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Time Use in Daily Life

*A Multidisciplinary Approach
to the Time Use's Analysis*

 Istat

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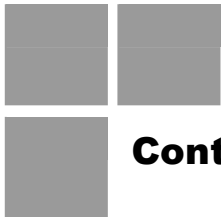
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Contents


	Page
An introduction to the Time Use statistics: a high social importance even at a European level	11
1. Gender differences in time use patterns over time	27
1.1 - Introduction.....	27
1.2 - The 24 hours organisation	28
1.3 - The main changes between the two surveys	31
<i>1.3.1 - Time spent on personal care activities</i>	<i>31</i>
<i>1.3.2 - Time for studying increased among young people...</i>	<i>33</i>
<i>1.3.3 - The gender differences persist in time devoted to paid work.....</i>	<i>34</i>
<i>1.3.4 - The time dedicated to domestic work drops among women and rises among men.....</i>	<i>37</i>
<i>1.3.5 - The internal composition of the domestic work is changing: time for childcare is on the increase for both men and women.....</i>	<i>40</i>
<i>1.3.6 - The total work time.....</i>	<i>42</i>
<i>1.3.7 - Time for daily trips is on the increase for everybody.....</i>	<i>44</i>
<i>1.3.8 - The huge box of free time</i>	<i>47</i>
1.4 - An always more diversified daily life.....	50

	Page
1.5 - A multivariate approach for analysing the changes	52
1.6 - Final remarks	56
References	73
2. The boundaries of working time	75
2.1 - Desynchronization and permeability of working time?.....	75
2.2 - Patterns in the distribution of working time across the work day	78
2.2.1 - <i>The distribution of working time according to socio-demographic characteristics</i>	79
2.2.2 - <i>The distribution of working time according to socio-professional characteristics</i>	88
2.3 - When the boundaries blur: out-of-hours work	97
2.4 - Out-of-hours work and time budgets.....	112
References	115
3. Time sequence analysis of activities as well as space and social context in large urban centres	117
3.1 - The social nature of time	117
3.2 - Characteristics of data analysed.....	122
3.3 - Time use summary indexes: average time and variability of time devoted to activities in a weekday and in a weekend day	123
3.4 - The daily collective rhythm - weekdays and weekend days - of some activities: specific empirical models of time use ..	126
3.5 - Overall daily rhythm, both in weekdays and weekend days, in the performance of all daily activities: empirical models of time use	134
3.6 - Daily rhythm of partner activities and a comparison with 1988-1989 data.....	142
3.6.1 - <i>Diachrony and synchrony in daily time use through the combined analysis of individual time sequences of specific social groups: an overview....</i>	148
3.7 - The space context of time use: the frequency of population in the different places at different times of a weekday and a weekend day.....	150

	Page
3.8 - The social framework of time use: frequency of population according to different types of social relations at different hours of a weekday and a weekend day.....	155
3.9 - Conclusions	159
References	160
4. Children's time	163
4.1 - Why a phenomenology of children's time.....	163
4.1.1 - <i>Time Use surveys and Childhood Sociology</i>	163
4.1.2 - <i>The everyday life of children: an interesting field for sociological studies</i>	166
4.2 - Main factors of variability in children's use of time	169
4.2.1 - <i>Dependent variables</i>	171
4.2.2 - <i>How much do territorial factors matter?</i>	172
4.2.3 - <i>The weak effect of parent's education</i>	179
4.2.4 - <i>Parents' work hours</i>	182
4.2.5 - <i>Do social classes still matter?</i>	183
4.2.6 - <i>"Social" age and gender: two crucial factors</i>	185
4.3 - Utility of time use surveys in studying Childhood.....	190
4.3.1 - <i>The analytical potential</i>	190
4.3.2 - <i>The time-use tool: development perspectives</i>	193
References	196
5. Division and sharing in daily life of families with a young child	199
5.1 - Households with young children in Italy.....	201
5.1.1 - <i>The parents of young children</i>	203
5.1.2 - <i>Comparison with non parents</i>	206
5.1.3 - <i>Young children and child care and education services</i>	208
5.1.4 - <i>Households with young children</i>	209
5.2 - The use of time in families with young children.....	210
5.2.1 - <i>Contribution by fathers and mothers to family life</i>	210
5.3 - Variability of commitment to the family life	214
5.3.1 - <i>Variability in the couple's use of time</i>	215
5.3.2 - <i>Variability of the use of time by fathers and mothers</i>	216

	Page
5.4 - Care activities in the daily life of fathers and mothers	218
5.5 - Sharing care between father and mother	223
5.5.1 - <i>Time shared by the two parents at home</i>	224
5.5.2 - <i>Days shared by the parents</i>	225
5.6 - Conclusions.....	231
References	234
6. Analysis of diaries through methods of textual statistics and tools of text mining	237
6.1 - Aims and objectives of the analysis	237
6.2 - Lexicometric measures on the corpus of diaries	239
6.3 - Lexical analysis.....	241
6.4 - Textual analysis: study of some concepts and relative information extraction	243
6.5 - “Actor” entities in the daily activities.....	246
6.6 - Actions as entities: types of activity	250
6.6.1 - <i>Relational activities</i>	250
6.6.2 - <i>Joint activities</i>	257
6.7 - A model for the construction of a dictionary of locutions indicating place	259
6.7.1 - <i>Construction of the model</i>	259
6.7.2 - <i>Analysis of content</i>	263
6.8 - Concluding remarks	268
References	269
7. Main innovations in the coding and correction process in the Time Use survey 2002-2003	271
7.1 - Introduction	271
7.2 - Coding of the textual data of the daily diary.....	272
7.2.1 - <i>The assisted coding system of the daily diary</i>	275
7.2.2 - <i>Assisted coding instruments</i>	276
7.3 - Data control and correction process of the daily diary	279
7.3.1 - <i>The process phases</i>	279
7.3.2 - <i>Identification of the errors and editino of the rules</i> .	281
7.3.3 - <i>Manual correction</i>	283
7.4 - Control and correction process of the weekly diary.....	285
7.4.1 - <i>The automatic correction</i>	286

	Page
7.4.2 - <i>Comparison of the working times: the “hour window” of the daily diary</i>	287
7.4.3 - <i>Beyond the check plan: an example of wrong compilation of the weekly diary’s hour scheme due to indication of “wrong” working intervals</i>	288
7.5 - Correction of the quantitative variables of the individual and household questionnaire	289
7.5.1 - <i>Combination of correction methods</i>	290
7.5.2 - <i>Implementation of the corrections</i>	290
7.5.3 - <i>Control procedure</i>	291
7.6 - Conclusion	292
References	293
8. Time Use and Labour Force: a proposal to integrate the data through statistical matching	297
8.1 Introduction	297
8.2 Time use survey and Labour force survey	299
8.2.1 - <i>The time use survey</i>	299
8.2.2 - <i>The labour force survey</i>	301
8.3 Data control and correction process of the daily diary	301
8.3.1 - <i>Partecipation in the labour market, working times and life times</i>	304
8.3.2 - <i>Strategies to collect integrated information</i>	305
8.4 Statistical matching techniques	305
8.4.1 - <i>Statistical matching an introduction</i>	305
8.4.2 - <i>Statistical matching techniques</i>	307
8.4.3 - <i>The conditional independence assumption</i>	308
8.4.4 - <i>Possible extensions</i>	310
8.5 Some preliminary results	312
8.5.1 - <i>The data</i>	312
8.5.2 - <i>The matching technique used</i>	315
8.5.3 - <i>Some results</i>	316
8.6 Concluding remarks	320
References	321



An introduction to the Time Use statistics: a high social importance even at a European level

The importance of the Time Use surveys

Up to few generations back, even in countries that boast a civilisation and a social organization that go back to the ancient times, to live to the age of fifty was rather an adventure. Today, the situation has changed. For the first time in men's history, we can say that time is no longer a scarce resource. The time we each have in front of us is incommensurably more than what we ever had. We live longer and work less; hence, we have more free time available than in the past. Nonetheless, despite the higher amount of free time available, we always seem to be running after time. Our life times are now differently organised, but, though our *time horizons* have widened, our everyday life still appears to be too regulated by rhythms external to our own personal needs. "*I need more time*", "*I do not have enough time*" are phrases typical of everyday's frenetic life. We are *constantly* hungry for more time and running for time we need.

Introduction by Linda Laura Sabbadini, Istat.

In the post-industrial society, the strong structuring of the life times and of the free times, typical of the Taylor and Ford era, underwent a deep crisis. Even the opportunities that the technological innovations offered were overshadowed by the perception of a free time evermore considered as evasive, limited, changing and conditioned by the times of the “obligations”.

Hence, how the life times are organised and the way in which time is viewed reflect the deep transformations that come with modernisation and which indirectly influence every social class.

Among their many merits, the time-balance surveys have helped demonstrate that daily life is in reality a puzzle made up of many different activities; they have highlighted the amount of time spent on sleep, meals, personal care, paid and non-paid work, travels and free time activities. Because we organise our life times differently as time goes by, some gender differences may appear stronger according to the life cycle phase. The organisation of the life times mirrors habits that establish overtime and that differ from one country to another. Moreover, it is highly important to understand it even for the social policies, as, by analysing it thoroughly, we can identify the level of rigidity of the social organisation. Consequently, we can improve it by means of policies that aim at removing all obstacles and reaching a society of time selected and free.

Even before the World Conference took place in Beijing, Italy had already dedicated much attention to the analysis of the Time Use data. During such Conference, the Time Use survey was included among the recommendations made to Governments and National Statistical Institutes, being the only survey able to adequately measure the non-paid work and the time balance of men and women's days. The National Commission for Parity, all the institutions for Parity and the Ministers for Equal Opportunities, one after the other, have all immediately grasped the importance of such survey from a gender viewpoint. In 1995, Istat and the Commission for Parity published a volume on the use men and women make of their time in all the life cycle phases (*Tempi diversi - Different Times*); this volume, translated in four languages, was presented at the World Conference on Women in Beijing.

This carefully chosen title represents both a warning and a wish to change our society from one where time is regulated to one where time is selected, a society where the differences no longer involve gaps but

rather express the richness of life of boys and girls, men and women. It is a wish for a society where the differences result from the choices made and awareness and not from *logics* of society organisation that *overshadows* the need to improve men and women's life quality.

This strategic survey is essential to monitor the asymmetry between the roles within the families in order to evaluate the reconciliation between work and life times. Italian lawmakers even decided to include an article in Law 53 of 2000, which states: "The National Institute of Statistics (Istat) is to ensure, every five year, an informative flow on the population's organization of the life times by means of the Time Use surveys, desegregating the information per gender and age".

Hence, the sensitivity of politicians and institutions towards this matter has greatly increased at a national level.

Deeply convinced of the importance of such survey, Istat has even hosted two Iatur Congress editions, one in 1992 and another in 2004. It believes in the strategic importance of the Time Use survey and in the methodological and thematic surveys that derive from it. Not only do they enrich the gender analyses, but the *Time Use* survey data also allow analysing the labour market from a new viewpoint (the Conference of Ilo, in 2003, underlined the strategic relevancy of the labour market of the *Time Use* surveys for the official statistics). In addition, they represent the presupposition necessary to approach differently the non-paid work, which the national accounts do not consider, and the analysis of problems inherent to urban mobility and use of spaces.

A new phase in Europe: the harmonisation of the Time Use survey

This type of time analysis can be found not only in Italy but all throughout Europe thanks to the attention that has been given for years now to the Time Use surveys. We have gone from ancient history to history in this field. While, in the past, the time use surveys involved only pioneer surveys few researchers carried out, without any funding and on small communities, today, every European country conducts them. What is more, they carry them out even though no regulation obliges them to do so, unlike what traditionally occurs with new official statistics. Hence, despite their methodological complexity and high realisation costs, the official statistics consider these surveys socially

and economically fundamental, as well as essential to adequately plan social policies.

Because of their methodological complexity and given the interest for a comparative analysis of the results, Eurostat has committed itself to harmonise the surveys on a European level. Such objective is pursued through the Hetus project (*Harmonised European Time Use Studies*), which has led to the publication, in 2000, of the Guidelines for realising the surveys. These Guidelines, though not compulsory, are actually the main reference for member countries interested in implementing a national survey for comparability purposes at a European level.

Most of these countries have followed the main recommendations provided by Eurostat, which can be synthesised as follows:

- The survey must cover a full solar year in order to gather all the activities that the population carries out in every period of the year (including activities typical of a specific season). Every person generally distributes over time its activities according to their duration cycles (daily, weekly, monthly, etc) that correspond to the rhythms of the nature or of society. The one-year duration cycle is the period of observation deemed most adequate to fill in a time balance since it allows gathering all the specificities of the times. Moreover, the survey is to include every day of every week and every month because determinate activities could concentrate on some days of a week or, likewise, they could concentrate on particular moments of a month;
- The sample structure must see to it that every day of the year is adequately represented, together with all its peculiarities. Such sample design fulfils the objective of providing estimates on the activities carried out, surveyed by means of diaries for the different types of day (weekday, Saturday, Sunday and average midweek day) and in each quarter of the year;
- The reference population must include every person aged ten and over; the fact that almost all age phases are represented makes it possible to carry out complete generational analyses. To this purpose, in conformity with past procedures, the Italian statistics have decided to lower the diary compilation threshold to children aged three. The parents of the children too young to write, are to fill in the diary on how their children spend their day;

- The survey unit must be the family of which every single component is to be interviewed. This procedure enables not only to carry out intra-individual analyses, but also to study the family time management and the asymmetry of the roles within a couple;
- The survey instruments include: an individual questionnaire, a family questionnaire, a daily diary and weekly diary;
- The daily diary is the most adequate instrument for surveying the use of time because it reports all the ten-minute activities in ten minutes. Interviewees are asked to indicate the activities they perform, the places they go to and the persons who were there. This diary consists in an hour scheme that covers a day's 24 hours divided in closed intervals of ten minutes. Following the experimentations carried out in the 1990s, this interval duration resulted as the most apt at soliciting the interviewee to report accurately all the daily activities performed: shorter time intervals induced respondents to indicate precise and not very important activities (such as opening and closing the windows, waiting for the elevator, etc) while longer time intervals led to an excessive aggregation of the activities and, thus, to an under-estimation of the short-duration activities;
- The day on which families are to fill in the daily diary is attributed to the interviewee through casual procedures in order not to generate any distortions due to the choice of the day to be described. The family can postpone the compilation of such diary only in full respect of the strict postponing procedures;
- Each family/component must fill in two daily diaries, one for the weekdays and one for the weekends (Saturday or Sunday). This procedure allows studying intra-individual variations in the time use;
- The purpose of the weekly diary is to gather all the time intervals dedicated to paid work on each day of the reference week and to provide an estimation of the hours worked, integrating them with the Labour Force survey estimates;
- A complex and articulated hierarchical classification system of the activities and places enables to transform the textural information gathered in the diaries into codes.

By adhering to the above main indications, it is possible to construct comparative tables that are able to identify the main differences in the daily life structures of the various European countries.

Although not every country applies scrupulously the Eurostat recommendations, we are very close to reaching such objective. The harmonisation of the surveys on a European level has indeed greatly progressed in the past years.

Following the conclusion of the planning and carrying out phases of the first harmonised surveys, the results are now currently being diffused, thus making it possible to analyse the differences encountered in the life times' organisation of the various countries.

In 2004, some tables were published relatively to Belgium, Germany, Estonia, France, Hungary, Slovenia, Finland, Sweden and the United Kingdom, all of which carried out the survey.

In addition to these countries, Italy, Norway, Spain, Latvia, Lithuania and Poland have also carried out the survey though at a later date.

In 2007, a software Statistics Sweden has planned and realised for Eurostat will be made available on the web, which, through this database, will allow elaborating international comparison tables. Consequently, it will contribute in diffusing and valorising the informative patrimony of the *Time Use* surveys.

In addition, a *Task Force* has been established with the purpose of updating the Guidelines, a fundamental reference for the second round of Time Use surveys that will be conducted in various countries as from 2007.

Time use in Italy and in Europe: a comparison of some data

The availability of this enormous, new bulk of data induces us to make some considerations. The Italian articulation of the 24 hours can be compared with those surveyed in other countries that have also carried out the Time Use surveys. Thus, we can distinguish the common features from the typical aspects.

More time for meals and personal care in Italy, less time for sleep

As regards personal care activities, and in particular, the time dedicated to sleep, the differences among the countries are rather

insignificant. Men sleep just about in every country a little less than women (Table 2). While they sleep more in France, Spain, Latvia, Estonia, and Hungary, they sleep less in Norway and Sweden.

Women sleep more than eight hours on an average day, taking into account also the time they sleep during the day or after lunch (Table 1). Norwegian and Swedish women (8h11') sleep less, followed by German and Italian women (8h19').

