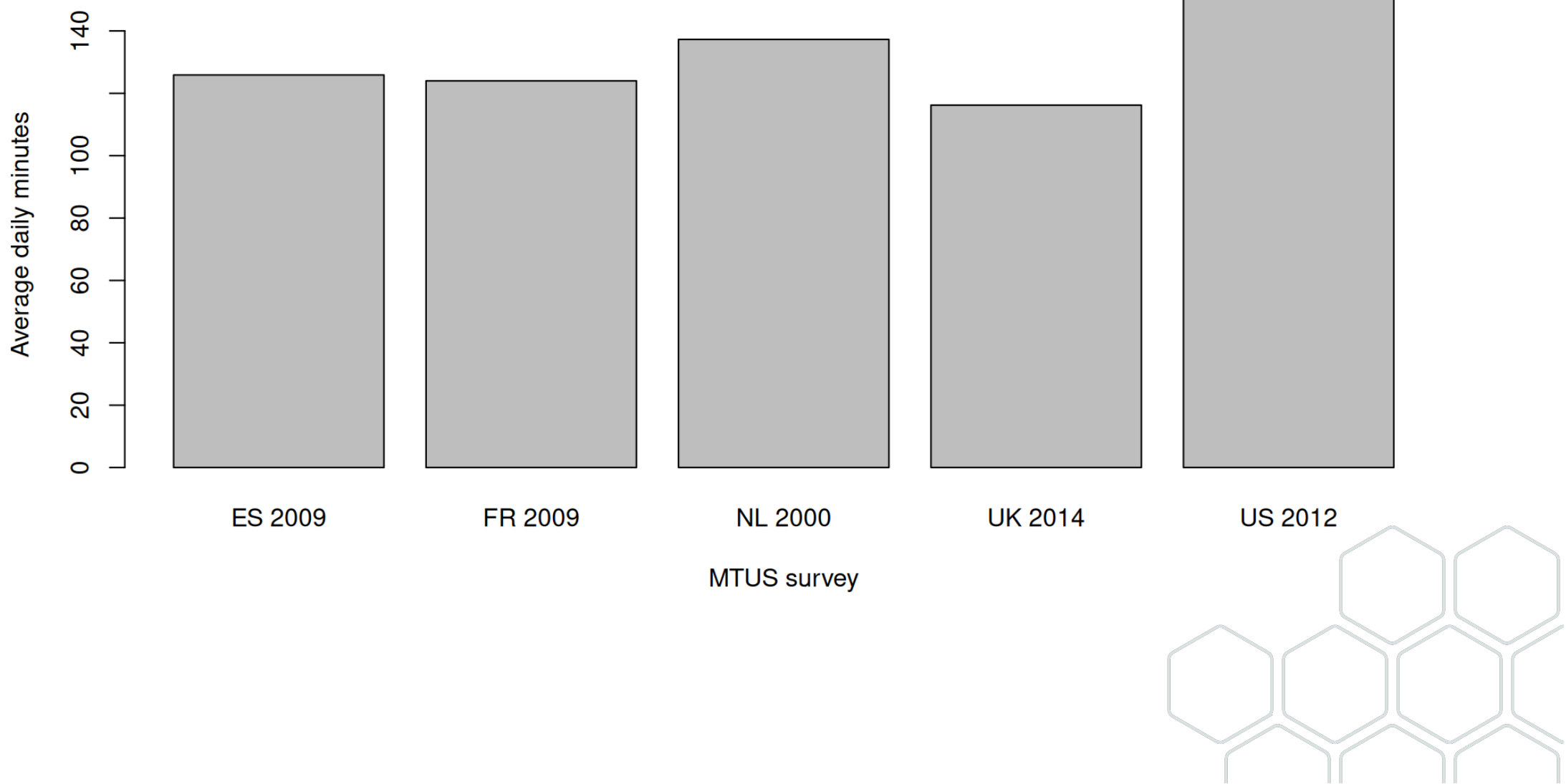
The daily number of minutes in paid work seem a bit low. Could this be due to the fact that we do not differentiate between weekend and weekdays?

```r
ep$wkd<-ifelse(ep$day>1 & ep$day<7,"Weekday","Weekend")
```


