Like mother, like daughter?
A dyadic sequence analysis approach

to uncover patterns of mothers and daughters careers

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In a *long time* perspective...

I. describe women’s employment careers,

II. their *evolution* through generations;

III. explore mother-daughter lineages
The women interviewed

1487 women, aged between 50 and 70 (born between 1930 and 1950), living in Paris region from 14 to 50 (i.e. 37 years)

4 situations:
- studies
- full-time job
- part-time job
- inactivity

The Biographies & entourage survey (INED, 2001)
Their mothers

1402 women,
born between 1886 and 1935
From 14 to 50 (i.e. 37 years)
3 situations:
  - studies
  - job (part- & full-time)
  - inactivity

Biographies & entourage survey (INED, 2001)
Sequence analysis (1)

- Individual trajectories are built as sequences of positions (or states)

- Grouped together according to their degree of similarity techniques = optimal matching analysis (OMA), …

  → Typology of trajectories
Optimal Matching Analysis (1)

• Method used in molecular biology (DNA strings)

• Introduced in social sciences by Andrew Abbott (80’s)

• **Principle**: measuring **dissimilarity** between pairs of sequences by calculating the cost of the transformation of one sequence into the other

*See for instance Macindoe & Abbott, 2004*
Optimal Matching Analysis (2)

• 3 elementary operations:
  o insertion
  o deletion
  o substitution

• each operation is assigned a cost

• the distance between two sequences is equal to the minimal cost needed to transform one sequence into the other
Sequence analysis (2)

Comparison between all pairs of sequences

→ distance matrix

→ clustering (HCA, ...)

→ typology of trajectories
Early full-time job (37%)
Late full-time job (18%)
Inactivity ou early stop (18%)
Interruption (11%)
Late stop (after 30) (6%)

Switch to part-time job (4%)

 Interruption, re-entry part-time (6%)
Evolution over cohorts

- **Early full-time**: = stability around 38%
- **Late full-time**: + from 14% (1930-1939) to 22% (1946-1950)
- **Inactivity or early stop**: - from 24% (1930-1939) to 12% (1946-1950)
# Mothers’ trajectories

1402 women born between 1886 and 1935

<table>
<thead>
<tr>
<th>Type of career</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>always active</td>
<td>35.3</td>
</tr>
<tr>
<td>stopping (at around 26)</td>
<td>33.7</td>
</tr>
<tr>
<td>always inactive</td>
<td>23.0</td>
</tr>
<tr>
<td>interruption (between around 21 and 32)</td>
<td>7.9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

1402 women born between 1886 and 1935
How to associate mothers’ and daughters’ trajectories?

- Mother and daughter trajectories placed « side by side » in a single sequence

- Creation of a state combining « mother’s situation X daughter’s situation », then of a single sequence per lineage

- Cross-tabulation « typology of mothers X typology of daughters »
A dyadic sequence analysis (DSA)

A. Resemblance measure (OMA) → 2 distance matrices (mothers and daughters separately)

B. Data reduction (MDS) → 2 sets of principal components (mothers and daughters separately)

C. Multiple factor analysis (canonical PLS) → 1 set of principal components (mothers and daughters separately)

D. Clustering (HCA) → typology of mother-and-daughter trajectories
A dyadic sequence analysis (DSA)

Mothers ($m$):
- History $m_i$
- History $m_j$

Daughters ($f$):
- History $f_i$
- History $f_j$

Optimal Matching
- distance: $d(m_i, m_j)$
- distance: $d(f_i, f_j)$
A dyadic sequence analysis (DSA)

Mothers ($m$):
- Distance matrix
- Multidimensional Scaling
- Scatterplot representation in a « Mother Space »

Daughters ($f$):
- Distance matrix
- Multidimensional Scaling
- Scatterplot representation in a « Daughter Space »
A dyadic sequence analysis (DSA)

Representation in the « Mother Space »

Ordered Pair
$c_i = (m_i, f_i)$

Representation in the « Daughter Space »

Symmetric PLS = search for correlated structures $S_m$ and $S_f$
A dyadic sequence analysis (DSA)

Ordered Pair $c_i = (m_i, f_i)$

PLS component-based representation of mothers

$S_m^1 \ldots S_m^h \ S_f^1 \ldots \ S_f^h$

PLS component-based representation of daughters

Matrix of distances between ordered pairs $c = (m, f)$

Cluster 1

Cluster 2
### Typology of mother-and-daughter trajectories

<table>
<thead>
<tr>
<th>Dyads’ main characteristics</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>mothers</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>always active</td>
<td></td>
<td></td>
</tr>
<tr>
<td>from full to part-time job</td>
<td>75</td>
<td>5</td>
</tr>
<tr>
<td>always active</td>
<td></td>
<td></td>
</tr>
<tr>
<td>always active</td>
<td>346</td>
<td>23</td>
</tr>
<tr>
<td>alternating job/inactivity</td>
<td>148</td>
<td>10</td>
</tr>
<tr>
<td>always inactive</td>
<td></td>
<td></td>
</tr>
<tr>
<td>always inactive (or for long)</td>
<td>186</td>
<td>13</td>
</tr>
<tr>
<td>long spell of part-time</td>
<td>82</td>
<td>6</td>
</tr>
<tr>
<td>always inactive</td>
<td></td>
<td></td>
</tr>
<tr>
<td>always active</td>
<td>151</td>
<td>10</td>
</tr>
<tr>
<td>alternating job/inactivity</td>
<td>101</td>
<td>7</td>
</tr>
<tr>
<td>always active</td>
<td>251</td>
<td>17</td>
</tr>
<tr>
<td>interruption</td>
<td>147</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1487</td>
<td>100</td>
</tr>
</tbody>
</table>

Daughters mothers
Dyads inactive mothers
A more marginal dyad
Conclusion

Dyadic sequence analysis (DSA):
  – sequences do not have to be contemporaneous
  – nor of the same nature

Applications:
  – transmission of life courses (family histories, etc.)
  – social mobility

Data availability?
webpage: http://nicolas.robette.free.fr/Publis.htm