In Italy and in France, both men and women dedicate more time to meals and personal care: in particular, women spend 2h53' and 3h02' and men 2h59' and 3h01' respectively. The results relative to the employed (Tables 3-4) confirm the position of these two countries, a position that might just reflect their different food habits. In conformity with its Mediterranean tradition, to eat all together at table remains a habit in Italy, both for lunch and for dinner. Fast food falls more under the category of a free time activity rather than a real regular food style. Moreover, such different habits could also reflect a different propensity to combine meals with socialisation.

Belgium and Germany follow Italy, registering rather high values too. On the other hand, Nordic countries close the ranking, dedicating one hour less to these activities.

Italian women spend the most on family work; Swedish women the least

Women aged between 20 and 74 dedicate more time to family work than to extra-family work and that in all Europe. However, Italian women spend on family work more time than any other European women (5h20'), while Swedish women spend the least (3h42').

The situation completely changes as regards paid work (also due to Italy's lower employment rates): while in Italy, women dedicate to it 2h06', Latvian and Lithuanian women spend 3h41'. Italian women work more or less the same number of paid hours as German women, though the latter dedicate 1h10' less to family work. Finally, in Estonia, though the average number of family work hours is similar to Italy (5h02'), the time averagely dedicated to paid work is higher (2h33').

In Italy, the time dedicated on an average day to work (both paid and family work) equals 7h26', more than many European countries (e.g. Germany 6h16', Belgium 6h39', Norway 6h40', Finland 6h45' and United Kingdom 6h48'), but lower than Lithuania, the first country in terms of total work hours (8h10'), Slovenia (7h57'), Latvia (7h37') and Estonia (7h35').

As regards the internal composition of the total work, the weight of family work is higher in Italy (74 percent) than elsewhere. On the contrary, such gap is more limited in Nordic countries.

Even among employed women, the family work of Italian women remains higher than in other countries: they dedicate to family work 3h53', German women 3h11' and Finnish women 3h21'. Italian employed women also spend on paid work (4h37') a higher amount of time than in Belgium and Germany (3h53'), Sweden and United Kingdom (4h05'). However, Latvia (5h46') and Lithuania (5h55') register the highest values of time dedicated to paid work.

Italian men dedicate less time than the others to family work and more time to paid work: the role of breadwinner is emphasised

Italian and Spanish men dedicate to family work the lowest amount of time of all Europe (1h35' and 1h37' respectively), one hour less than Belgium, Hungary, Slovenia and Sweden. On the other hand, they register higher paid workload: 4h26', almost one hour more than Belgium and Germany. Only Latvians (5h09'), Lithuanians (4h55') and Spaniards (4h39') spend more time on paid work than Italy.

In Italy, the incidence of paid work on the total work time is among the highest one of Europe, together with Latvia and Spain (more than 70 percent). Such incidence drops to 56 percent in Belgium and Estonia.

Even among employed men only, Italians still occupy the first positions of the European ranking as far as extra-family work time is concerned (preceded only by Latvia and Lithuanian) and last per time dedicated to family work (Table 4).

Men have more free time than women in all Europe; Italians and Frenchmen have less free time than the others

Even though men work more than women outside the house, they have more free time available. This is due to the lower quantity of time they spend on family work and sleep, except for Italy where both men and women sleep the same amount of time.

As regards the ranking of men with less free time available, France occupies the first position (4h44'), followed by Latvia (4h45'), Lithuania (4h47') and Italy (5h05'). On the other hand, Norwegians benefit of more free time (5h59'), followed by the Finnish (5h55') and the Germans (5h46'). Sweden (5h17') distinguishes itself from the other Nordic countries since its values are more similar to Italy's (Table 6).

Women have, overall, less free time available than men in all countries (Table 5). In this case too, Italian and French women have less free time (4h05') than the others. The difference between men and women is either stronger or weaker according to the country considered: it reaches its highest value in Italy (one hour more) and its lowest in Norway (12' more).

Italian employed women occupy one of the last positions of the ranking (Table 3) as regards free time available (3h18'), faring just a little better than Lithuanian women (3h05') and French women (3h08'). The gap between employed women and employed men appears less marked (49' less). Italian employed men also have less free time (4h07') than the other European countries, together with the French (3h51'), Latvians (3h58') and Lithuanians (4h02').

TV absorbs most of the free time in all Europe

All Europeans have on average about four to five hours a day of free time. The main activity carried out during such free time is to watch TV, followed by socialising with family members and friends. Depending on the country considered, the third position usually involves reading (especially in Nordic countries), sport or relax (South European countries).

In Italy, women spend 36 percent of their free time watching the TV (Table 5), followed by social life (20 percent), relax (13 percent), sport (9 percent) and reading (7 percent).

Italian men too spend most of their free time watching TV (Table 6), followed by socialisation (19 percent), sport (12 percent), relax (10 percent) and reading (7 percent). Men dedicate to sport more time than women. Italy comes third (with 12 percent) as far as free time dedicated to sport is concerned, right after Spain and France (17 and 13 percent respectively).

The importance of a multi-discipline approach for analysing the Time Use data

These few considerations already show how important it is to carry out theme analyses, to exchange ideas and to reunite on the network scholars from different contexts to allow them to make use of the surveys' potentials.

Conscious of the significant informative wealth deriving from the time use surveys, Istat launched an initiative to promote the constitution of a research group. By coordinating its activities, it aims at introducing and encouraging researchers and scholars from various fields to use the results of the survey carried out in 2002-2003.

This volume includes the results of the activities carried out under the research protocol Istat has established with five Italian universities (University of Bologna, University of Turin, University of Rome "La Sapienza", University of Milano-Bicocca and University of Trieste) and with the Institute of Sciences and Technologies of the National Research Centre in November 2004. A multi-field study for the data analysis seems most appropriate due to both the extent of the arguments that can be dealt with through the Time Use surveys and the numerous objectives to which they provide an answer. The synergy of resources and competences represents the main condition to adequately valorise the survey. The first results of the research group's activities were presented at the convention *I tempi della vita quotidiana* (The times of daily life) in Rome on December 20, 2005.

While some contributions pertain to the arguments and others to the methods, they are all extremely precious and very interesting. Let us hope that this is only the beginning to the valorisation of these data that are so important to Italy's scientific community.

Table 1 - Time use of women aged 20 to 74 by country (average time in hours and minutes)

COUNTRY	Work							Total	
	Sleep	Meals and other personal care	Paid work (a)	Domestic work	Total work	Travels	Free time		Unspecified time
Italy	8:19	2:53	2:06	5:20	7:26	1:14	4:05	0:03	24:00
Belgium	8:29	2:43	2:07	4:32	6:39	1:19	4:50	0:00	24:00
Estonia	8:35	2:08	2:33	5:02	7:35	1:06	4:35	0:01	24:00
Finland	8:32	2:06	2:49	3:56	6:45	1:07	5:16	0:14	24:00
France	8:55	3:02	2:31	4:30	7:01	0:54	4:06	0:02	24:00
Germany	8:19	2:43	2:05	4:11	6:16	1:18	5:19	0:05	24:00
Hungary	8:42	2:19	2:32	4:58	7:30	0:51	4:38	0:00	24:00
Latvia	8:44	2:10	3:41	3:56	7:37	1:20	4:07	0:02	24:00
Lithuania	8:35	2:22	3:41	4:29	8:10	1:04	3:45	0:04	24:00
Norway	8:10	2:08	2:53	3:47	6:40	1:11	5:47	0:04	24:00
Poland	8:35	2:29	2:29	4:45	7:14	1:06	4:31	0:05	24:00
Slovenia	8:24	2:08	2:59	4:58	7:57	1:02	4:27	0:02	24:00
Spain	8:32	2:33	2:26	4:55	7:21	1:05	4:26	0:03	24:00
Sweden	8:11	2:28	3:12	3:42	6:54	1:23	4:57	0:07	24:00
United Kingdom	8:27	2:16	2:33	4:15	6:48	1:25	4:53	0:11	24:00

(a) Paid work includes also time devoted to study.

Table 2 - Time use of men aged 20 to 74 by country (average time in hours and minutes)

COUNTRY	Sleep	Meals and other personal care	Work				Travels	Free time	Unspecified time	Total
			Paid work (a)	Domestic work	Total work					
Italy	8:17	2:59	4:26	1:35	6:01	1:35	5:05	0:03	24:00	
Belgium	8:15	2:40	3:30	2:38	6:08	1:35	5:22	0:00	24:00	
Estonia	8:32	2:15	3:40	2:48	6:28	1:17	5:28	0:00	24:00	
Finland	8:22	2:01	4:01	2:16	6:17	1:12	5:55	0:13	24:00	
France	8:45	3:01	4:03	2:22	6:25	1:03	4:44	0:02	24:00	
Germany	8:12	2:33	3:35	2:21	5:56	1:27	5:46	0:06	24:00	
Hungary	8:31	2:31	3:46	2:39	6:25	1:03	5:29	0:00	24:00	
Latvia	8:35	2:10	5:09	1:50	6:59	1:28	4:45	0:03	24:00	
Lithuania	8:28	2:25	4:55	2:09	7:04	1:13	4:47	0:03	24:00	
Norway	7:57	2:02	4:16	2:22	6:38	1:20	5:59	0:04	24:00	
Poland	8:21	2:23	4:15	2:22	6:37	1:13	5:21	0:04	24:00	
Slovenia	8:17	2:13	4:07	2:40	6:47	1:09	5:32	0:02	24:00	
Spain	8:36	2:35	4:39	1:37	6:16	1:16	5:16	0:01	24:00	
Sweden	8:01	2:11	4:25	2:29	6:54	1:30	5:17	0:07	24:00	
United Kingdom	8:18	2:04	4:18	2:18	6:36	1:30	5:20	0:12	24:00	

(a) Paid work includes also time devoted to study.

Table 3 - Time use of employed women by country (average time in hours and minutes)

COUNTRY	Sleep	Meals and other personal care	Work				Travels	Unspecified time	Total
			Paid work (a)	Domestic work	Total work				
Italy	8:00	2:44	4:37	3:53	8:30	1:28	3:18	24:00	
Belgium	8:16	2:36	3:53	3:52	7:45	1:30	3:53	24:00	
Estonia	8:23	2:06	4:13	4:04	8:17	1:15	3:59	24:00	
Finland	8:22	2:02	4:20	3:21	7:41	1:16	4:39	24:00	
France	8:38	2:57	4:32	3:40	8:12	1:05	3:08	24:00	
Germany	8:11	2:31	3:52	3:11	7:03	1:27	4:48	24:00	
Hungary	8:18	2:21	4:43	3:54	8:37	1:02	3:42	24:00	
Latvia	8:21	2:06	5:46	3:08	8:54	1:26	3:13	24:00	
Lithuania	8:13	2:16	5:55	3:24	9:19	1:07	3:05	24:00	
Norway	8:07	2:02	3:46	3:26	7:12	1:17	5:22	24:00	
Poland	8:08	2:14	4:46	3:58	8:44	1:10	3:43	24:00	
Slovenia	8:12	2:02	4:23	4:24	8:47	1:09	3:50	24:00	
Spain	8:11	2:28	4:57	3:29	8:26	1:22	3:33	24:00	
Sweden	8:05	2:23	4:05	3:32	7:37	1:28	4:27	24:00	
United Kingdom	8:25	2:07	4:06	3:28	7:34	1:33	4:21	24:00	

(a) Paid work includes also time devoted to study.

Table 4 - Time use of employed men by country (average time in hours and minutes)

COUNTRY	Sleep	Meals and other personal care	Work				Travels	Unspecified time	Total
			Paid work (a)	Domestic work	Total work				
Italy	7:59	2:52	6:12	1:10	7:22	1:40	4:07	24:00	
Belgium	8:01	2:35	5:03	2:15	7:18	1:43	4:23	24:00	
Estonia	8:22	2:11	5:00	2:20	7:20	1:20	4:47	24:00	
Finland	8:12	1:55	5:32	1:59	7:31	1:17	5:05	24:00	
France	8:24	2:58	5:44	1:53	7:37	1:10	3:51	24:00	
Germany	8:00	2:21	5:05	1:52	6:57	1:31	5:11	24:00	
Hungary	8:08	2:30	5:25	2:09	7:34	1:10	4:38	24:00	
Latvia	8:16	2:08	6:41	1:26	8:07	1:31	3:58	24:00	
Lithuania	8:08	2:23	6:31	1:39	8:10	1:17	4:02	24:00	
Norway	7:53	1:58	4:56	2:12	7:08	1:23	5:38	24:00	
Poland	7:59	2:14	6:10	1:53	8:03	1:15	4:29	24:00	
Slovenia	8:06	2:07	5:20	2:24	7:44	1:14	4:49	24:00	
Spain	8:15	2:31	6:11	1:20	7:31	1:23	4:20	24:00	
Sweden	7:52	2:05	5:17	2:23	7:40	1:32	4:51	24:00	
United Kingdom	8:11	1:55	5:42	1:54	7:36	1:36	4:42	24:00	

(a) The time dedicated to study, which is considered residual in the adult population, is included in paid work.

Table 5 - Free time of women aged 20 to 74 by activity and country (average time in hours and minutes)

COUNTRY	Other free time										Total free time
	TV and video	Social life	Reading	Sports and outdoor activities	Resting or doing nothing	Hobbies and games	Volunteer work and meetings, helping other households	Entertainment	Other free time	Total	
Italy	1:29	0:49	0:16	0:23	0:31	0:07	0:14	0:04	0:12	0:37	4:05
Belgium	2:09	0:50	0:26	0:15	0:28	0:14	0:10	0:09	0:09	0:42	4:50
Estonia	2:11	0:37	0:38	0:17	0:18	0:06	0:13	0:05	0:10	0:34	4:35
Finland	2:02	0:54	0:47	0:28	0:20	0:13	0:16	0:05	0:11	0:45	5:16
France	1:55	0:44	0:23	0:23	0:06	0:11	0:14	0:05	0:05	0:35	4:06
Germany	1:41	1:09	0:38	0:28	0:20	0:25	0:15	0:14	0:09	1:03	5:19
Hungary	2:37	0:40	0:22	0:13	0:22	0:08	0:08	0:03	0:05	0:24	4:38
Latvia	1:55	0:35	0:29	0:20	0:20	0:05	0:11	0:04	0:08	0:28	4:07
Lithuania	1:59	0:32	0:23	0:13	0:13	0:03	0:11	0:02	0:09	0:25	3:45
Norway	1:39	2:04	0:39	0:28	0:12	0:15	0:10	0:06	0:14	0:45	5:47
Poland	2:03	0:49	0:25	0:16	0:12	0:09	0:14	0:02	0:21	0:46	4:31
Slovenia	1:44	0:57	0:23	0:26	0:30	0:07	0:06	0:04	0:10	0:27	4:27
Spain	1:46	0:49	0:12	0:38	0:26	0:08	0:13	0:06	0:08	0:35	4:26
Sweden	1:40	1:07	0:35	0:25	0:25	0:19	0:12	0:05	0:09	0:45	4:57
United Kingdom	2:09	1:00	0:25	0:11	0:23	0:15	0:14	0:06	0:10	0:45	4:53

Table 6 - Free time of men aged 20 to 74 by activity and country (average time in hours and minutes)

COUNTRY	Other free time										Total free time
	TV and video	Social life	Reading	Sports and outdoor activities	Resting or doing nothing	Hobbies and games	Volunteer work and meetings, helping other households	Entertainment	Other free time	Total free time	
Italy	1:52	0:59	0:21	0:38	0:32	0:21	0:09	0:06	0:07	0:43	5:05
Belgium	2:23	0:42	0:31	0:22	0:26	0:25	0:11	0:11	0:11	0:58	5:22
Estonia	2:39	0:36	0:39	0:28	0:22	0:09	0:17	0:06	0:12	0:44	5:28
Finland	2:25	0:50	0:44	0:37	0:24	0:20	0:16	0:06	0:13	0:55	5:55
France	2:08	0:43	0:23	0:36	0:06	0:18	0:18	0:05	0:07	0:48	4:44
Germany	1:59	1:03	0:37	0:29	0:17	0:41	0:17	0:14	0:09	1:21	5:46
Hungary	2:49	0:49	0:27	0:21	0:25	0:14	0:13	0:04	0:07	0:38	5:29
Latvia	2:18	0:34	0:26	0:31	0:23	0:10	0:11	0:05	0:07	0:33	4:45
Lithuania	2:36	0:33	0:23	0:21	0:15	0:12	0:15	0:01	0:11	0:39	4:47
Norway	2:06	1:39	0:33	0:33	0:11	0:25	0:10	0:07	0:15	0:57	5:59
Poland	2:34	0:50	0:21	0:25	0:15	0:18	0:17	0:02	0:19	0:56	5:21
Slovenia	2:12	0:59	0:23	0:36	0:38	0:16	0:11	0:05	0:12	0:44	5:32
Spain	2:00	0:57	0:17	0:53	0:24	0:21	0:08	0:07	0:09	0:45	5:16
Sweden	1:58	0:57	0:30	0:32	0:22	0:30	0:12	0:05	0:11	0:58	5:17
United Kingdom	2:37	0:50	0:26	0:18	0:17	0:24	0:10	0:07	0:11	0:52	5:20



1. Gender differences in time use patterns over time

1.1 - Introduction

Time Use surveys¹ offer a detailed portrait of how individuals spend their time and illustrate which activities people engage in, for how long, where and with whom. Therefore they represent a valuable source of information for investigating the gender share of paid work, household work and the organisation of all the other times (personal care, leisure activities, etc.).