Daily working time in selected countries
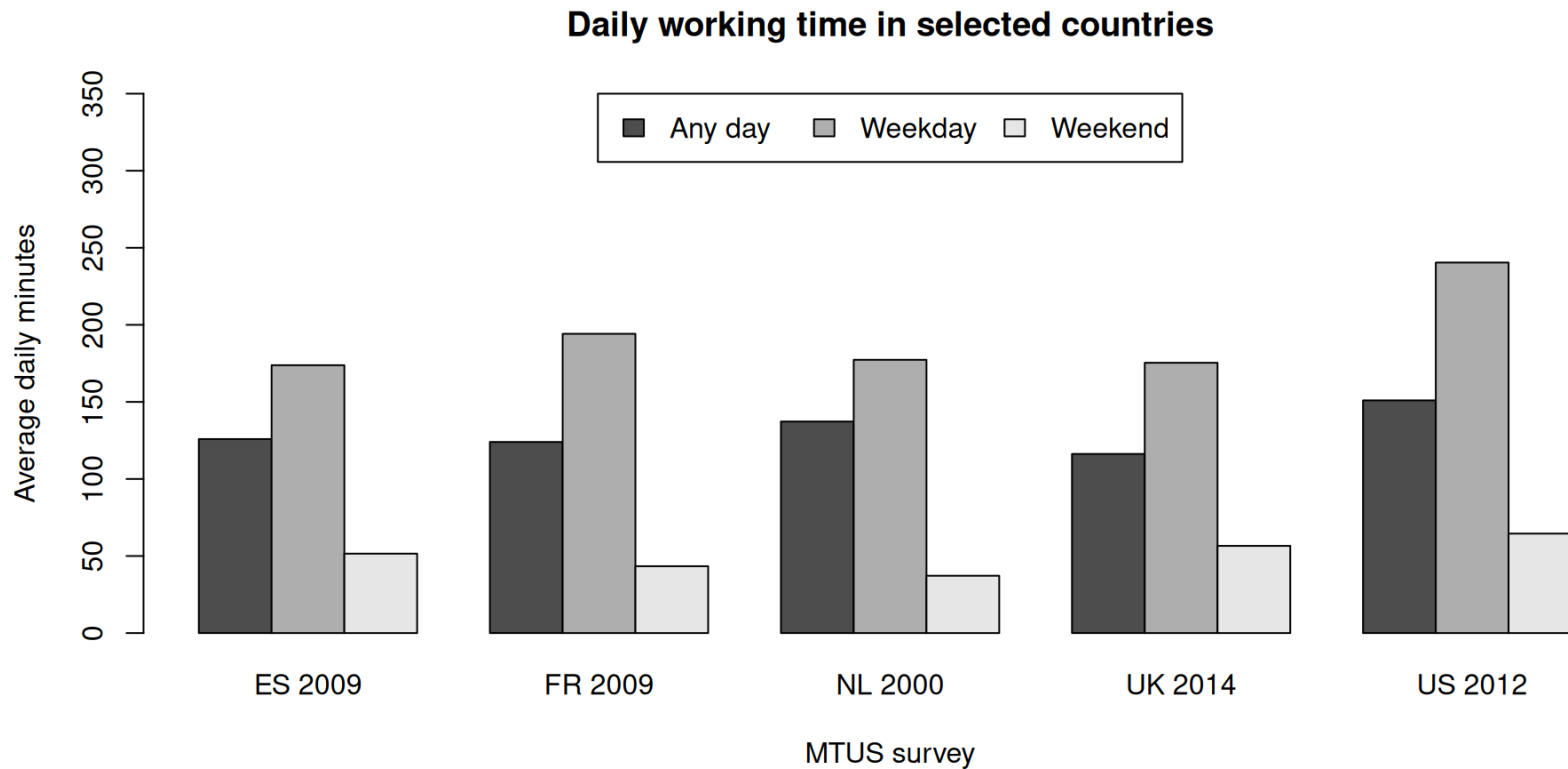
- We need to decide:
  - are we interested in an overall mean, also including people who not engage in paid work?
  - … or instead just reflecting the typical daily working time of those who did work on the day?
- Let's only keep respondents with at least one episode of reported paid work aka 'Participants'

