Analysis of Daily Activity Patterns & Sequences

Basic Ideas and Illustrations

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A Day in the Life of ...

Source: Michael Bittman (2014)
A Day in the **Lives** of ...

Different person, different day; i.e., different time-use allocation
Visualization!

STATISTICAL SUMMARIES FOR A POPULATION [ALL, SUBGROUPS ...]
Percentage (or proportion) of population performing specified activity at the given time
OVER THE 24 HOURS IN A DAY, WHEN DO PEOPLE ...
... PREPARE FOOD?
Daily/weekly portrait of an activity: food preparation

WHAT WOULD THIS TEMPOGRAM LOOK LIKE FOR [SUBGROUP X]?
WHAT USE IS THIS KIND OF INFORMATION?
OVER THE 24 HOURS IN A DAY, WHEN DO PEOPLE ...
What constitutes domestic work?

... DO DOMESTIC WORK?
Figure 1. Tempogram of Finnish mothers and fathers with young children: distribution of time used in domestic work during the day.

Source: HETUS
WHAT USE IS THIS KIND OF INFORMATION?
HOW DOES THIS COMPARE TO SWEDISH MOTHERS AND FATHERS?
Figure 2. Tempogram of Swedish mothers and fathers with young children: distribution of time used in domestic work during the day.

Source: HETUS
OVER THE 24 HOURS IN A DAY, WHEN DO PEOPLE ...
What activities constitute ‘paid work’? 

... DO PAID WORK?
... AND HAS THIS CHANGED OVER TIME?
Time of day and ‘unsociable hours’ – Collapse of standard length working day

Length of the working day (metropolitan male prime aged workers)

Length of the working day (female metropolitan prime aged workers)
... ARE THERE DIFFERENCES BY SEX?
BY DAY OF THE WEEK?
Proportion of population working by time of day

Source: ABS Time Use Survey 2006 data cube.
Graph 7. Proportion of the population undertaking total and unpaid work, population 15 years and over, by sex; weekdays, Republic of Serbia, 2010/2011
WHAT USE IS THIS KIND OF ANALYSIS OF TIME-USE DATA?
Portrait of a Moment
Tempogram 1. Distribution of time spent on activities during the day, population 20-74 years, by sex; all days, Republic of Serbia, 2010/2011
Tempogram 2. Distribution of time spent on activities during the day, population 20-74 years, by sex; weekdays, Republic of Serbia, 2010/2011
Tempogram 4. Distribution of time spent on activities during the day, population 20-74 years, by sex; weekend days, Republic of Serbia, 2010/2011
Weekends

The graphs above illustrate the distribution of activities throughout the day for women and men over the weekends. The x-axis represents time, ranging from 4 AM to 1 AM, while the y-axis shows the percentage of individuals engaged in various activities.

For **Women**:
- **Paid work** shows a peak around 9 AM to 12 PM.
- **Free time** is minimal during the day but increases in the evening.
- **TV** viewing is highest in the evening, specifically between 7 PM and 11 PM.
- **Sleep** is less frequent during the day and peaks around 1 AM.
- **Meal** times are distributed evenly throughout the day, with a slight rise in the evening.

For **Men**:
- **Paid work** is consistent throughout the day, with a slight dip around 6 PM.
- **Free time** is lowest during the day and increases in the late evening.
- **TV** viewing is highest in the evening, specifically between 7 PM and 11 PM.
- **Sleep** is relatively constant with a spike around 1 AM.
- **Meal** times are distributed throughout the day, with a slight increase in the evening.

These graphs highlight the different patterns of activity between men and women during the weekends.
CHINA EXAMPLES [PAGES 7-10 OF ‘TIME USE PATTERNS IN CHINA]: BY GENDER, WEEKEND/WEEKDAY AND URBAN/RURAL
JUST BECAUSE ...
1. Which activities constitute morning and evening peaks?
   What is the timing and duration of activities during the morning (7.00 - 10.00 am) and afternoon (4.30 – 7.30 pm) peak periods, from Monday to Friday respectively?

2. Are there differences between peak activities and peak energy demand?
   Are many people doing the same things at the same time, or is the peak (electricity) made of many people doing different things?

3. How are activities synchronised and sequenced?
   Is it possible to develop an index of societal synchronicity? Can we identify close-coupled sequences of activities?
1. What are peaks made of?

Morning and evening peaks compared: Mondays

Illustrative examples, based on a small sub-set
Source: Trajectory Global Foresight
Base: Subsample (50)
Monday and Friday evening peaks compared

Monday

Friday

Finish work earlier on Friday
2. Societal synchronisation

Examples
Lots of people doing the same thing creates synchronised demand for energy: e.g. TV watching

Lots of people doing different things creates non-synchronised demand for energy: e.g. ‘Saturday midday peak travel’

Lots of people doing the same ‘low’ energy things creates non-demand: e.g. Sleep
## 2. Societal synchronisation

<table>
<thead>
<tr>
<th>Synchronisation high</th>
<th>Synchronisation low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Many people doing the same energy-intensive activity at the same time</td>
<td>Many people doing different energy-intensive activities at the same time</td>
</tr>
<tr>
<td>Many people doing the same lower energy activity at the same time</td>
<td>Many people doing different lower energy activities at the same time</td>
</tr>
</tbody>
</table>

**Energy demand**
- higher (synchronisation high)
- lower (synchronisation low)
3. Sequences and flexibilities

Activities are linked over time—sequence patterns

- Some activities have to come before or after others
- Some activities often come before or after others
- Some activities rarely come before or after others

Some sequences are **tightly locked** together, others are more **flexible**, and can be done at different times.

Tightly locked sequences make ‘blocks’ that structure the rhythm of the day

These arrangements have distinctive features both of timing and duration

How to identify and analyse sequential patterns?
Start with your research objectives!

HOW TO IDENTIFY AND ANALYSE SEQUENCE PATTERNS?
Example 1.
Activities which follow free time periods, by sex, weekdays

- Paid work
- Housework
- Personal care
- Meals
- Other free time activity
- Other

Source: Swedish TUS, 2000/01
Example 2. Tempograms representing several activities at once

- Assume: food preparation, eating and washing are linked

Example 3. Peaks and co-presence: implications for schedules and flexibility
Who respondents were with at time of main activities (weekdays)

Source: Trajectory Global Foresight
Base: Subsample (50)
What are your research objectives?

• Research issues?
• Research questions?
• Conceptual framework?
• Analysis framework?
“For our analysis objectives ...

... tempograms would be a useful tool for:

• Describing daily patterns of the following activities/group of activities for the following subpopulations: [list]

• Comparing daily patterns of activity X for subpopulations A, B, C ...

• Identifying and analyzing the following sequence of patterns [list].”