By showing the different patterns of time allocation associated with gender, Time Use surveys also highlight the roles and conditions of women and men in family and social life. Therefore, time use statistics can help to plan policies and public services addressing the actual needs of the population.

In Italy, the political relevance of the time use statistics for studying gender and life cycle is also recognised at a legislative level. Article 16 (*Official Statistics on life times*) of Law nr. 53 of 2000 indeed states that: “By means of the Time Use survey, the National Institute of

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¹ In the 2002-2003 “Time Use” Multi-purpose survey carried out by Istat, interviewees were asked to compile a day diary and to describe the activities they carried out during the 24 hours of the day, randomly assigned to the sample household (and to all its members).

Statistics (Istat) ensures a five-year informative flow on the organisation of the population's life times, breaking down the data per gender and age".

In particular, the Department for Equal Opportunities financed the introduction of an ad hoc form in the individual questionnaire of the survey carried out in 2002-03, with the purpose of analysing how men and women reconcile work with family. According to the Department, the Time Use survey is indeed able: 1) to provide very high-quality information necessary for studying the reconciliation work-family; 2) to guarantee very high-quality information on household work and its mixing with work times; 3) and to allow international comparability on such matters.

Thanks to the data gathered through the National Institute of Statistics' surveys, this paper aims at analysing the gender differences that characterise the population when organising their daily life and the main trends in Italy. In particular, the results of the survey carried out in 2002-03² will be compared with those relative to the 1988-89³ survey.

1.2 - The 24 hours organisation

In both surveys, all members of the sample households were surveyed. In particular, all persons aged 3 and over were required to fill in a day diary⁴. The reference population is thus very wide not excluding, unlike other countries, any age group.

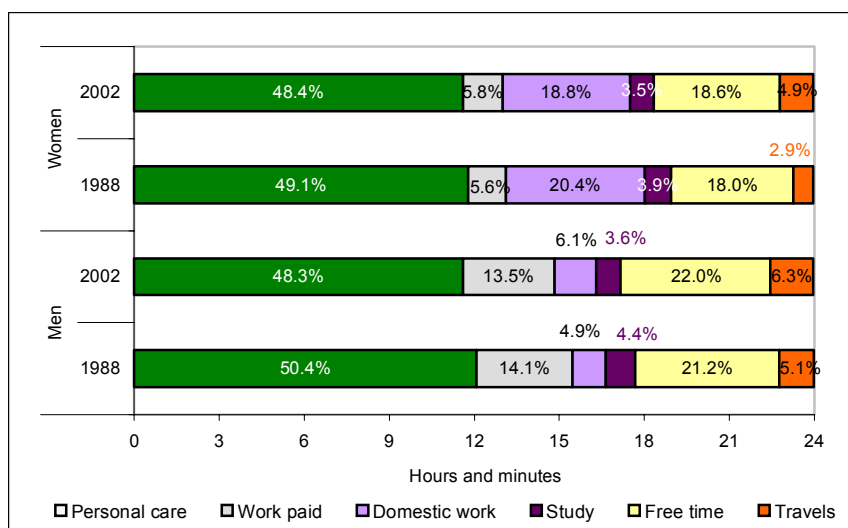
² The survey was carried out from April 1, 2002 to March 31, 2003. A sample of 21,075 households was surveyed for a total of 55,773 individuals (51,206 diary days). The survey tools included an individual questionnaire, an household questionnaire, a day diary and a week diary. The Time Use surveys were realised following Eurostat Guidelines, except as regarding the fact that each person was to compile only one day diary and not two.

³ The previous survey was carried out between June 1988 and May 1989 on a sample of 13,729 households for a total of 39,286 individuals (38,110 diary days). The main difference between the two methods used for gathering the data regards the structure of the day diary, which, back in 1988-89, provided for open hour intervals and not for 10-minute intervals as in the last survey.

⁴ In the case of children, parents, generally the mothers, were asked to compile their day diary, describing how their children spend their day.

Figure 1.1 presents the structure of the organisation of the daily life times in Italy, taking into consideration the whole population aged 3 and over⁵. In 2002-2003 both for men and women, about half of the day is spent sleeping, eating and carrying out other personal care activities. Moreover, in the case of men, one fifth (19.6 percent) of the day is dedicated to work activities (paid and domestic), a similar share of the day is dedicated to free time activities (22.0 percent) and 6.3 percent to daily trips. Women, on the other hand, register a higher incidence of the total work time: they dedicate a little less than one fourth of the day to it (24.6 percent); consequently, they spend 18.6 percent of their 24 hours in free time and the left over (4.9 percent) in travelling.

Figure 1.1 - Time use among persons aged 3 years and over by gender and survey year on an average day (percentage and hours)



The different impact that work times have on men and women's daily life as well as their internal composition represents the main

⁵ The activities are divided into 6 main categories: personal care, paid work, study, household work, travels, and free time. In particular, free time is a residual category, which includes all the activities that are not part of the previous categories: in such case, it is considered a time free from other activities.

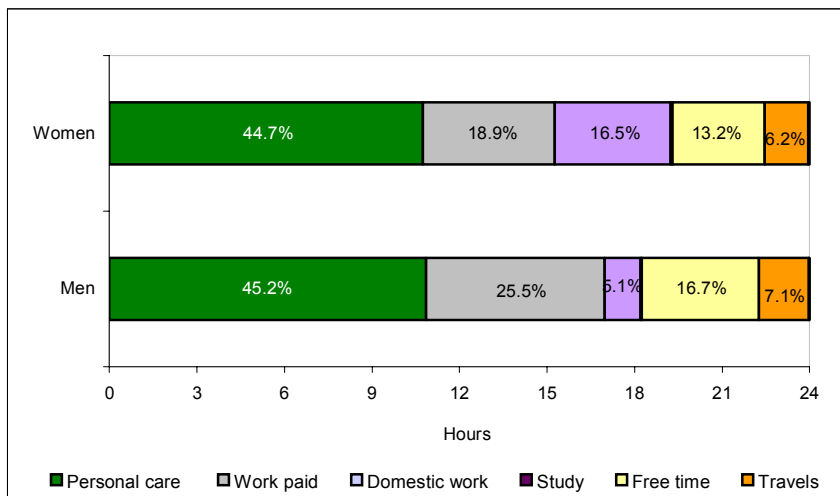
difference between genders. As regards men, 68.8 percent of the overall work time is dedicated to paid work; for women, 76.2 percent of their work time is dedicated to domestic work.

Finally, time dedicated to study, which accounts for 3.5 percent of the 24 hours, does not present any particular gender differences, nor in terms of participation rates nor in terms of time devoted to such activity.

If we consider the employed (Figure 1.2), the total work time is further widened: men dedicate 30.6 percent of their average day to it and women 35.4 percent. Consequently, the other life times are reduced: especially free time of employed men drops to 16.7 percent of the day and, for women, to 13.2 percent.

Reorganising even time devoted to personal care is necessary both for men and women to make room for working times. Time for trips, on the other hand, increases for men and women.

Figure 1.2 - Time use among the employed by gender on an average day (percentage and hours)



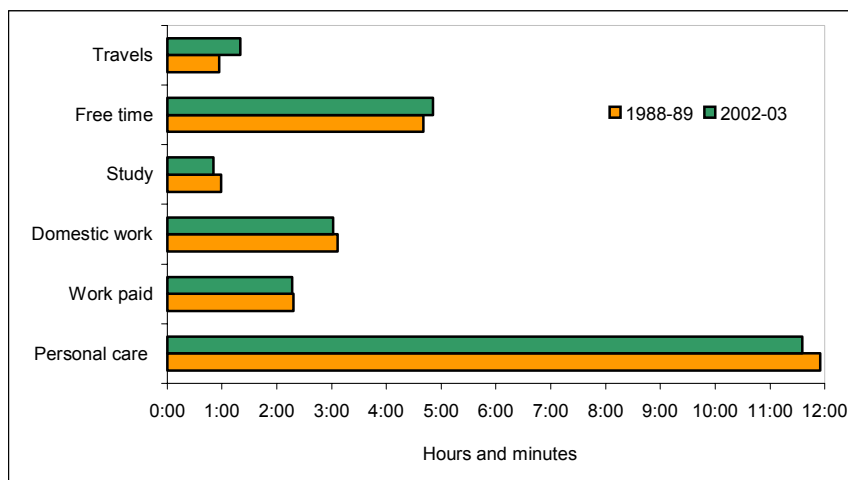
1.3 - The main changes between the two surveys

As shown by figure 1.1, the structure of the 24 hours surveyed in 2002-03 is almost the same of 14 years before. Nevertheless, figure 1.3 does point out to some differences showing the main trends of the various activity categories.

While the overall time dedicated by the population to domestic work, study, and personal care reduced, time spent on paid work is stable. The amount of time out of the 24 hours dedicated to free time activities and especially to daily trips increased.

The analysis by gender, age group (Table 1.1) and household typology points out to trends of different intensity and even of opposite signs as regards the various groups analysed in the next paragraphs.

Figure 1.3 - Time use among persons aged 3 years and over by activity and survey year on an average day (in hours and minutes)



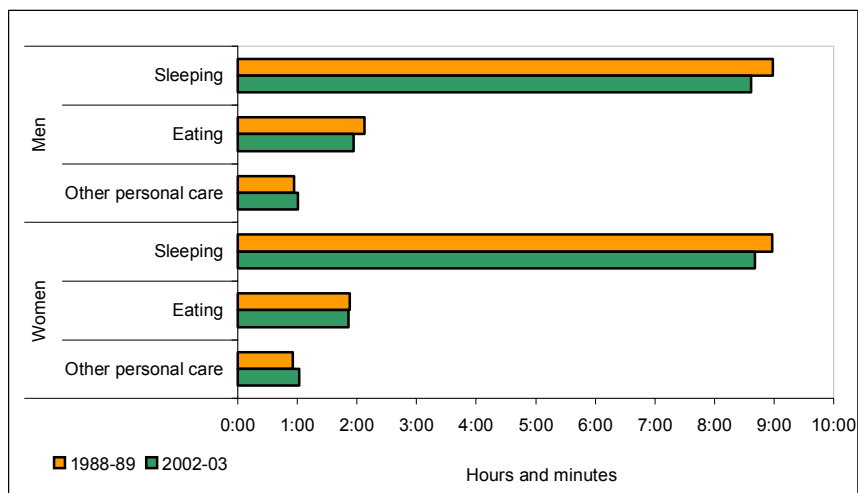
1.3.1 - Time spent on personal care activities

Time spent on personal care activities, that is to say, time dedicated to sleeping, eating, dressing, washing and all personal care activities, decreased, on average, by 20 minutes. Though generalised, this reduction presents a different intensity in relation to gender. During the

14 years elapsed between one survey and the other, a 29-minute drop was registered in the case of men and a 11-minute drop in the case of women.

The different trend of time spent in personal care activities fully cancels the gender differences surveyed in 1988-89, when women dedicated, on average, about 18 minutes less to it than men. In 2002-03, time dedicated to these activities amounted to about 1h36' both for men and women.

Figure 1.4 - Time for personal care among persons aged 3 years and over by gender, activity and survey year on an average day (in hours and minutes)

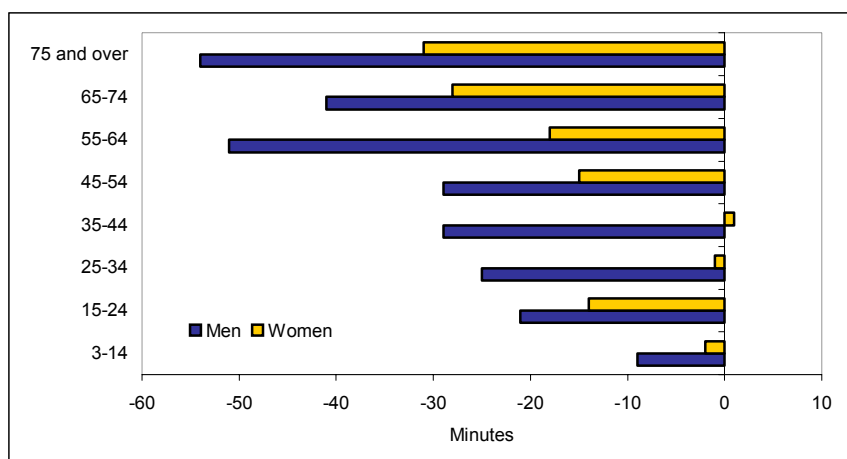


Source: Istat, Time Use Survey, 1988-89 and 2002-03

These changes are also related to the composition of “personal care activities”: in 2002-03, about 8h40' were spent sleeping, 1h54' eating and 1h01' for personal hygiene, while, back in 1988-89, time dedicated to personal care was of 8h59', 2h00', 0h57' for sleeping, eating and personal hygiene respectively (Figure 1.4). More specifically, men and women reduced sleeping time (by 19 minutes on average), while time spent in personal care activities (washing, dressing, combing oneself, etc.) remains substantially stable (+4 minutes) (Figure 1.5). Considering

the whole population, a slight drop has been registered in time dedicated to meals (-6'), as a consequence of different trends in relation to gender: such drop indeed mainly regards the male population (-11 minutes), while women are not really interested by such drop. These trends of different intensity, here too, lead to a reduction of gender differences: in 2002-03, time spent eating resulted 5 minutes higher for men in comparison with women, while it was of 15 minutes in 1988-89.

Figure 1.5 - Changes in time (2002-1988) for personal care among persons aged 3 years and over by gender and age group (in minutes)



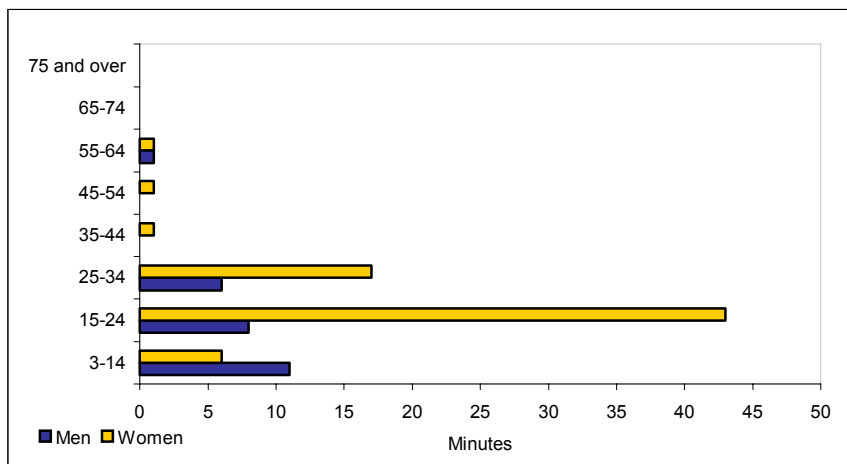
1.3.2 - Time for studying increased among young people

Time for studying decreased by 8 minutes during the 14-year interval between one survey and the other (-11 for men and -6 for women), going from 59 minutes to 51 minutes. This drop is probably linked to the ageing of the population and to the reduced percentage of children out of the overall population.

If we indeed consider only the age groups up to 24 years of age, a completely different trend emerges (Figure 1.6): time spent on studying increased by 9 minutes among young people aged between 3 and 14 and by 26 minutes among those aged between 15 and 24 and again by 11 minutes between 25 and 34. While in the first age group considered, the highest increase during such a 14-year span was registered among

young boys (+11' compared to the +6' registered for young girls), in the following age group, women registered the highest increase with + 43' compared to the +8' registered by men.

Figure 1.6 - Time for studying among persons aged 3 years and over by gender and age group on an average day (in minutes)



1.3.3 - The gender differences persist in time devoted to paid work

Time for paid work represents an important part of the day, strongly conditioning the organisation of all the other life times (time for unpaid work, time for personal care, free time, etc).