Daily working time in selected countries (participants)
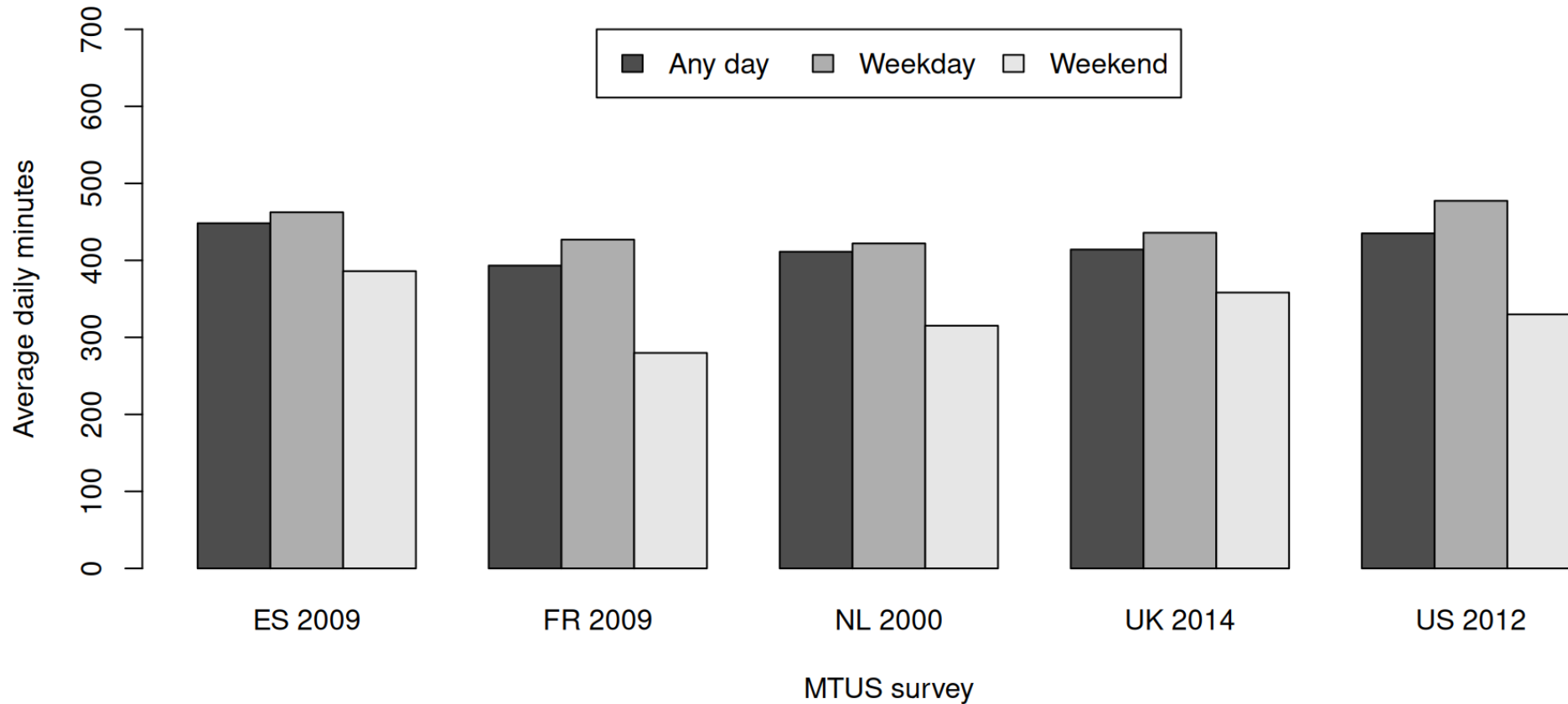
These durations are more realistic, but samples may differ if other activities are also estimated

Probabilities of participation

- Instead of durations, we are looking at *probabilities* ie $P(wk.\,t > 0)$ on a given day.

- ... Which we then average over all diaries

Daily probability of reporting paid work in selected countries
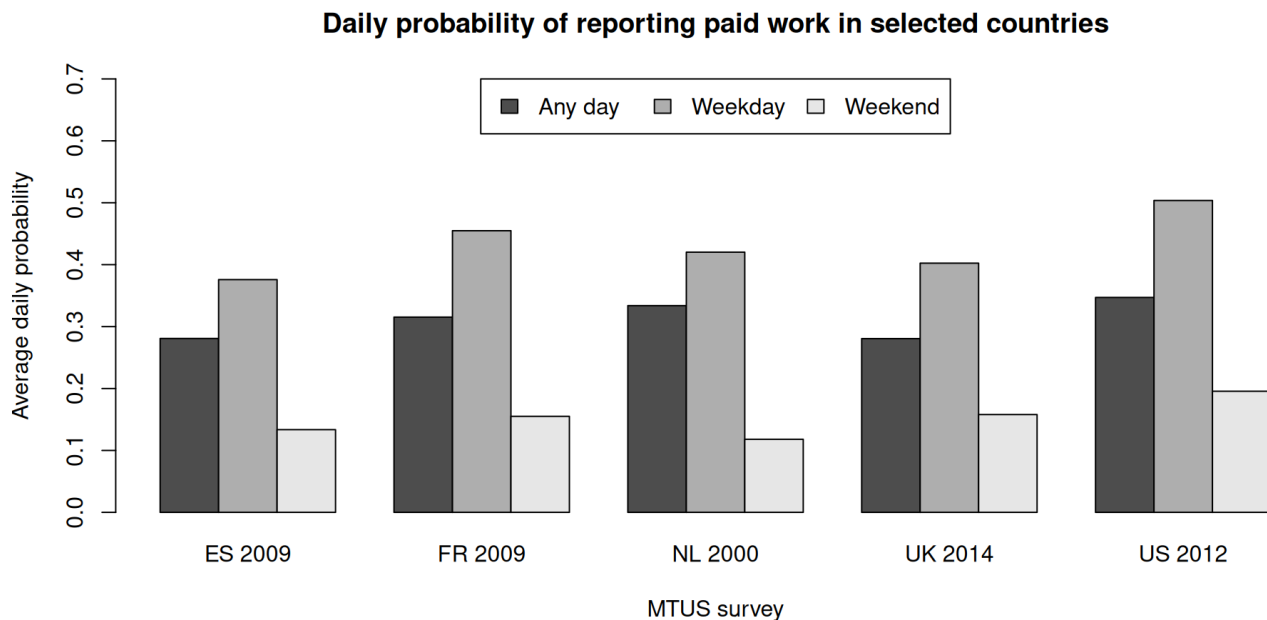
Tempograms