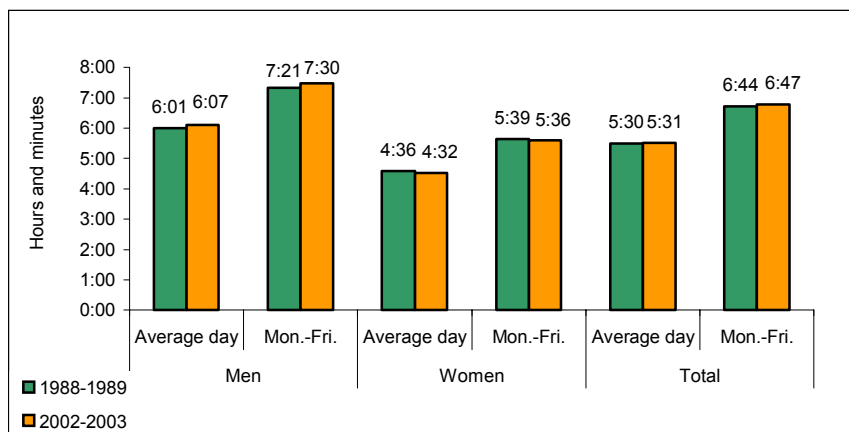
If we consider all the employed⁶, the work time absorbs just a little less than one fourth of the day, that is 5h31' on an average day (net of coffee breaks and work-related trips).

The impact of the work time on the day is different according to the day of the week (Figure 1.7): the employed dedicate to work 6h47' on weekdays (from Monday to Friday), 3h25' on Saturdays and 1h15' on Sundays. These strong differences among the mean times are only partially due to the time actually dedicated to work on the various days, and much more to the different participation rate in the work activities. If we consider only the group of people who dedicated to their paid

⁶ Such total includes also the employed who, for various reasons, did not work on the specific diary day.

work at least 10 minutes during the day, the (specific) mean time of the work time amounts to 7h48' on a weekday, to 6h42' on Saturdays and 6h15' on Sundays.

Figure 1.7 - Time for paid work among employed people by gender, type of day and survey year (in hours and minutes)



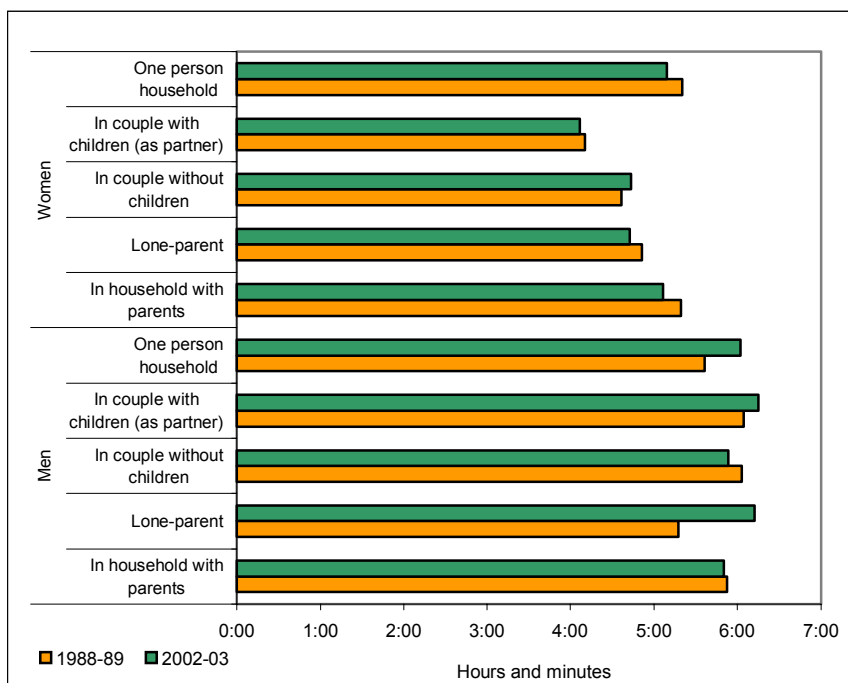
Compared to 14 years before, though the participation rate has dropped, time devoted on average by all the employed people to paid work is on the same level of 1988-89 survey (5h31' and 5h30' respectively). However, men have registered a 6-minute increase and women a 4-minute decrease.

In 2002-03, just as in 1988-89, men still dedicate to paid work about an hour and a half more than women: more specifically, men dedicate, on an average day, 6h07' to paid work while women about 4h32'. This gender difference can only be partially attributed to a relatively lower female participation rate (67.3 percent compared to the 75.3 percent of men), but also to a different duration of daily working time (6h44' for women compared to the 8h07' for men).

Gender differences, in terms of investment in paid work, are strongly conditioned by the family condition. Generally, wider changes have been surveyed in the case of women compared to men as their role within the household changes.

Family loads tend to widen such gap: having children brings, indeed, fathers to dedicate more time (6h16') to paid work, compared to men without children (5h54'), and to cover the role of breadwinner that the traditional division of the gender roles attributes to them (Figure 1.8).

Figure 1.8 - Time for paid work among the employed by gender, role in the household and survey year in an average day (in hours and minutes)



On the contrary, women succeed in investing more time in work only when they have no family load, that is to say when they are single or when they live with their parents. To have children, thus, represents for women a problem as far as their participation in the labour market is concerned: employed mothers dedicate to work less time than women living in a couple without children and lone mothers (4h07', 4h44' and 4h43' respectively): such gap even widens when considering the age

group included between 25 and 44 years of age, when the difference in terms of paid work time between mothers and non-mothers even reaches one hour.

Compared to 1988, different trends in work time have been registered in relation to the role played in the household. In particular, among men, fathers (living in a couple or lone fathers) together with single men increased the time they dedicate to work, unlike men in other family conditions. As regards women though, all the analysed groups have registered a drop in work time, except for women living in a couple without children.

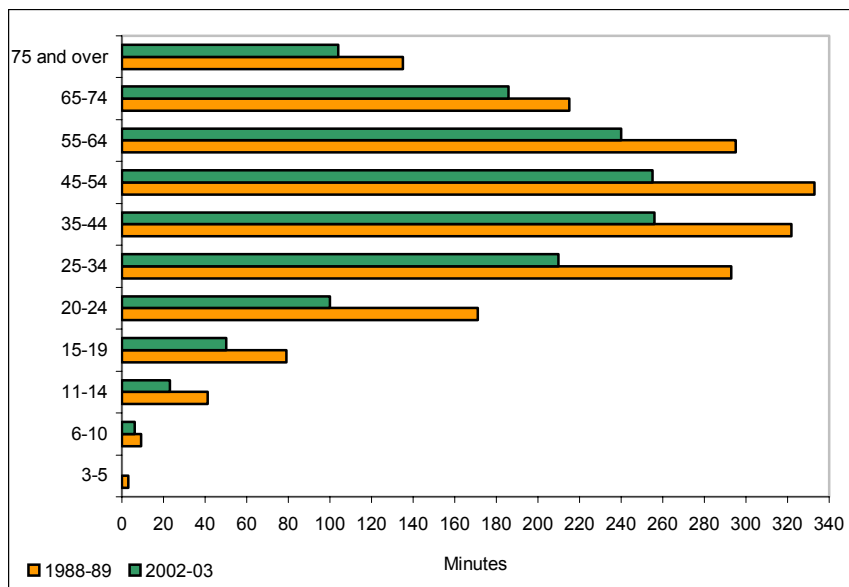
1.3.4 - The time dedicated to domestic work drops among women and rises among men

The classification system used in Time Use surveys to measure time dedicated to domestic work activities is very detailed and allows gathering a wide range of activities that fall under such category. The domestic work indeed includes all the activities relative to meal preparation, house cleaning, household members' care, plants and animals care, goods and house maintenance, shopping and various tasks.

In Italy, the amount of time women dedicate to domestic work represents the most evident element of gender difference in the use of daily time. Such gap between men and women has an impact on the organisation of all the other times of life. Women dedicate to domestic work on average 4h30', while men only 1h28'.

The analysis carried out by age groups shows that such gender gap appears very early: it indeed already develops during childhood, sharpens as young people become adults and take on family responsibility roles, persisting until the more advanced ages (Figure 1.9). Thus, already in the younger age groups, girls give to domestic work a higher share of their daily time than boys: the gender gap exceeds one hour when they reach 15 years of age and even doubles in the age group between 20 and 24 years of age. The difference between men and women as regards the share of time they dedicate to domestic work further increases in the next age groups, reaching its peak between 35 and 54 years of age. After it slowly decreases, even though still exceeding one hour among elderly people aged 75 and over.

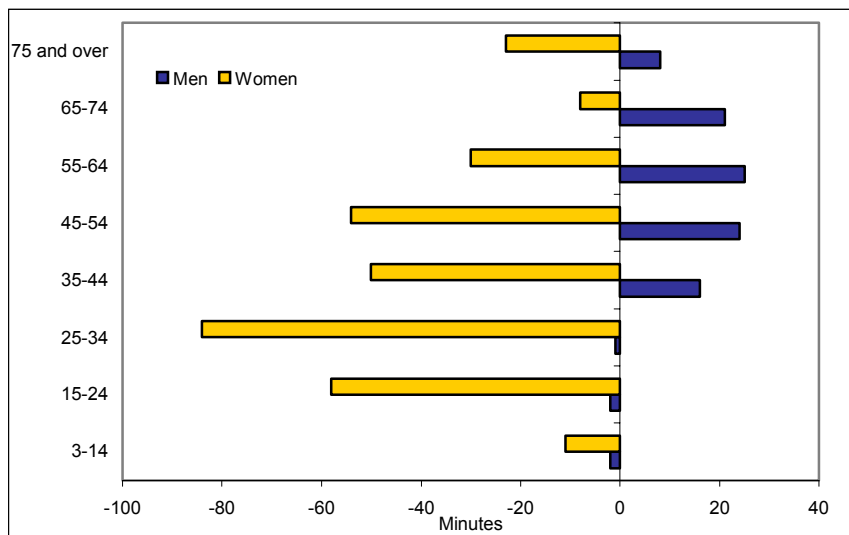
Figure 1.9 - Gender gap (W-M) in domestic work among persons aged 3 years and over by age group and survey year on an average day (in minutes)



This convergence of time observed as to people aged 55 and over results not only from the less important investment of the more mature women in domestic work, but also from the higher involvement of men as they grow older, as if they were somehow substituting the paid work, on the one hand, and the contribution of their children who left the parental family, on the other hand. Men aged between 45 and 64 living in a couple and without children contribute more in the domestic work than men of the same age with children (2h25' and 1h52' respectively).

Despite the strong gender asymmetry, the gender differences decreased compared to 1988-89, thanks to these opposite trends (Figure 1.10). Regarding women, the time they dedicate to domestic work decreased in all social groups: such reduction amounts to 24 minutes on average (21' for employed women). In the case of men, though, the time they invest in domestic work increased on average by 18 minutes.

Figure 1.10 - Changes in time (2002-1988) for domestic work by gender and age group (difference in minutes)



This gender gap is present in all phases of an individual's life cycle, already starting in childhood and teenage years, though more limited compared to the situation registered 14 years before.

Of course, the household composition strongly affects the amount of time devoted to domestic work in a day's 24 hours. Women with the heaviest workload are still those living in a couple and with children: they dedicate 6h43' to domestic work, while women living in a couple but without children dedicate to it 5h38' to it, lone mothers 5h09' and single women 4h01'. In particular, as regards women aged between 25 and 44, living in a couple with children involves a higher domestic workload of about 3 hours, compared to women of the same age but without children (6h47' and 3h52' respectively). But the increase of the household workload is of just 25 minutes for men in the same family situations. Such reduction in time spent on domestic work, despite being visible in all phases of a family life cycle, appears more limited in the case of mothers aged between 25 and 44: during the same time interval,

they indeed recuperate 26 minutes, while women of the same age without children gain 35 minutes.

Also in the case of employed women, being a mother involves a higher domestic workload, even though at a slightly lesser extent (+1h36' compared to women living in a couple without children), because of the constraints that the more rigid time for paid work sets on the rest of the day. For them too, the time that has been gained is of about 25'.

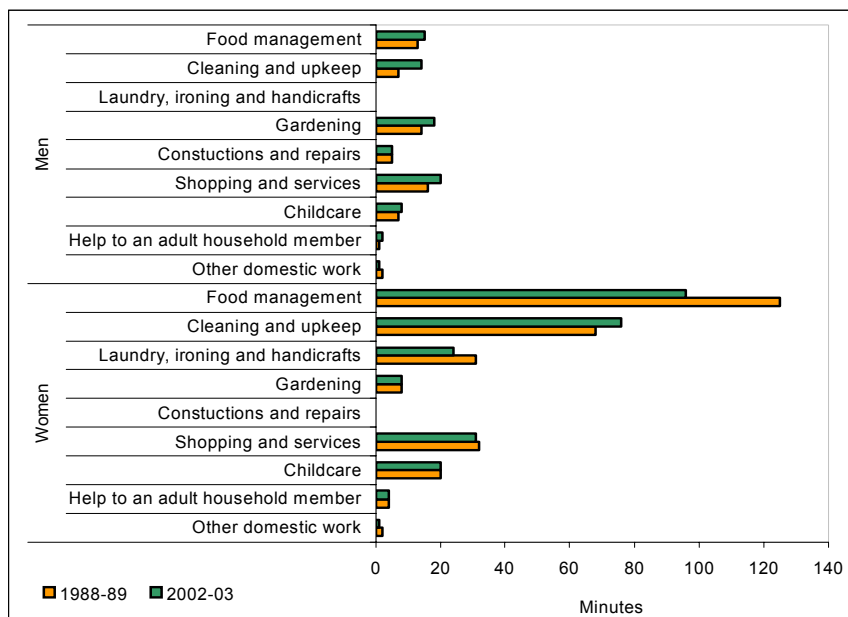
For men too, the household composition influences the quantity of time they dedicate to domestic work though to a lesser extent: if we exclude lone fathers, men living in a couple without children are those who provide a higher share of their 24 hours to house and household management activities compared to any other family condition. While they dedicate to these activities 2h16', single men dedicate 2h07' and men living in a couple with children, absorbed by the time they spend on paid work, 1h51'. If we now consider the age group included between 25 and 44, fathers living in a couple and single parents are those who spend more time not only on paid work but also on domestic work, to which they dedicate 1h43' and 1h45' respectively.

Compared to 1988-89, their higher involvement, though to different extents, characterises the various phases of the life cycle: nevertheless, the trend towards a higher investment in terms of time dedicated to domestic work is particularly evident among those aged between 45 and 64 and, independently from the age, among men living in a couple whether with or without children (+25').

1.3.5 - The internal composition of the domestic work is changing: time for childcare is increasing for both men and women

Significant changes are also emerging in the internal composition of this portion of daily time: time all women dedicate to housekeeping decreased by about half an hour, but time dedicated to childcare is stable. Activities linked to meal preparation and to linen and clothes care (washing, ironing, etc.) are those among the housekeeping activities to which women devote, in 2002-03, less time than 14 years before (Figure 1.11).

Figure 1.11 - Time for domestic work among persons aged 3 years and over by gender, activity and survey year on an average day (in minutes)



Nevertheless, a slight increase has been registered in the time mothers, living in a couple, dedicate to taking care of their children aged 13 and under⁷ (+8'), an increase partially counterbalancing the drop (-49') registered in the housework workload. In particular, the age group between 25 and 44 presents the most evident changes in the internal composition of domestic work, registering a 49-minute drop in the domestic work and a 27-minute increase in care activities, thus highlighting an internal re-distribution of the domestic workload.

Generally, the male population too has been registering different trends in relation to the various domestic work activities: while time dedicated to housekeeping activities increased by 11 minutes, time for

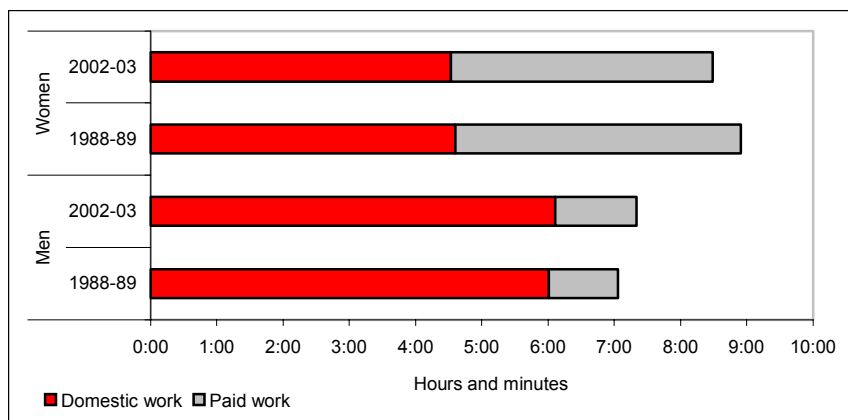
⁷ In the 1988-89 survey, the over 13 children care activity falls under the category "to help an adult household member". Thus, the comparative analysis of the time spent on childcare can be done only referring to parents of children up until 13 years old.

childcare is stable (+1'). Just as for women, also for fathers time devoted to childcare increased by 8 minutes, especially in the 25-44 age group: though time for childcare has risen from 26' to 43', housekeeping time is substantially stable.

1.3.6 - The total work time

The scarce flexibility of time devoted to household work is the reason behind the higher incidence of the total work time on women's daily life: if we consider only the employed, on an average day of the week, the total time for work amounts to 8h30' for women and to 7h21' for men (Figure 1.12).

Figure 1.12 - Time for total work among the employed by gender and survey year on an average day (in hours and minutes)

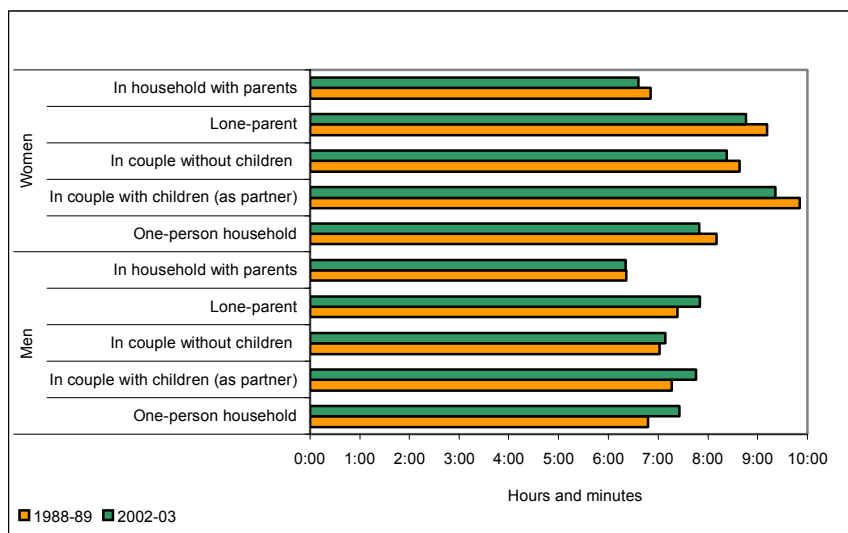


The quantity of total work hours is strongly conditioned by the phase of the family life cycle: parents (whether in a couple or alone, men or women) are those bearing the heaviest workload.

The different trends observed in man and woman paid and domestic work results in a 17-minute increase of the total work amount in the case of employed men and in a 25-minutes reduction in the case of women. Consequently, in the division of the overall workload burden gender differences seem to be less: the surplus of total women work time has dropped from 1h51' to 1h09'.

The quantity of total work increased in all the male life cycle phases, whether being single, living in a couple with or without children and lone fathers (Figure 1.13): only men living at home with their parents as children are the exception as the total work time has not changed for them. However the highest increase of the total workload has been registered mainly for 25 to 44 men living in a couple with children (+41'): in 2002-03, men wholly dedicate to domestic and paid work 8h09' in comparison with 7h28' of 1988-89.

Figure 1.13 - Time for total work among the employed by gender, role in the household and survey year on an average day (in hours and minutes)



The reduction in the women workload is transversal to their life cycle phases. Also for women, the most critical workload life cycle is the same age group, mainly for mothers living in a couple: the total time workload is 9h25'. However, in this case, their situation is better than in 1988-89, because women set free from work 29'.

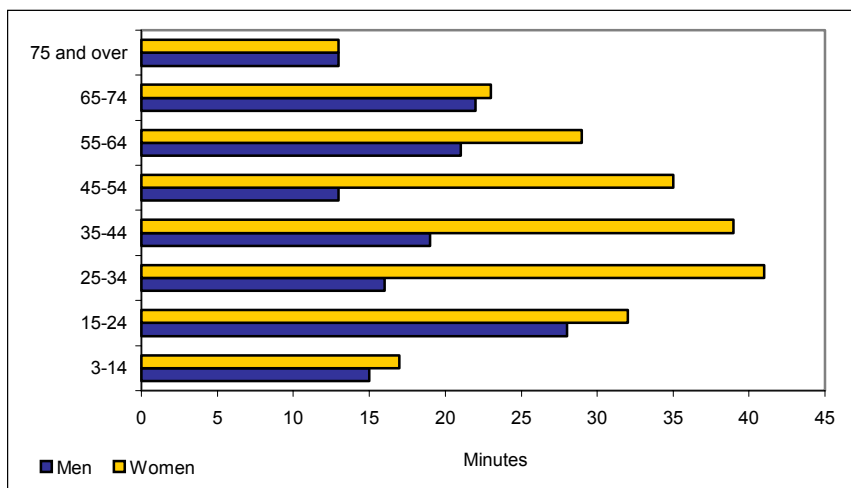
Despite the persistence of an asymmetric division of the domestic work and total workloads, some clear signals of changes in progress can be seen.

1.3.7 - Time for daily trips is on the increase for everybody

About 5.6 percent of the 24 hours is spent in trips.

Time for everyday trips increased for all the population without exceptions (Figure 1.14). The average increase is of 23': from 57' to 1h20'. The share of people travelling at least once during the day has also increased: from 76.2 percent in 1988-89 to 89.7 percent in 2002-03. The propensity to travel daily and the duration of such travels increased both in small municipalities and in large urban centres.

Figure 1.14 - Changes in time (2002-1988) for travelling among persons aged 3 years and over by gender and age group (difference in minutes)

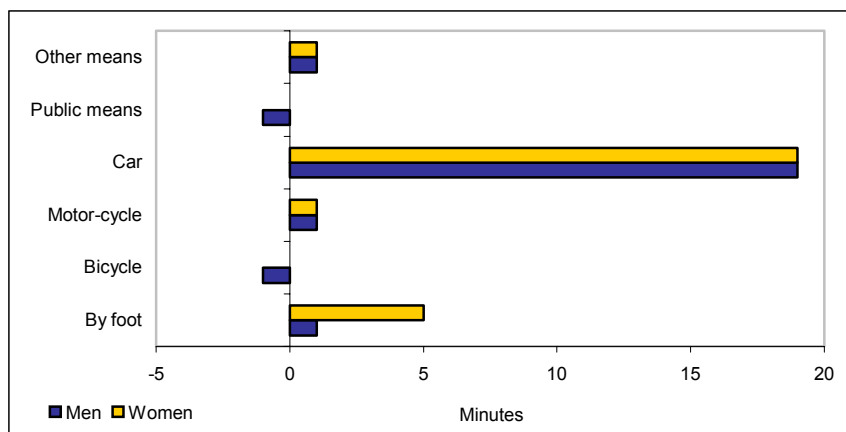


Time for travelling increased for both men and women, though with different intensities. Although women still spend less time in travelling during the day (1h10' compared to the 1h31' registered for men), the highest increase surveyed in the female population has led to a reduction in gender differences as regards this specific dimension: it has dropped from 31' in 1988-89 to 21' in 2002-03.

The increase in time spent in daily trips has registered similar levels for both employed and non-employed population.

Another important data is the incidence of the use of the various means of transport to travel (Figure 1.15). Time spent in travelling by car on an average day increased by 19³; persons declaring to travel by car at least once a day increased by 17 percentage points (from 39.8 percent to 56.9 percent).

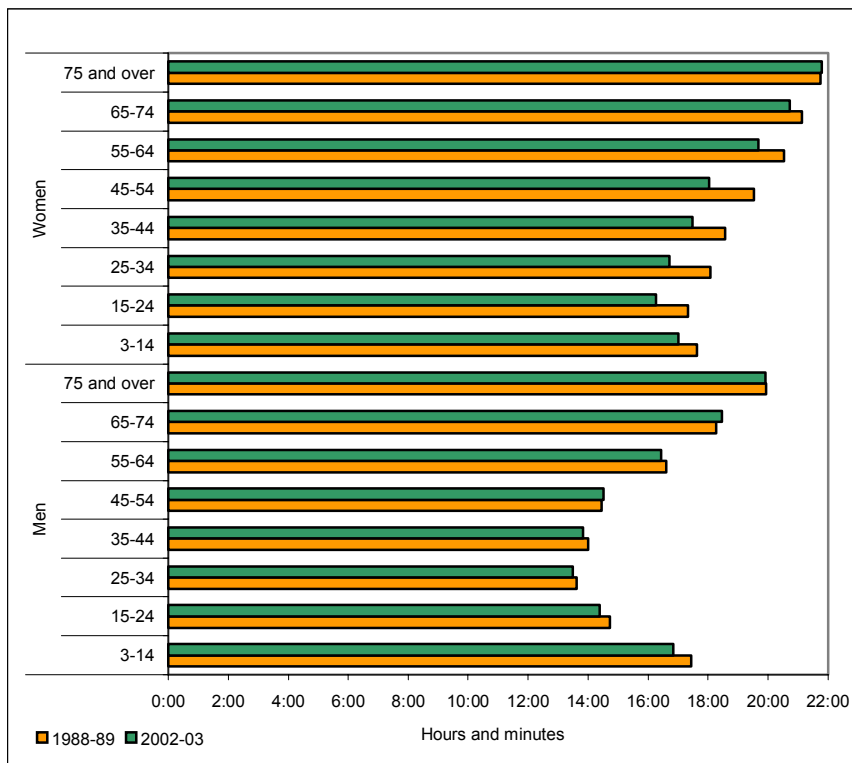
Figure 1.15 - Changes in time (2002-1988) for travelling among persons aged 3 years and over by gender and mean of transport (in minutes)



Time dedicated to travels by car amounts, in 2002-03, to 53.8 percent of the total time dedicated to daily trips, while such percentage was of 42.1 percent in 1988-89.

The increase in time spent in daily trips involves an important change also in terms of time spent at home (Figure 1.16). In 2002-03, people on average, spend less time at home (-24³): the gender difference is rather important as men have registered only a 4-minute drop while women a 38-minute drop. Such reduction in time spent at home concerns all women, of every age group and activity status; nevertheless, a more consistent reduction in time spent at home has been registered in the central age groups (from 24 to 54 years of age).

Figure 1.16 - Time spent at home among persons aged 3 years and over by gender, age group and survey year on an average day (in hours and minutes)



Time use patterns of men and women seem to be converging here too. The difference in time spent at home was of 3h25' more for women in 1988-89: in 2002-03, though the difference sign is still the same, it now amounts to 2h51'.

1.3.8 - The huge box of free time

Personal care activities, work (paid and domestic), study and trips cover 79.7 percent of an average day; the rest of the day is spent on activities that can be listed under the wide category of free time. In 2002-03, social life, use of mass media, entertainment and hobbies,

sports, social and religious participation amount overall to 4h51' on average (5h17' for men and 4h27' for women). Thus, an average 10-minute increase has been registered compared to 1988-89 (+12 for men and +8 for women). The free time of employed people amounts to 3h40', just as in 1988-89.

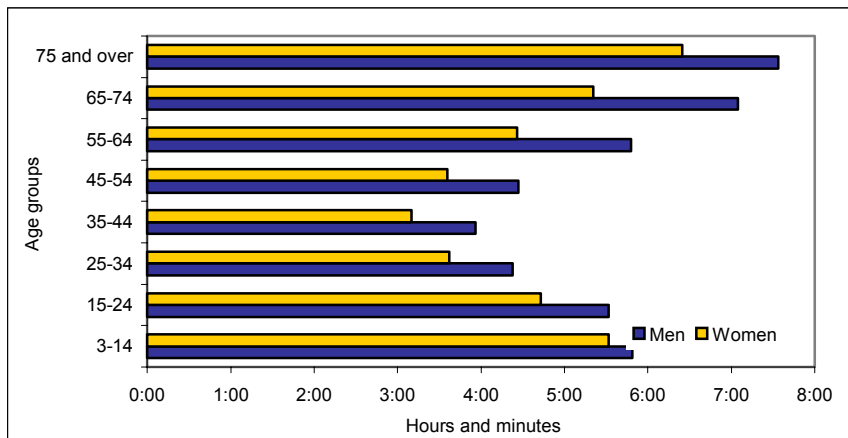
The quantity of free time available during the day is still, though, strongly conditioned by the dilation/contraction trends characterising the other life times and which vary according to the age, professional status, life cycle phase and context (such as, for example, the days of the week). Of course, children in pre-school age and the elderly have a higher quantity of free time. As school involvement increases or it is replaced by paid or domestic workloads, the share of the day dedicated to free time activities drastically shrinks, before expanding again, when work activity ends and the domestic workloads decreases.

Domestic and extra-domestic workloads are the root of the reduction of free time availability in the central age groups. Coherently with the results of the analysis carried out on the working times, men and women aged between 25 and 44 are more disadvantaged in terms of quantity of free time availability (4h09' and 3h23' respectively). The free time availability further drops until reaching minimum levels when being parents: fathers aged between 25 and 44 have 3h35' free time available while mothers 2h53' hours available.

In addition to variations due to age, the dimension of free time in Italy still presents a strong and generalised gender gap: during the day, women have, on average, less free time than men, and in all life cycle phases (Figure 1.17).

Already in childhood, on an average day of the week, girls aged between 3 and 14 have 17' less free time than boys (5h32' and 5h49' respectively), which they dedicate almost entirely to housekeeping and studying.

Figure 1.17 - Free time among persons aged 3 years and over by gender, age group and survey year on an average day (in hours and minutes)



Young girls aged between 15 and 24 dedicate, on average, 4h43' of their daily time to free time activities, while young boys of the same age 5h32'. Boys spend, indeed, a more significant part of their day in all the free time activities: social life, sports, entertainment, etc., while the days of the girls are already conditioned by time devoted to domestic work (1h46' against the 30' registered for boys).

If we consider the central age groups and the heavier female workload women have from 46' to 51' less free time than men.

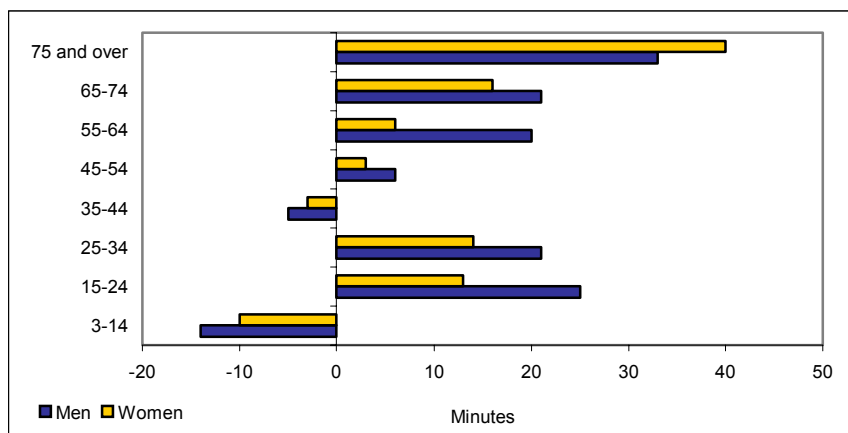
Even after 65 years of age, men still have more free time available. Despite the contribution of men to house management and to family life increases, at least in terms of amount of time dedicated to it, domestic work is always women's task and burden. Women aged between 65 and 74 have, indeed, 1h44' less free time and, when aged 75 and over, 1h09' less.

When entering the labour market, the gender difference decrease: employed women have 3h10' of free time, while employed men 4h01'. Nevertheless, while, for men, working or not working means to lose or to gain respectively 2h56' of free time, such difference amounts only to 1h45' in the case of women. Once again, the low profit women generally gain, in terms of free time, from being non-employed depends

on several factors: the lower incidence that paid work has on the day of women (due to a lower female participation rate in the labour market, and for, on average, working women who dedicate to their paid work less time than men); and the strong rigidity of the domestic work time.

In comparison with 1988-89, gender gap increased going from 46 minutes to 50 minutes of more free time for men. The analysis by age groups points out to strong differences hiding behind the average 10-minute increase. The increase is recorded both for men and women in almost every age group, though with a higher intensity among men. (Figure 1.18). On the contrary, a free time decrease is recorded in childhood and in the 35-44 age group, both for female and male population. As to children, free time loss goes together with an almost equal increase of time devoted to study and to daily trips. In the central age group, on the other hand, the very light decrease is linked to the specific trends of whole workloads. This is a very meaningful data because it is related to the age group in which free time is more scarce: 3h56' for men and 3h10' for women.

Figure 1.18 - Changes in free time (2002-1988) by gender and age group on an average day (difference in minutes)



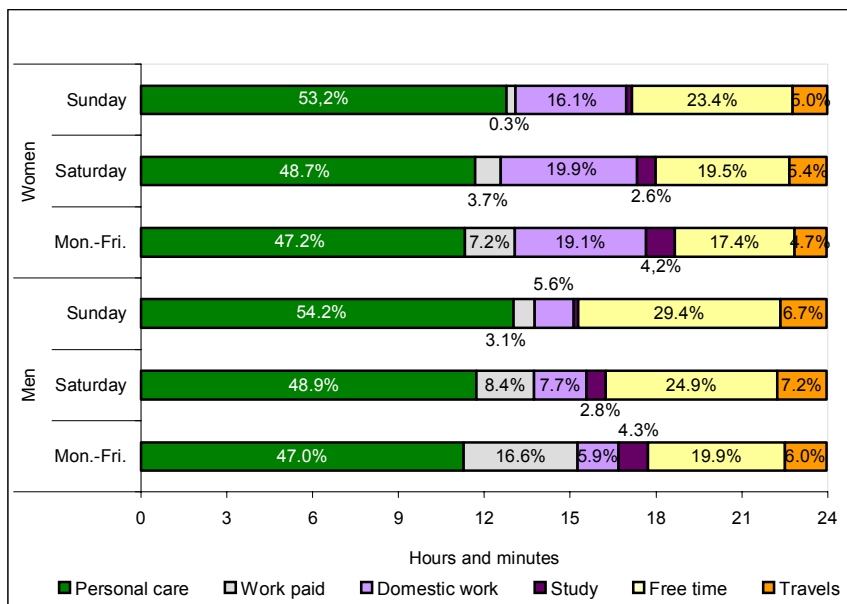
In particular the employed people between 25 and 44 are the ones to have the minimum of free time availability, mainly if they live together as a couple with children; in this case they have 3h29' if men,

2h31' if women. Besides, in comparison with 1988-89, a decrease by 21' for the first and of 4' for the second is detected.