- Tempograms are plots in which probabilities of participation are represented at each time point recorded in the time diary ie usually 10 minutes

- These are really useful instruments for mapping the social sequencing of activities – and paid work throughout the day

A typical weekday in the UK

Typical daily activities (UK-MTUS)
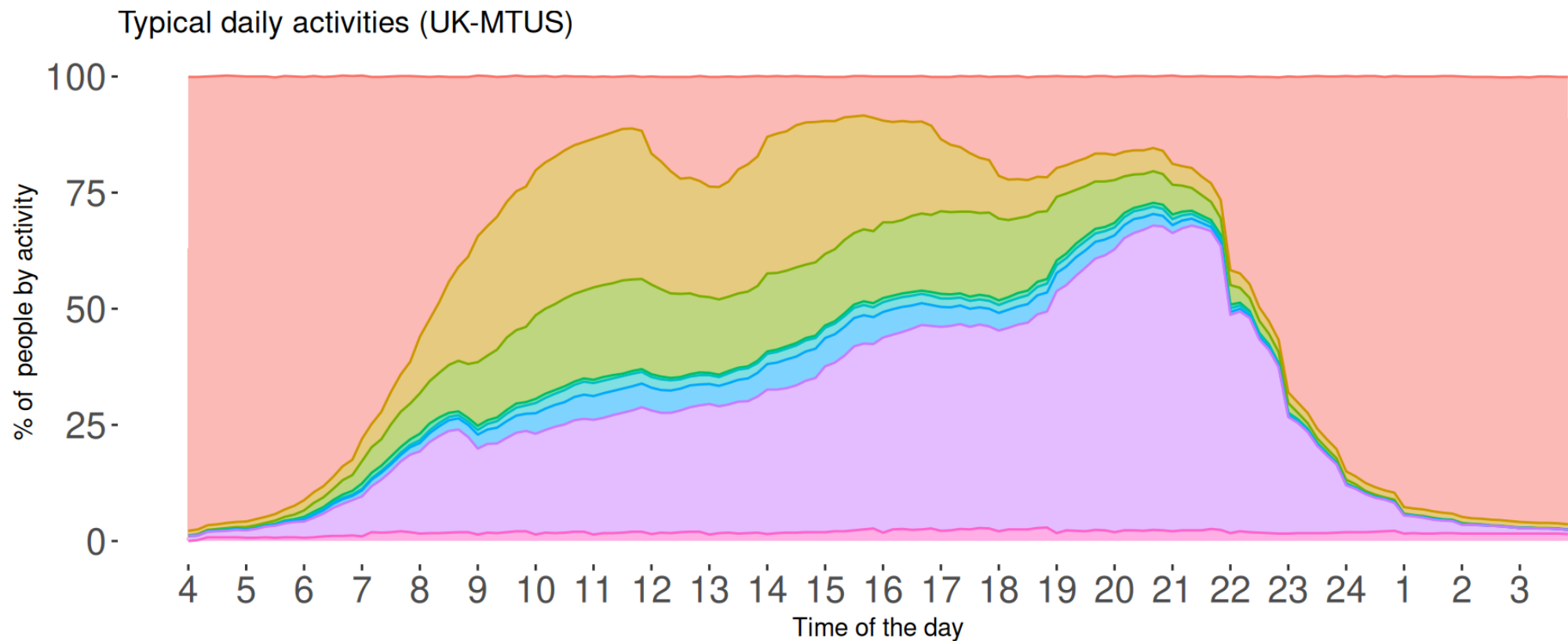
Let's now compare with France