1.4 - An always more diversified daily life

The structure of the day and the organisation of the daily times change according to the type of day. The progressive reduction of the total work time (both paid and domestic) from a weekday to Saturday and to Sunday can clearly be seen in the case of men (Figure 1.19).

Figure 1.19 - Time use among persons aged 3 years and over by gender and type of day (percentage and hours)

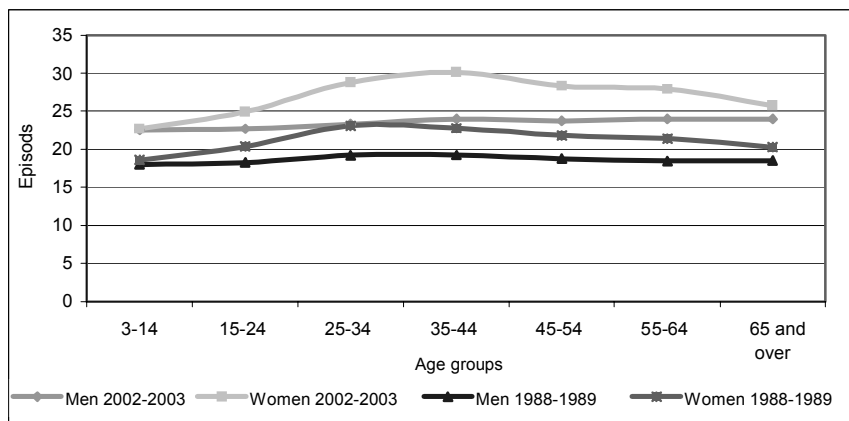


As regards women though, the rigidity of the domestic work time makes such variations less evident. Though different, this reduction of the “compulsory” time allows generally dilating personal care time and free time. The time spent by men on personal care increases from 11h17' during a weekday to 13h01' on Sunday, time women spend on it

increases from 11h20' to 12h47'; likewise, free time for men goes from 4h47' during a weekday to 7h04' on Sunday and, for women, from 4h11' to 5h37'.

Moreover, the changes that have taken place since 1988-89, do not involve only the contents of the day but also the dynamics of the 24 hours. If we consider the episodes, that is the time intervals during which an identical time use is registered in terms of activities carried out, location, present persons (in other words, when none of these elements changes), they amount to 25.4 on an average day in 2002-03, and to 20 in 1988-89⁸. The articulation of daily time has become more complex and varied in comparison with the past. Gender differences not only persist but they have even increased: in 1988-89, a woman's day presented, on average, 2.6 episodes more than men; in 2002-03, that number increased to 3.6 (4.5 if we consider the employed).

Figure 1.20 - Episodes by gender, age group and survey year on an average day (mean value)



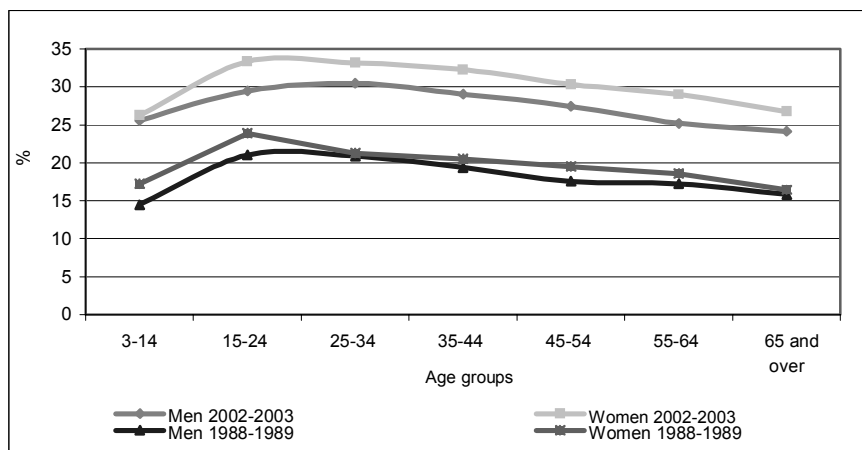
Not only the elements making up the 24-hour mosaic are more numerous but their contents are also more varied: in 2002-03, on average people indeed carry out 12.2 different activities compared to the 11.2 in 1988-89.

⁸ The comparison with the previous survey is affected by the different structure of the day diary, with open intervals in 1988-89, and closed 10-minute intervals in 2002-03.

Finally, the overlap of several activities also increased: while, in 2002-03, more than one sixth of the day (4h11') is spent carrying out several activities in the meantime, in 1988-89, this phenomenon was more limited (3h31').

Even if we consider the average number of events and the share of time dedicated to several activities performed at the same time, the day of the women is always more intense and heterogeneous than that of men.

Figure 1.21 - Time used by persons aged 3 years and over performing more than one activity in the same time by gender age group and survey year (percentage on the 24 hours)



1.5 - A multivariate approach for analysing the changes

A multivariate analysis involves applying a multiple regression model, where the explicative variables are the socio-demographic factors and the dependent variables the time (expressed in minutes per day) dedicated to the various daily life activities. Since the participation rate in the different activities is less than 100 percent, except for personal care activities, the Tobit model was used as it allows studying appropriately dependent variables expressed on a censored scale.

While a regression model was estimated for each of these variables, the analysis was carried out both for the data from the first Istat Time Use survey and for the data from the second survey (1988-1989 and 2002-2003).

The categorical explicative variables, transformed in dummy variables to apply the model, take into account both socio-demographic characteristics (age, educational qualification, activity status), and the characteristics of the household or of the context (role played within the family, geographical location and demographic size of the municipality of residence, type of day). These variables were chosen to be included in the model in order to keep under control all the structural characteristics, whose distribution in the population considered has changed during the time elapsed between one survey and the other and which could well explain the changes registered in the use of daily time.

The results of the analysis are expressed as estimated coefficients (which evaluate the effect on the underlying latent variable of a unit variation of the independent variables) and as two marginal effects: (a) the marginal variation in the conditional expected value of the dependent variable for those who have reported a value of the latter greater than 0 (*conditional on being uncensored*) and (b) the variation in the probability of reporting a value greater than 0 in the dependent variable following a unit variation of the explicative variables (*probability uncensored*). From an interpretation point of view, such effects must be seen in relation to the modality chosen as reference category for each independent variable.

The results of the model applied to both survey editions are reported in Appendix and they essentially confirm what stand out from the descriptive analysis in terms of the changes that have occurred between one survey and the other.

The added-value of the modellistic approach was instead to point out the contribution of the behavioural component compared to the structural one in determining these differences, by decomposing the expected change in the time dedicated to each activity between the period 1988-1989 and the period 2002-2003.

The decomposition adopted is based on the following equation ⁹:

⁹ Ibidem and Barmby, T. and N. Smith, (2001).

$$E(y_{t1} | y_{t1} > 0, X_{t1}) - E(y_{t2} | y_{t2} > 0, X_{t2}) = y(\hat{B}_{t1}X_{t1} - \hat{B}_{t1}X_{t2}) + y(\hat{B}_{t1}X_{t1} - \hat{B}_{t2}X_{t1}) \quad 10$$

The difference between the conditional expected values estimated by the model in the two survey editions (left term of the equation) is decomposed into two factors. The first one regards a compositional or structural variation to be attributed to the differences in the socio-demographic characteristics of the two samples (constant model coefficients and values of the explicative variables referred to two different time occasions). The second factor regards a behavioural variation, and derives from the alteration of the relation that binds the socio-demographic factors to the dependent variables (different coefficients and constant values of the explicative variables). The estimates were obtained substituting to the values of the explicative variables a weighted average of the samples' characteristics for each of the two survey editions¹¹.

First, the Tobit model shows that the reduction in the time men in particular and women dedicate to personal care activities mainly results from a change in the behaviour of the population. Even though the structural changes would seem to increase such portion of the day, the effect is annulled by the opposite sign due to the change in the structure of the relations between the dependent variable and the model's socio-demographic factors.

As to work activities, according to the model's estimates, people have reduced the time they dedicate to it during the 14 years elapsed between one survey and the other. Nevertheless, in this case, the two components act alike though their intensity is different in relation to the gender. While, in the case of men, the change in the socio-demographic structure accounts for 83 percent of the whole variation, in the case of women, the two contributions show that such reduction mainly results equally from a behavioural change and a modification in the population's socio-demographic structure.

The variation registered in the housework and household members' care activities, is more diversified as it strongly points out to a gender effect (see paragraph 1.3.5). The model indicates a positive variation for

¹⁰ The reference time occasion (t1 in the formula) could be each of the two survey editions. Nevertheless, the similarities of the results suggest to illustrate only the one in which the 2002-03 has been considered as reference system.

¹¹ Though the system of weights was not used to apply the model, it have instead been considered in this second phase.

men but, in the case of women, it confirms the reduction registered in the time spent in caring for the house and after household members. Nevertheless, despite such difference, the weight of the two components is quite similar as the behavioural factor greatly accounts for such difference (64 percent for men and 73 percent for women). In other words, these variations seem to stem from the choice of both subgroups.

If, on the one hand, the time dedicated to personal care and work activities has been reduced, the model's estimates point out to an increase in the time available for free time activities, and that for both men and women. Based on the following decomposition, the cause seems to be mainly of a structural nature (in particular, the ageing of the population). This component indeed accounts for 77 percent of the increase estimated for men and 65 percent of the increase estimated for women.

Table 1.1 - Decomposition of the predicted difference in time of daily activities - Years 2002-2003, 1988-1989

ACTIVITY	1988-1989	2002-2003	Difference	Behavioral component (a)		Structural component	
MEN							
Personal care	740	718	-22	-43	195%	21	-95%
Work	276	207	-69	-12	17%	-57	83%
Domestic work	122	133	11	7	64%	4	36%
Free time	300	365	65	15	23%	50	77%
Travels	98	112	14	11	79%	3	21%
WOMEN							
Personal care	723	713	-10	-26	260%	16	-160%
Work	179	143	-36	-16	44%	-20	56%
Domestic work	288	260	-28	-21	75%	-7	25%
Free time	252	303	51	18	35%	33	65%
Travels	69	92	23	21	91%	2	9%

(a) The percentage values have been computed dividing the contribution, expressed in minutes per day, of the behavioral and structural component by the overall difference estimated by the model and preserving the algebraic sign of the division.

Finally, according to the results of the model, the quantity of time spent on average in travelling during the day is higher in 2002 than in 1988. Although this increase is higher among women, the reasons behind it are the same for men and women. The different socio-demographic composition indeed plays only a small role in this change; rather, it mainly derives from a different propensity to travel on the territory. This is particularly the case of women, for whom the behavioural component accounts for 91 percent of the estimated difference, while for men this percentage is of about 79 percent.

1.6 - Final remarks

Time use patterns still reflect, in 2002-03, a strong gender connotation, just as back in 1988-89. Compulsory times influence the condition of women's daily life more than that of men. The strong gender gap in terms of domestic workload is the reason for men and women to differently organise the other times of life. Differences in the domestic workloads go all the way back to childhood and teenage years, become more intense during adulthood and persist until the older ages, thus affecting the whole organisation of the daily time.

The emerging picture shows a traditional sharing of roles, where men invest in their paid work and women take up much of the domestic work, even when they are employed, thereby taking up a heavy work overload difficult to manage.

In spite of such persistent gender asymmetry, the comparison between the two time use surveys shows some signals of convergence between men's and women's time use patterns. Such convergence of patterns does not only involve the domestic work, thanks to the women's decreasing trend and men's increasing trend, but also time dedicated to personal care and to daily trips. Under such profile, thus, it seems possible to confirm the thesis, supported by many people, according to which the progressive convergence of men and women's time use structure reflects the one between social groups (Robinson & Goodbey, 1999; Gershuny, 2000; Niemi, 1995). Italy too appears to be following the same trend as the one surveyed at the international level: a progressive higher participation of men in the domestic work and a reduction in the domestic workload of women (Gershuny, 2000).

Even so, despite the convergence and consequent reduction of gender differences, a social category is currently emerging in Italy, particularly overburdened by work: employed men and women aged between 25 and 44 and in a couple with children, deeply engaged in paid work and in family commitments. It's a social group overburdened by paid work commitments at one hand and by new family ones on the other. Everyday life is strongly articulated by work times, reaching 9h25' for women and 8h09' for men. Free time comes out strongly limited: around 3 hours and a half for men and 2 hours and a half for women. Also sleeping, eating and taking care of themselves are restrained in comparison with same condition but different age people or with same age but different family condition people. However in comparison with 14 years before, while a meaningful reduction of women workload is recorded (thanks to domestic workload reduction), and thus a slight improvement, a substantial total workload increasing is recorded for men (+41'), together with a free time decrease (-22') and less time to dedicate to personal care (-33').

Thus, in addition to gender differences, some critical points can be observed, especially in relation to some phases of the life cycle, which social policies will hopefully take into consideration when planning support actions for families in the next years.

Part of changes in the organisation of daily life derives from the structural modifications and from the demographic trends that have interested the population during the 14 years elapsed between one time use survey and the other: the raising of the education level, the increase in the average life span, the drop in fertility, the ageing of population, the increase in female participation rate to the labour market, the raising of the average age of young people leaving their parental family and the consequent delay in constituting one's own.

The Italian family was deeply affected by these transformation processes, which had a strong influence on the structure of the 24 hours mainly when analysed per large groups of population. However also some changes in behaviours and lifestyles emerge; it will be suitable to continue highlighting them, making use of analysis able to break up the recorded changes into their structural and behavioural components that determined them.