Typical daily activities (FR-MTUS)
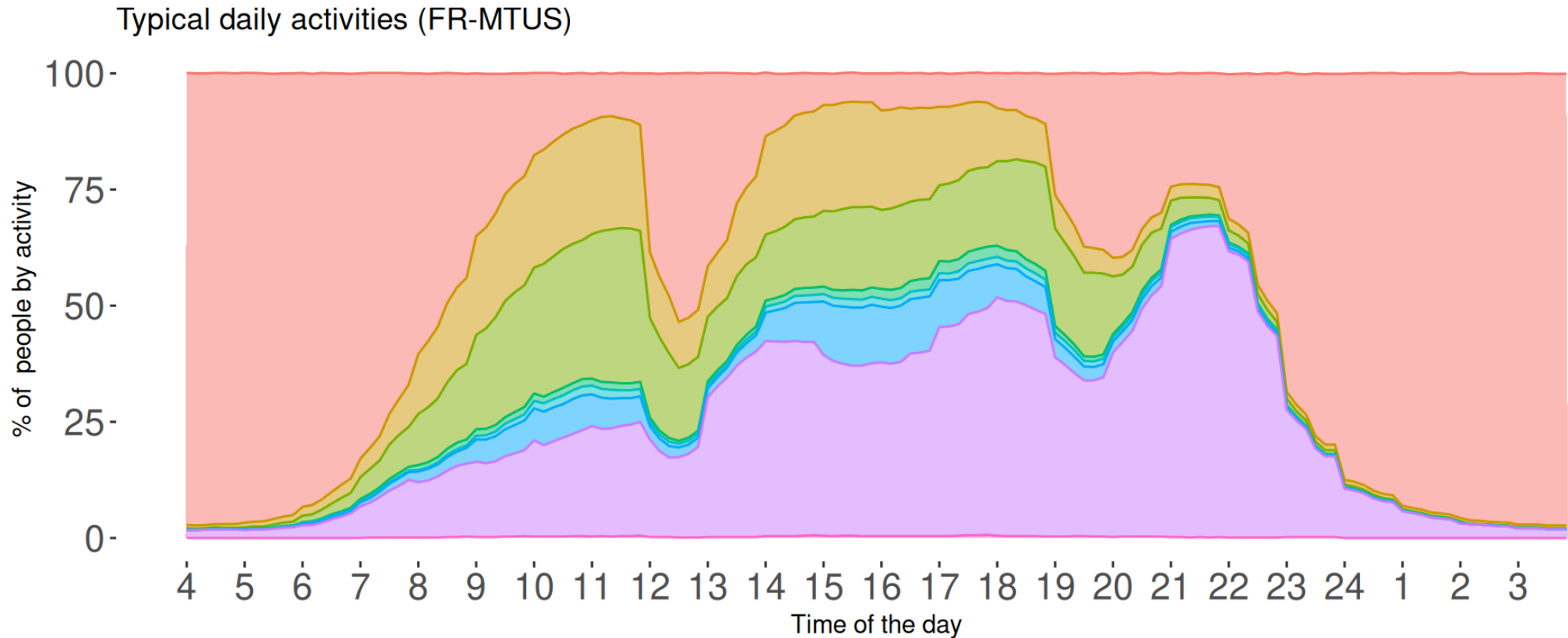
5. Examples

- So far, we have looked at basic 'staple' estimates that most researcher use in their daily analyses one way or the other.

- However, things start becoming really interesting once we start combining these basic estimates with socio-demographic characteristics:

  - Working time by gender and day of the week

  - ... We look at contextual aspects of activities

  - Or build our own research-informed indicators

5.1 Unsocial working hours

- Interest for the extent and consequence for mental health of paid work carried out outside 'normal' or 'social' hours

- Relatively straightforward to build typologies based on the time of the day at which activities take place.

- Let's define unsocial working hours, as those taking place outside the 8AM and 6PM window on weekdays or at the weekend

- … And try to find out about the proportion of daily working time taking place outside this window

So, how do we do it?

- We first need to identify work episodes (as previously defined), that are either happening before 8AM or after 6PM on weekdays, or any time at the weekend

- Such episode are then labelled as unsocial, or untypical, and the rest, social/typical

- As previously, we can just sum the amount of working time within each of these categories per diary day

- Compute means by group ie by gender and sector of activity

- Rely on work schedule data

Unsocial working hours
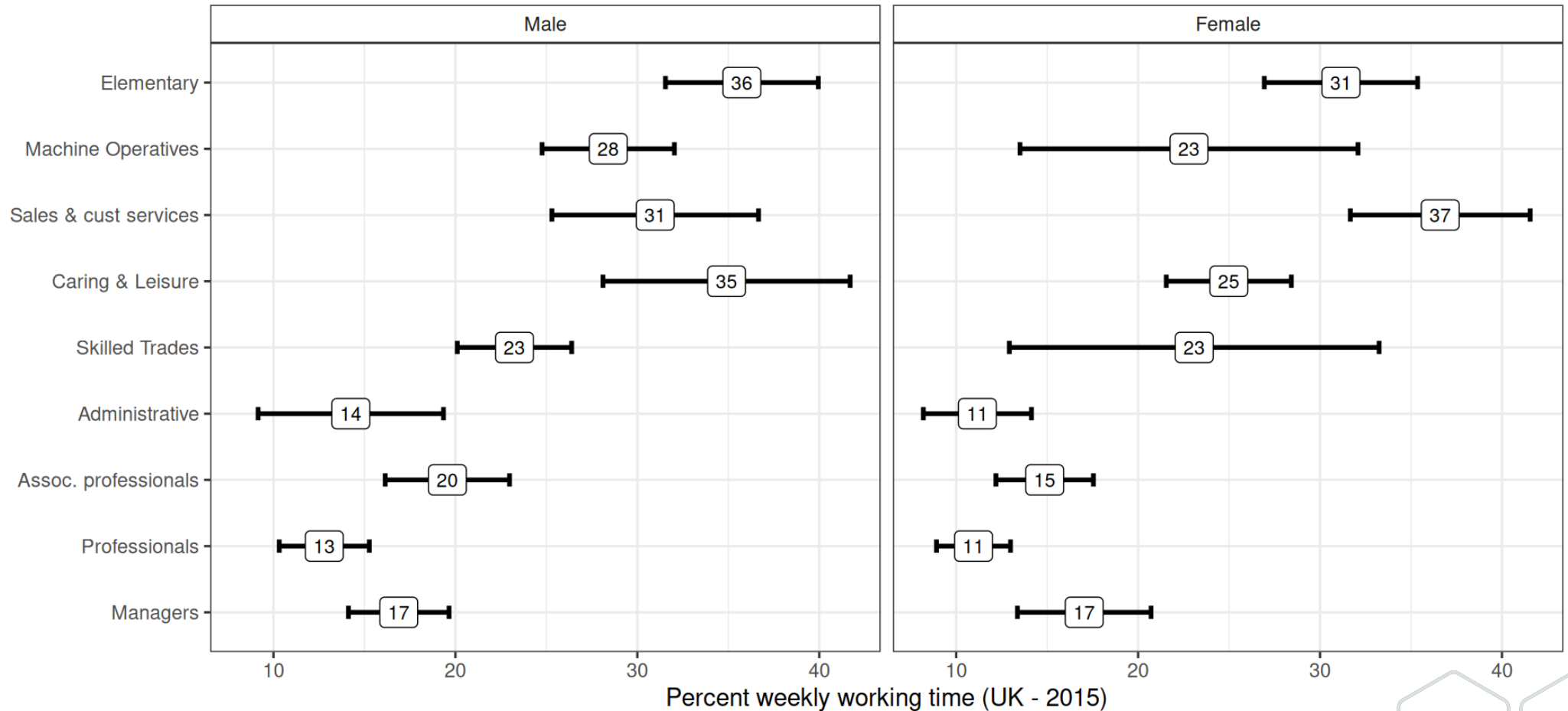
Weekly percentage of working time taking place during unsoccial hours by gender and SOC 2010 occupations, respondents aged 16 and older (minutes per day), weighted for non-response and adjusted for survey design
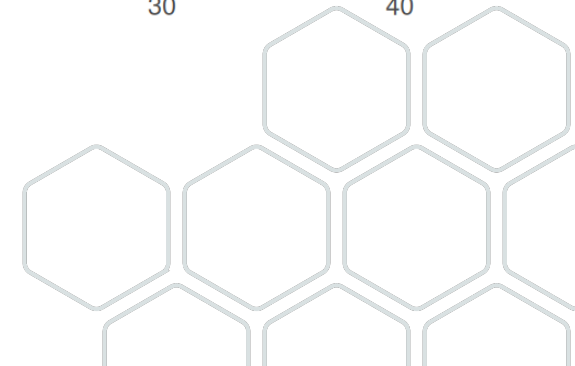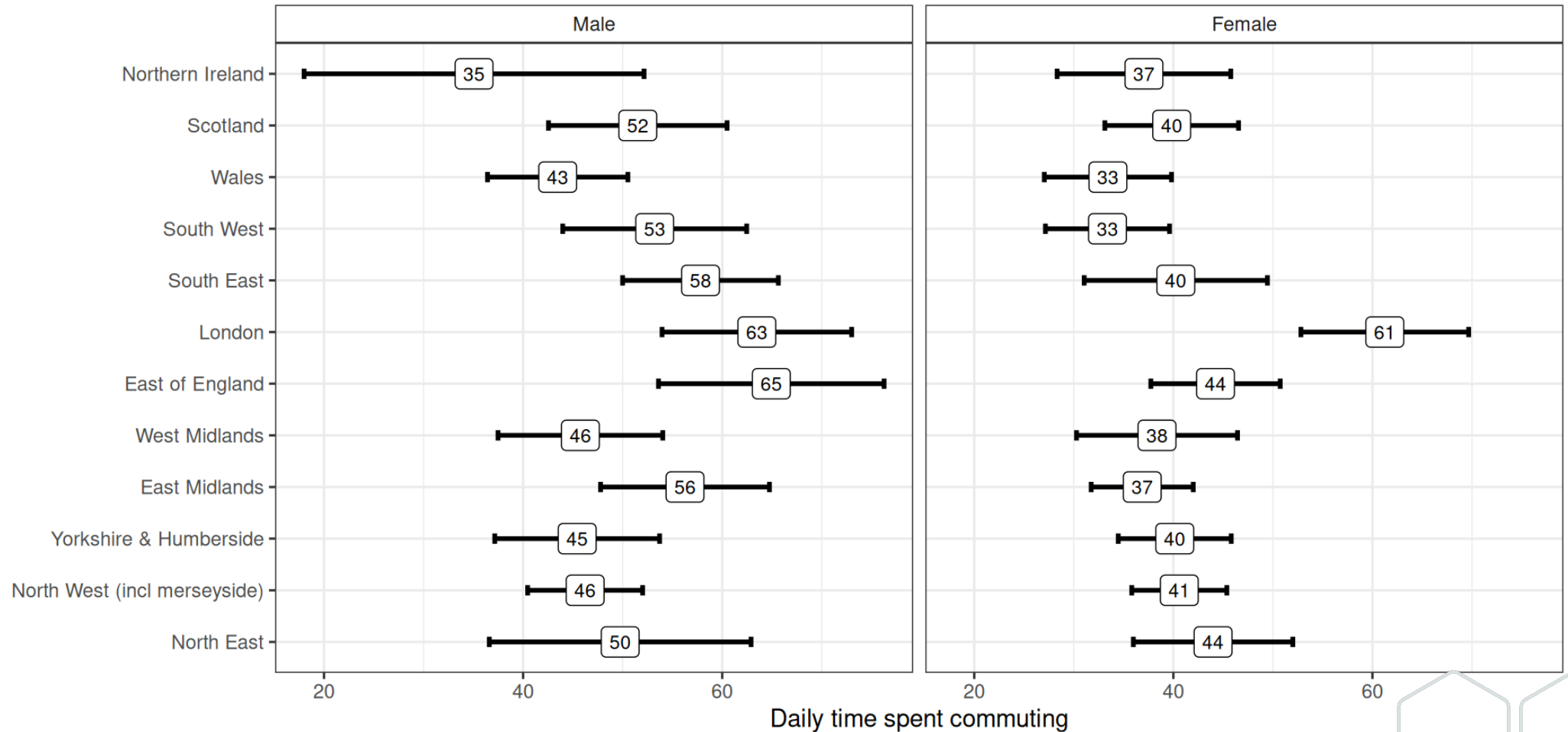
5.2 The context of work