Table 1.2 - Time use among persons aged 3 years and over by gender and age group - Year 1988-1989 (average time in hours and minutes and participation rate in percentage)

ACTIVITY	Age groups										Total
	3-14	15-24	25-34	35-44	45-54	55-64	65-74	75 and over			
	MEN										
Personal care	T 12:57	T 11:45	T 11:28	T 11:22	T 11:26	T 12:21	T 13:00	T 14:10	T 12:05		
	% 100.0	% 100.0	% 100.0	% 100.0	% 100.0	% 100.0	% 100.0	% 100.0	% 100.0		
Paid work	T 0:03	T 2:37	T 5:41	T 5:58	T 5:32	T 3:06	T 0:56	T 0:15	T 3:23		
	% 1.4	% 1.4	% 5.41	% 5.58	% 5.32	% 3.06	% 0.56	% 0.15	% 3.23		
Study	T 3:48	T 2:28	T 0:12	T 0:01	T 0:01	T 45:1	T 16:4	T 5:6	T 46:2		
	% 66.7	% 38.5	% 4.4	% 0.9	% 0.5	% 45.1	% 16.4	% 5.6	% 46.2		
Domestic work	T 0:18	T 0:32	T 1:02	T 1:15	T 1:16	T 2:00	T 2:28	T 2:01	T 1:10		
	% 31.2	% 39.9	% 64.1	% 68.9	% 64.7	% 72.8	% 82.1	% 77.4	% 58.7		
Free time	T 6:03	T 5:07	T 4:02	T 4:01	T 4:21	T 5:28	T 6:44	T 7:01	T 5:05		
	% 99.8	% 98.5	% 97.4	% 97.5	% 97.1	% 98.4	% 99.3	% 98.7	% 98.3		
Travels	T 0:50	T 1:29	T 1:33	T 1:22	T 1:24	T 1:03	T 0:51	T 0:33	T 1:13		
	% 83.9	% 90.3	% 92.2	% 91.0	% 89.2	% 78.9	% 71.3	% 55.7	% 85.1		
Unspecified time use	T ..	T 3:3	T 2:1	T 2:1	T ..	T 3:3	T 1:9	T 1:5	T 2:3		
	% ..	% 3.3	% 2.1	% 2.1	% ..	% 3.3	% 1.9	% 1.5	% 2.3		
	WOMEN										
Personal care	T 12:55	T 11:49	T 11:10	T 10:52	T 11:04	T 11:33	T 12:17	T 13:42	T 11:47		
	% 100.0	% 100.0	% 100.0	% 100.0	% 100.0	% 100.0	% 100.0	% 100.0	% 100.0		
Paid work	T 0:02	T 1:34	T 2:32	T 2:31	T 1:57	T 0:42	T 0:10	T 0:02	T 1:20		
	% 1.4	% 1.4	% 2.32	% 2.31	% 1.57	% 0.42	% 0.10	% 0.02	% 1.20		
Study	T 3:56	T 2:15	T 0:09	T 0:01	T 0:01	T 12:4	T 3:7	T 0:6	T 21:5		
	% 68.8	% 36.6	% 3.4	% 0.6	% 0.5	% 12.4	% 3.7	% 0.6	% 21.5		
Domestic work	T 0:38	T 2:44	T 5:55	T 6:37	T 6:49	T 6:55	T 6:03	T 4:16	T 4:54		
	% 48.3	% 82.9	% 96.1	% 98.9	% 99.6	% 99.3	% 98.8	% 89.5	% 88.3		
Free time	T 99:5	T 4:30	T 3:23	T 3:13	T 3:33	T 4:20	T 5:05	T 5:45	T 4:19		
	% 99.5	% 98.5	% 96.1	% 96.4	% 97.5	% 98.8	% 99.5	% 99.2	% 98.1		
Travels	T 0:47	T 1:07	T 0:50	T 0:44	T 0:36	T 0:29	T 0:25	T 0:15	T 0:42		
	% 86.0	% 81.2	% 74.8	% 73.8	% 63.3	% 54.6	% 53.8	% 30.2	% 68.2		
Unspecified time use	T 0:01	T ..	T 0:01	T 0:02	T ..	T 0:01	T 0:01	T 0:01	T 0:01		
	% 2.8	% ..	% 4.6	% 2.8	% ..	% 3.3	% 1.7	% 1.4	% 2.7		

Table 1.3 - Time use among persons aged 3 years and over by gender and age group - Year 2002-2003 (average time in hours and minutes and participation rate in percentage)

ACTIVITY	Age groups										Total
	3-14	15-24	25-34	35-44	45-54	55-64	65-74	75 and over			
MEN											
Personal care	T 12:48 100.0	T 11:24 100.0	T 11:03 100.0	T 10:53 100.0	T 10:57 100.0	T 11:30 100.0	T 12:19 100.0	T 13:16 100.0	T 11:36 100.0		
Paid work	% ..	% 1:58 25.7	% 5:24 66.7	% 5:54 71.9	% 5:16 66.9	% 2:49 35.0	% 0:32 7.7	% 0:12 4.0	% 3:14 40.4		
Study	T 3:59	T 2:36	T 0:18	T 0:01	T 0:01	T 0:01	T ..	T ..	T 0:52		
	% 68.8	% 42.7	% 6.2	% 0.9	% 0.5	% 0.7	% 0.7	% ..	% 15.0		
Domestic work	T 0:16	T 0:30	T 1:01	T 1:31	T 1:40	T 2:25	T 2:49	T 2:09	T 1:28		
	% 33.5	% 42.8	% 60.1	% 73.5	% 73.2	% 76.8	% 87.3	% 77.5	% 64.9		
Free time	T 5:49	T 5:32	T 4:23	T 3:56	T 4:27	T 5:48	T 7:05	T 7:34	T 5:17		
	% 100.0	% 100.0	% 100.0	% 100.0	% 100.0	% 100.0	% 100.0	% 100.0	% 100.0		
Travels	T 1:05	T 1:57	T 1:49	T 1:41	T 1:37	T 1:24	T 1:13	T 0:46	T 1:31		
	% 93.4	% 97.2	% 96.6	% 96.4	% 95.4	% 93.0	% 89.1	% 73.6	% 93.4		
Unspecified time use	T 0:02	T 0:03	T 0:03	T 0:03	T 0:03	T 0:03	T 0:02	T 0:03	T 0:02		
	% 3.9	% 4.6	% 5.3	% 5.4	% 5.9	% 5.1	% 3.5	% 3.7	% 4.8		
WOMEN											
Personal care	T 12:53 100.0	T 11:35 100.0	T 11:09 100.0	T 10:53 100.0	T 10:49 100.0	T 11:15 100.0	T 11:49 100.0	T 13:11 100.0	T 11:36 100.0		
Paid work	T -	T 1:16 18.2	T 2:43 39.6	T 2:42 41.2	T 2:24 36.3	T 0:52 13.6	T 0:05 1.4	T 0:02 0.7	T 1:24 21.1		
Study	T 4:02	T 2:58	T 0:26	T 0:02	T 0:02	T 0:01	T ..	T ..	T 0:50		
	% 69.2	% 48.8	% 8.7	% 1.2	% 1.2	% 0.4	% ..	% ..	% 14.6		
Domestic work	T 0:27	T 1:46	T 4:31	T 5:47	T 5:55	T 6:25	T 5:55	T 3:53	T 4:30		
	% 46.3	% 75.7	% 91.6	% 98.3	% 98.5	% 99.2	% 99.2	% 85.1	% 87.9		
Free time	T 5:32	T 4:43	T 3:37	T 3:10	T 3:36	T 4:26	T 5:21	T 6:25	T 4:27		
	% 100.0	% 100.0	% 100.0	% 100.0	% 100.0	% 100.0	% 100.0	% 100.0	% 100.0		
Travels	T 1:04	T 1:39	T 1:31	T 1:23	T 1:11	T 0:58	T 0:48	T 0:28	T 1:10		
	% 92.4	% 92.8	% 93.1	% 93.6	% 91.6	% 86.4	% 77.0	% 53.2	% 86.2		
Unspecified time use	T 0:02	T 0:03	T 0:03	T 0:03	T 0:03	T 0:02	T 0:02	T 0:01	T 0:03		
	% 4.6	% 6.8	% 6.2	% 6.9	% 6.2	% 4.7	% 3.0	% 1.3	% 5.1		

Table 1.4 - Time use among persons aged 3 years and over by gender and role in the household - Years 1988-1989
(average time in hours and minutes and participation rate in percentage)

ACTIVITY	Role in the household						Total
	Single	In couple with children (as partner)	In couple without children	Lone-parent	In household with parents		
	MEN						
Personal care	T 12:17	11:35	12:45	11:33	12:18	12:05	
%	100,0	100,0	100,0	100,0	100,0	100,0	
Paid work	T 3:06	5:11	2:34	3:34	1:48	3:23	
%	43,8	69,4	36,2	55,5	25,3	46,2	
Study	T 0:03	0:01	0:01	-	2:48	1:03	
%	1,4	0,5	0,5	-	47,1	17,8	
Domestic work	T 2:00	1:28	1:49	2:27	0:26	1:10	
%	21,36	7,12	9,36	7,12	2,24	16,48	
Free time	T 5:22	4:26	5:48	5:18	5:27	5:05	
%	97,7	97,7	98,8	96,9	98,8	98,3	
Travels	T 1:11	1:18	1:02	1:07	1:13	1:13	
%	78,2	88,0	75,4	77,4	87,4	85,1	
Unspecified time use	T 0:01	0:01	0:01	0:01	0:01	0:01	
%	2,8	2,0	2,6	2,0	2,5	2,3	
	WOMEN						
Personal care	T 12:33	11:00	11:55	11:47	12:20	11:47	
%	100,0	100,0	100,0	100,0	100,0	100,0	
Paid work	T 0:53	1:42	1:05	1:44	1:08	1:20	
%	13,1	28,4	17,7	28,5	17,5	21,5	
Study	T 0:01	0:01	0:01	0:01	3:03	0:56	
%	0,5	0,6	0,5	0,9	52,2	16,2	
Domestic work	T 4:33	7:21	6:06	5:42	1:19	4:54	
%	95,8	99,9	98,6	97,9	65,1	88,3	
Free time	T 5:27	3:19	4:20	4:06	5:08	4:19	
%	99,6	96,5	98,6	98,5	99,1	98,1	
Travels	T 0:32	0:36	0:33	0:38	1:01	0:42	
%	55,4	65,0	56,9	64,6	84,9	68,2	
Unspecified time use	T 0:01	0:01	0:01	0:01	0:01	0:01	
%	2,7	2,8	2,2	1,5	3,0	2,7	

Table 1.5 - Time use among persons aged 3 years and over by gender and role in the household - Year 2002-2003
(average time in hours and minutes and participation rate in percentage)

ACTIVITY	Role in the household						Total
	Single	In couple with children (as partner)	In couple without children	Lone-parent	In household with parents	Total	
	MEN						
Personal care	T 11:23	11:06	12:06	11:33	11:53	11:36	
	% 100,0	100,0	100,0	100,0	100,0	100,0	
Paid work	T 3:23	4:54	2:02	3:17	2:01	3:14	
	% 42,8	60,7	25,2	40,3	25,9	40,4	
Study	T 0:05	0:01	0:01	0:03	2:28	0:52	
	% 2,0	0,7	0,7	0,6	42,2	15,0	
Domestic work	T 2:07	1:51	2:16	2:33	0:28	1:28	
	% 9,36	14,24	19,12	4,48	16,48	21,36	
Free time	T 5:22	4:34	6:17	5:11	5:30	5:17	
	% 100,0	100,0	100,0	100,0	100,0	100,0	
Travels	T 1:38	1:31	1:16	1:19	1:37	1:31	
	% 93,7	95,3	87,2	88,4	95,1	93,4	
Unspecified time use	T 0:02	0:03	0:03	0:03	0:02	0:02	
	% 4,1	5,6	4,5	6,9	4,3	4,8	
	WOMEN						
Personal care	T 11:58	10:53	11:40	11:34	12:06	11:36	
	% 100,0	100,0	100,0	100,0	100,0	100,0	
Paid work	T 1:05	1:49	1:12	1:47	1:10	1:24	
	% 15,5	29,2	17,1	25,9	16,4	21,1	
Study	T 0:04	0:01	0:02	0:01	2:57	0:50	
	% 1,7	0,7	1,0	0,4	50,4	14,6	
Domestic work	T 4:01	6:43	5:38	5:09	1:13	4:30	
	% 92,7	99,4	97,0	94,9	64,9	87,9	
Free time	T 5:53	3:20	4:30	4:25	5:04	4:27	
	% 100,0	100,0	100,0	100,0	100,0	100,0	
Travels	T 0:57	1:11	0:56	1:03	1:27	1:10	
	% 77,5	90,3	79,8	82,6	92,9	86,2	
Unspecified time use	T 0:01	0:03	0:02	0:02	0:02	0:02	
	% 2,4	6,7	4,5	3,8	5,4	5,1	

Table 1.6 - Time use among persons aged 15 years and over by gender, activity status and survey year (average time in hours and minutes and participation rate in percentage)

ACTIVITY	Activity status					
	1988-1989			2002-2003		
	Employed	Not employed	Total	Employed	Not employed	Total
	MEN					
Personal care	T 11:23	T 12:45	T 11:55	T 10:51	T 12:16	T 11:25
	% 100,0	% 100,0	% 100,0	% 100,0	% 100,0	% 100,0
Paid work	T 6:01	T 0:52	T 4:01	T 6:07	T 0:09	T 3:42
	% 79,5	% 15,6	% 54,7	% 75,3	% 3,7	% 46,2
Study	T 0:02	T 1:17	T 0:31	T 0:03	T 0:57	T 0:25
	% 1,2	% 20,1	% 8,6	% 1,5	% 15,6	% 7,2
Domestic work	T 1:03	T 1:47	T 1:20	T 1:14	T 2:15	T 1:39
	% 62,6	% 66,2	% 64,0	% 65,1	% 75,6	% 69,4
Free time	T 4:02	T 6:17	T 4:54	T 4:01	T 6:57	T 5:12
	% 97,2	% 99,2	% 98,0	% 100,0	% 100,0	% 100,0
Travels	T 1:28	T 1:01	T 1:17	T 1:42	T 1:23	T 1:34
	% 91,6	% 75,5	% 85,3	% 96,8	% 88,4	% 93,4
Unspecified time use	T 0:01	T 0:01	T 0:01	T 0:02	T 0:03	T 0:03
	% 2,1	% 2,8	% 2,4	% 5,0	% 4,9	% 5,0
	WOMEN					
Personal care	T 10:56	T 11:54	T 11:36	T 10:44	T 11:47	T 11:26
	% 100,0	% 100,0	% 100,0	% 100,0	% 100,0	% 100,0
Paid work	T 4:36	T 0:11	T 1:32	T 4:32	T 0:04	T 1:35
	% 70,4	% 4,5	% 24,8	% 67,3	% 1,3	% 23,7
Study	T 0:04	T 0:37	T 0:27	T 0:04	T 0:37	T 0:26
	% 2,0	% 10,1	% 7,6	% 2,1	% 10,6	% 7,7
Domestic work	T 4:20	T 6:10	T 5:36	T 3:58	T 5:34	T 5:01
	% 94,6	% 95,0	% 94,9	% 93,5	% 93,0	% 93,1
Free time	T 3:01	T 4:35	T 4:06	T 3:10	T 4:55	T 4:19
	% 96,0	% 98,7	% 97,8	% 100,0	% 100,0	% 100,0
Travels	T 1:01	T 0:33	T 0:41	T 1:29	T 1:01	T 1:10
	% 85,1	% 56,5	% 65,3	% 95,1	% 80,4	% 85,4
Unspecified time use	T 0:02	T 0:01	T 0:01	T 0:03	T 0:02	T 0:03
	% 3,8	% 2,2	% 2,7	% 6,4	% 4,6	% 5,2

Table 1.7 - Tobit regression model of minutes per day devoted to personal care activities by men aged 3 years and over - Years 2002-2003, 1988-1989

	MEN							
	2002-2003				1988-1989			
	Coeff.	Signif.	E	P	Coeff.	Signif.	E	P
AGE GROUPS (55-64 omitted)								
3-14	51,79	**	51,79	0,00	-10,89		-10,89	0,00
15-24	-3,09		-3,09	0,00	-24,14	**	-24,14	0,00
25-34	8,75	*	8,75	0,00	-8,08		-8,08	0,00
35-44	4,89		4,89	0,00	-16,96	**	-16,96	0,00
45-54	-0,33		-0,33	0,00	-18,82	**	-18,82	0,00
65-74	18,98	**	18,98	0,00	27,42	**	27,42	0,00
75 and over	69,39	**	69,39	0,00	93,97	**	93,97	0,00
LEVEL OF EDUCATION (Primary/no degree omitted)								
University	-2,75		-2,75	0,00	-33,62	**	-33,62	0,00
High school	-20,58	**	-20,58	0,00	-25,81	**	-25,81	0,00
Junior school	-16,59	**	-16,59	0,00	-25,72	**	-25,72	0,00
EMPLOYMENT STATUS (Not employed omitted)								
Employed	-40,23	**	-40,23	0,00	-36,56	**	-36,56	0,00
GEOGRAPHICAL AREAS (North omitted)								
Centre	2,75		2,75	0,00	1,95		1,95	0,00
South	7,43	**	7,43	0,00	3,20		3,20	0,00
TYPE OF MUNICIPALITY (Centre of metropolitan area omitted)								
Suburbs of metropolitan area	4,63		4,63	0,00	5,42		5,42	0,00
Municipality <2,000 inhabitants	1,31		1,31	0,00	7,99	*	7,99	0,00
Municipality >2,000 inhabitants	2,03		2,03	0,00	10,78	**	10,78	0,00
ROLE IN THE HOUSEHOLD (Partner without children omitted)								
Single	-20,41	**	-20,41	0,00	-13,07	*	-13,07	0,00
In couple with children (as partner)	-9,86	**	-9,86	0,00	-9,36	**	-9,36	0,00
In household with parents	-0,99		-0,99	0,00	11,90	*	11,90	0,00
Lone-parent	-0,46		-0,46	0,00	9,92		9,92	0,00
DAY OF THE WEEK (Weekday omezzo)								
Saturday	25,37	**	25,37	0,00	31,97	**	31,97	0,00
Sunday	104,43	**	104,43	0,00	98,69	**	98,69	0,00

* p < 0,05; ** p < 0.01.

E = Marginal effect in the conditional expected value; P = Marginal effect in the probability of being uncensored.