- Standard time diary data enables us to also look into the context of paid work: copresence, location

- Work from home; work in the presence of others

- We are going to look at work commute

- Travelling in time diaries tends to be coded as a special category of location

Mean daily commuting time

Mean daily time spent commuting by gender and Government Office Regions, respondents aged 16 and older (minutes per day), weighted for non-response and adjusted for survey design
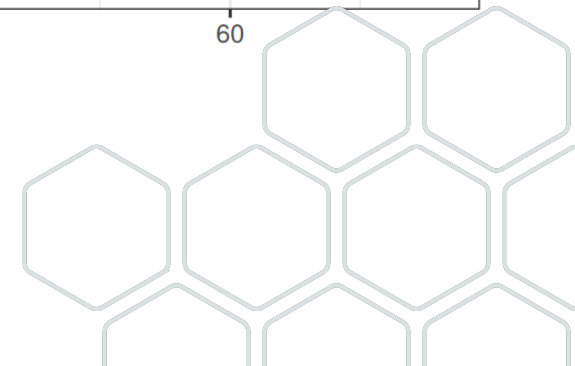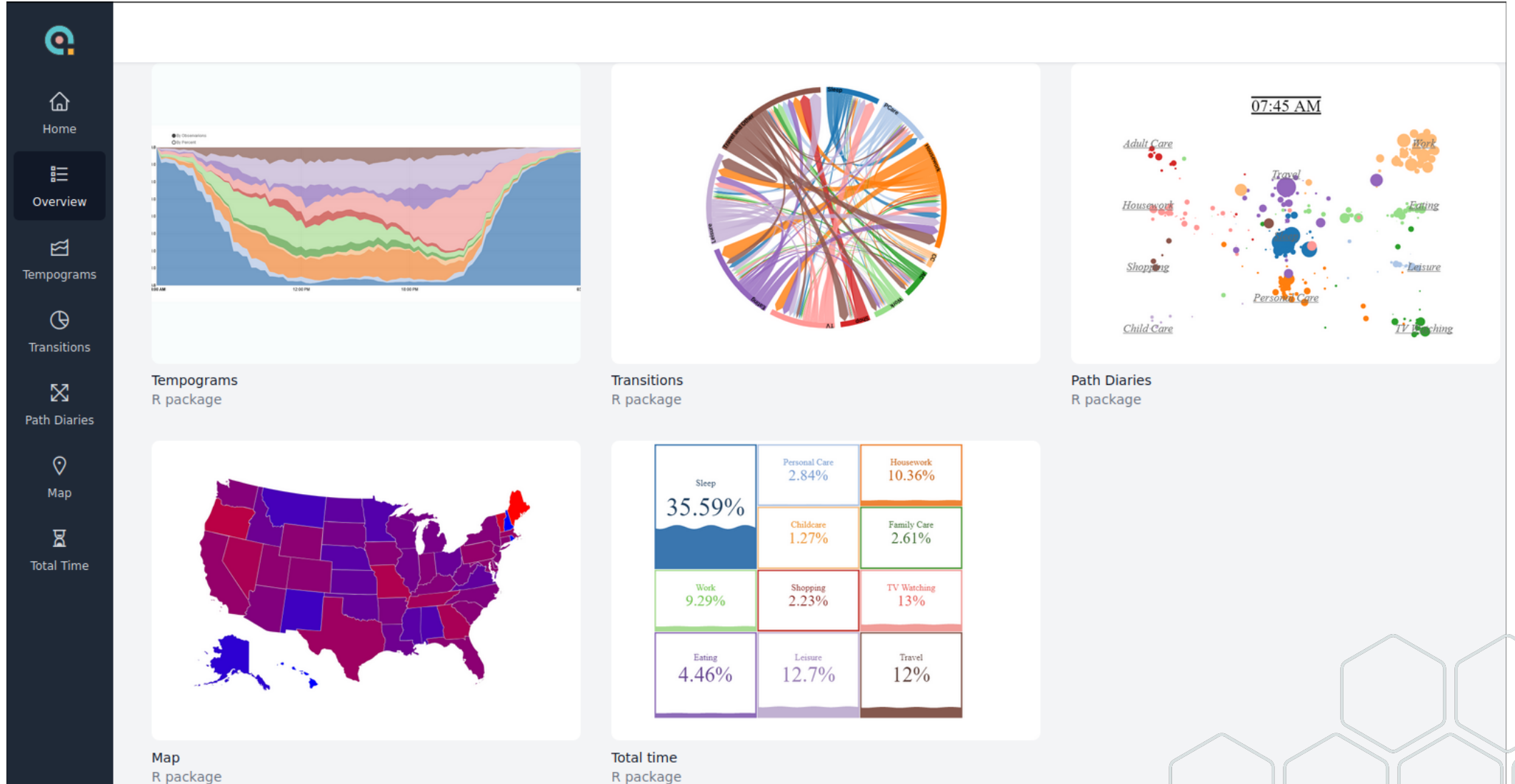
Advanced visualisation

- The above examples have relied on relatively basic tools for result visualisation: ie bar/area/line plots

- More advanced visualisation techniques that exploit the full potential of time diary data have been explored in the last few years.

- For examples and illustration Kamila Kopashnikova's websites

Advanced visualisations

Where to find more information?

- Centre for Time Use Research at UCL

- Aggregate estimates (typically, mean durations)
    - Harmonised European Time Use Survey
    - OECD Time Use Statistics

- Microdata:
    - Multinational Time Use Study data and documentation
    - UK Data Service for UK time use data
    - ICATUS nomenclature

UK Data Service

Thank you.

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Please remember to complete your feedback form

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