Table 1.8 - Tobit regression model of minutes per day devoted to personal care activities by women aged 3 years and over - Years 2002-2003, 1988-1989

	WOMEN							
	2002-2003				1988-1989			
	Coeff.	Signif.	E	P	Coeff.	Signif.	E	P
AGE GROUPS (55-64 omessa)								
3-14	66.93	**	66.93	0.00	51.21	**	51.21	0.00
15-24	18.21	**	18.21	0.00	14.25	**	14.25	0.00
25-34	17.15	**	17.15	0.00	10.67	**	10.67	0.00
35-44	7.24	*	7.24	0.00	-3.57		-3.57	0.00
45-54	-2.92		-2.92	0.00	-5.00		-5.00	0.00
65-74	22.60	**	22.60	0.00	39.00	**	39.00	0.00
75 and over	88.18	**	88.18	0.00	134.62	**	134.62	0.00
LEVEL OF EDUCATION (Primary/no degree omitted)								
University	9.15	**	9.15	0.00	-10.51	*	-10.51	0.00
High school	-11.78	**	-11.78	0.00	-4.35		-4.35	0.00
Junior school	-13.96	**	-13.96	0.00	-15.08	**	-15.08	0.00
EMPLOYMENT STATUS (Not employed omitted)								
Employed	-27.00	**	-27.00	0.00	-18.47	**	-18.47	0.00
GEOGRAPHICAL AREAS (North omitted)								
Centre	1.64		1.64	0.00	9.86	**	9.86	0.00
South	-2.76		-2.76	0.00	2.75		2.75	0.00
TYPE OF MUNICIPALITY (Centre of metropolitan area omitted)								
Suburbs of metropolitan area	11.78	**	11.78	0.00	-2.55		-2.55	0.00
Municipality <2,000 inhabitants	8.82	**	8.82	0.00	0.13		0.13	0.00
Municipality >2,000 inhabitants	5.06	*	5.06	0.00	2.48		2.48	0.00
ROLE IN THE HOUSEHOLD (Partner without children omitted)								
Single	-0.49		-0.49	0.00	3.09		3.09	0.00
In couple with children (as partner)	-15.29	**	-15.29	0.00	-23.54	**	-23.54	0.00
In household with parents	20.67	**	20.67	0.00	27.31	**	27.31	0.00
Lone-parent	10.48	**	10.48	0.00	16.32	**	16.32	0.00
DAY OF THE WEEK (Weekday omezzo)								
Saturday	19.70	**	19.70	0.00	19.97	**	19.97	0.00
Sunday	87.71	**	87.71	0.00	85.59	**	85.59	0.00

* $p < 0,05$; ** $p < 0,01$.

E = Marginal effect in the conditional expected value; P = Marginal effect in the probability of being uncensored.

Table 1.9 - Tobit regression model of minutes per day devoted to paid work by men aged 3 years and over - Years 2002-2003, 1988-1989

	MEN							
	2002-2003				1988-1989			
	Coeff.	Signif.	E	P	Coeff.	Signif.	E	P
AGE GROUPS (55-64 omitted)								
3-14	9.46		2.38	0.01	-8.89		-3.11	-0.01
15-24	30.24	*	7.68	0.03	27.80	*	9.94	0.04
25-34	4.78		1.20	0.00	19.14		6.81	0.02
35-44	-7.28		-1.81	-0.01	20.45		7.29	0.03
45-54	-81.71	**	-19.31	-0.07	-35.51	*	-12.12	-0.05
65-74	-156.69	**	-34.82	-0.13	-179.21	**	-53.91	-0.22
75 and over	9.46		2.38	0.01	-8.89		-3.11	-0.01
LEVEL OF EDUCATION (Primary/no degree omitted)								
University	2.13		0.53	0.00	-14.33		-4.97	-0.02
High school	-21.09		-5.23	-0.02	-63.56	**	-21.53	-0.08
Junior school	2.55		0.64	0.00	-30.18	**	-10.54	-0.04
EMPLOYMENT STATUS (Not employed omitted)								
Employed	812.34	**	193.09	0.61	467.37	**	148.09	0.54
GEOGRAPHICAL AREAS (North omitted)								
Centre	9.46		2.37	0.01	12.14		4.30	0.02
South	45.08	**	11.38	0.04	61.91	**	22.09	0.08
TYPE OF MUNICIPALITY (Centre of metropolitan area omitted)								
Suburbs of metropolitan area	-13.84		-3.42	-0.01	14.44		5.13	0.02
Municipality <2,000 inhabitants	37.95	**	9.73	0.04	46.03	**	16.01	0.06
Municipality >2,000 inhabitants	5.59		1.39	0.01	91.84	**	34.35	0.12
ROLE IN THE HOUSEHOLD (Partner in couple without children omitted)								
Single	27.19		6.93	0.03	-7.09		-2.48	-0.01
In couple with children (as partner)	35.09	**	8.80	0.03	23.34	*	8.20	0.03
In household with parents	9.20		2.31	0.01	8.68		3.07	0.01
Lone-parent	25.03		6.38	0.02	14.13		5.03	0.02
DAY OF THE WEEK (Weekday omezzo)								
Saturday	-267.14	**	-62.05	-0.23	-186.45	**	-61.82	-0.24
Sunday	-577.81	**	-125.86	-0.43	-519.98	**	-159.20	-0.57

* p < 0,05; ** p < 0.01.

E = Marginal effect in the conditional expected value; P = Marginal effect in the probability of being uncensored.

Table 1.10 - Tobit regression model of minutes per day devoted to paid work by women aged 3 years and over - Years 2002-2003, 1988-1989

	WOMEN							
	2002-2003				1988-1989			
	Coeff.	Signif.	E	P	Coeff.	Signif.	E	P
AGE GROUPS (55-64 omitted)								
3-14	-38.69		-5.23	-0.01	-20.18		-3.55	-0.01
15-24	-25.32		-3.45	-0.01	16.08		2.89	0.01
25-34	-5.66		-0.78	0.00	7.76		1.39	0.00
35-44	3.10		0.43	0.00	43.23	*	7.90	0.03
45-54	-102.4	**	-13.34	-0.03	-91.24	**	-15.24	-0.05
65-74	-252.04	**	-30.03	-0.05	-320.50	**	-45.68	-0.11
75 and over	-38.69		-5.23	-0.01	-20.18		-3.55	-0.01
LEVEL OF EDUCATION (Primary/no degree omitted)								
University	6.08		0.84	0.00	1.30		0.23	0.00
High school	6.70		0.93	0.00	-22.98		-4.04	-0.01
Junior school	32.30	*	4.51	0.01	-19.10		-3.38	-0.01
EMPLOYMENT STATUS (Not employed omitted)								
Employed	884.82	**	165.30	0.49	621.50	**	140.63	0.49
GEOGRAPHICAL AREAS (North omitted)								
Centre	23.32	*	3.26	0.01	14.13		2.53	0.01
South	24.07	*	3.34	0.01	-5.63		-1.00	0.00
TYPE OF MUNICIPALITY (Centre of metropolitan area omitted)								
Suburbs of metropolitan area	-43.36	**	-5.85	-0.01	35.01		6.38	0.02
Municipality <2,000 inhabitants	23.60		3.31	0.01	54.50	**	9.60	0.03
Municipality >2,000 inhabitants	-12.46		-1.73	0.00	91.15	**	17.14	0.06
ROLE IN THE HOUSEHOLD (Partner in couple without children omitted)								
Single	36.38	*	5.14	0.01	-8.71		-1.54	-0.01
In couple with children (as partner)	-33.29	**	-4.58	-0.01	-26.04		-4.63	-0.02
In household with parents	87.39	**	12.62	0.03	87.32	**	16.28	0.06
Lone-parent	12.35		1.72	0.00	9.61		1.72	0.01
DAY OF THE WEEK (Weekday omezzo)								
Saturday	-242.83	**	-31.70	-0.06	-159.00	**	-27.09	-0.08
Sunday	-527.10	**	-65.17	-0.12	-477.86	**	-75.88	-0.22

* $p < 0,05$; ** $p < 0.01$.

E = Marginal effect in the conditional expected value; P = Marginal effect in the probability of being uncensored.

Table 1.11 - Tobit regression model of minutes per day devoted to domestic work by men aged 3 years and over - Years 2002-2003, 1988-1989

	MEN							
	2002-2003				1988-1989			
	Coeff.	Signif.	E	P	Coeff.	Signif.	E	P
AGE GROUPS (55-64 omitted)								
3-14	-119.6	**	-44.10	-0.32	-95.06	**	-33.52	-0.26
15-24	-70.39	**	-27.67	-0.19	-55.78	**	-20.54	-0.15
25-34	-5.17		-2.24	-0.01	-7.64		-3.01	-0.02
35-44	16.48	**	7.37	0.04	-0.82		-0.33	0.00
45-54	3.26		1.43	0.01	-11.75	*	-4.60	-0.03
65-74	-6.40		-2.77	-0.02	4.27		1.72	0.01
75 and over	-40.18	**	-16.36	-0.11	-29.39	**	-11.07	-0.08
LEVEL OF EDUCATION (Primary/no degree omitted)								
University	-3.68		-1.60	-0.01	7.36		2.97	0.02
High school	4.64		2.04	0.01	18.20	**	7.43	0.05
Junior school	-8.21	**	-3.57	-0.02	2.89		1.15	0.01
EMPLOYMENT STATUS (Not employed omitted)								
Employed	-72.94	**	-32.12	-0.19	-53.12	**	-21.35	-0.14
GEOGRAPHICAL AREAS (North omitted)								
Centre	-11.54	**	-4.97	-0.03	-21.03	**	-8.15	-0.06
South	-42.56	**	-18.23	-0.11	-47.95	**	-18.75	-0.13
TYPE OF MUNICIPALITY (Centre of metropolitan area omitted)								
Suburbs of metropolitan area	12.63	**	5.63	0.03	12.08	*	4.90	0.03
Municipality <2,000 inhabitants	17.40	**	7.82	0.05	3.89		1.55	0.01
Municipality >2,000 inhabitants	7.38	*	3.21	0.02	19.28	**	7.89	0.05
ROLE IN THE HOUSEHOLD (Partner in couple without children omitted)								
Single	15.02	**	6.74	0.04	32.98	**	13.98	0.09
In couple with children (as partner)	20.16	**	8.90	0.05	10.35	**	4.14	0.03
In household with parents	-91.92	**	-38.17	-0.25	-94.90	**	-36.23	-0.26
Lone-parent	-7.97		-3.43	-0.02	-2.42		-0.96	-0.01
DAY OF THE WEEK (Weekday omissio)								
Saturday	37.81	**	16.99	0.10	41.26	**	16.93	0.11
Sunday	-5.29	*	-2.30	-0.01	-6.62	*	-2.62	-0.02

* p < 0,05; ** p < 0.01.

E = Marginal effect in the conditional expected value; P = Marginal effect in the probability of being uncensored.

Table 1.12 - Tobit regression model of minutes per day devoted to domestic work by women aged 3 years and over - Years 2002-2003, 1988-1989

	WOMEN							
	2002-2003				1988-1989			
	Coeff.	Signif.	E	P	Coeff.	Signif.	E	P
AGE GROUPS (55-64 omitted)								
3-14	-215	**	-139	-0.3	-225	**	-158	-0.3
15-24	-82.65	**	-61.23	-0.08	-63.98	**	-51.43	-0.05
25-34	6.07		4.87	0.00	-3.68		-3.08	0.00
35-44	14.07	**	11.35	0.01	-0.86		-0.72	0.00
45-54	5.43		4.35	0.00	-2.90		-2.43	0.00
65-74	-12.71	**	-10.04	-0.01	-26.29	**	-21.62	-0.02
75 and over	-100.12	**	-72.41	-0.11	-117.59	**	-88.03	-0.12
LEVEL OF EDUCATION (Primary/no degree omitted)								
University	-47.04	**	-35.99	-0.04	-42.03	**	-33.96	-0.03
High school	-18.14	**	-14.37	-0.01	-18.82	**	-15.62	-0.01
Junior school	-10.07	**	-8.00	-0.01	-7.55	*	-6.33	0.00
EMPLOYMENT STATUS (Not employed omitted)								
Employed	-88.88	**	-68.35	-0.08	-95.00	**	-76.39	-0.07
GEOGRAPHICAL AREAS (North omitted)								
Centre	4.21		3.37	0.00	-6.03	*	-5.05	0.00
South	8.75	**	7.00	0.01	8.01	**	6.73	0.00
TYPE OF MUNICIPALITY (Centre of metropolitan area omitted)								
Suburbs of metropolitan area	10.18	**	8.20	0.01	22.03	**	18.76	0.01
Municipality <2,000 inhabitants	24.06	**	19.60	0.02	15.69	**	13.13	0.01
Municipality >2,000 inhabitants	16.55	**	13.14	0.01	27.54	**	23.50	0.01
ROLE IN THE HOUSEHOLD (Partner in couple without children omitted)								
Single	-74.86	**	-55.87	-0.07	-72.84	**	-57.37	-0.06
In couple with children (as partner)	73.77	**	60.14	0.05	68.23	**	57.89	0.04
In household with parents	-174.20	**	-126.73	-0.19	-201.12	**	-155.71	-0.18
Lone-parent	-27.13	**	-21.15	-0.02	-45.23	**	-36.58	-0.03
DAY OF THE WEEK (Weekday omezzo)								
Saturday	20.87	**	16.79	0.01	14.19	**	11.96	0.01
Sunday	-41.88	**	-32.89	-0.03	-67.72	**	-55.49	-0.04

* p < 0,05; ** p < 0.01.

E = Marginal effect in the conditional expected value; P = Marginal effect in the probability of being uncensored.

Table 1.13 - Tobit regression model of minutes per day devoted to free time libero by men aged 3 years and over - Years 2002-2003, 1988-1989

	MEN							
	2002-2003				1988-1989			
	Coeff.	Signif.	E	P	Coeff.	Signif.	E	P
AGE GROUPS (55-64 omitted)								
3-14	-86.05	**	-77.07	-0.03	-1.18		-1.06	0.00
15-24	-72.49	**	-65.26	-0.02	-41.32	**	-36.52	-0.01
25-34	-55.82	**	-50.74	-0.01	-38.81	**	-34.35	-0.01
35-44	-46.34	**	-42.33	-0.01	-26.75	**	-23.82	-0.01
45-54	-18.11	**	-16.71	0.00	-9.96	*	-8.93	0.00
65-74	19.47	**	18.20	0.00	4.14		3.73	0.00
75 and over	29.27	**	27.47	0.00	15.12	*	13.72	0.00
LEVEL OF EDUCATION (Primary/no degree omitted)								
University	26.67	**	24.98	0.00	39.21	**	36.01	0.01
High school	26.00	**	24.24	0.00	36.59	**	33.40	0.01
Junior school	15.60	**	14.51	0.00	21.98	**	19.88	0.01
EMPLOYMENT STATUS (Not employed omitted)								
Employed	-119.41	**	-110.54	-0.02	-89.39	**	-80.58	-0.03
GEOGRAPHICAL AREAS (North omitted)								
Centre	-11.54	**	-10.68	0.00	-1.73		-1.56	0.00
South	-2.69		-2.50	0.00	4.63		4.17	0.00
TYPE OF MUNICIPALITY (Centre of metropolitan area omitted)								
Suburbs of metropolitan area	-13.50	**	-12.48	0.00	-12.33	*	-11.05	0.00
Municipality <2,000 inhabitants	-23.39	**	-21.52	-0.01	-11.16	**	-10.07	0.00
Municipality >2,000 inhabitants	-7.13	*	-6.63	0.00	-33.25	**	-29.51	-0.01
ROLE IN THE HOUSEHOLD (Partner in couple without children omitted)								
Single	-14.06	**	-12.98	0.00	-20.76	**	-18.47	-0.01
In couple with children (as partner)	-18.09	**	-16.75	0.00	-10.47	*	-9.42	0.00
In household with parents	25.12	**	23.39	0.00	4.30		3.87	0.00
Lone-parent	-11.75		-10.85	0.00	-18.39	*	-16.38	-0.01
DAY OF THE WEEK (Weekday omezzo)								
Saturday	70.42	**	65.97	0.01	55.45	**	50.45	0.01
Sunday	135.08	**	127.27	0.02	167.05	**	153.81	0.04

* p < 0,05; ** p < 0.01.

E = Marginal effect in the conditional expected value; P = Marginal effect in the probability of being uncensored.

Table 1.14 - Tobit regression model of minutes per day devoted to free time by women aged 3 years and over - Years 2002-2003, 1988-1989

	WOMEN							
	2002-2003				1988-1989			
	Coeff.	Signif.	E	P	Coeff.	Signif.	E	P
AGE GROUPS (55-64 omitted)								
3-14	-17.897	**	-16.151	-0.006	35.67	**	32.494	0.0112
15-24	-53.26	**	-47.06	-0.02	-27.69	**	-24.42	-0.01
25-34	-58.26	**	-51.45	-0.02	-33.10	**	-29.11	-0.02
35-44	-51.37	**	-45.64	-0.02	-19.39	**	-17.18	-0.01
45-54	-23.19	**	-20.88	-0.01	-17.46	**	-15.48	-0.01
65-74	13.75	**	12.60	0.00	6.47		5.82	0.00
75 and over	52.01	**	48.47	0.01	11.32	*	10.21	0.00
LEVEL OF EDUCATION (Primary/no degree omitted)								
University	42.00	**	38.99	0.01	42.24	**	38.84	0.01
High school	25.09	**	22.99	0.01	21.07	**	19.07	0.01
Junior school	12.76	**	11.66	0.00	10.86	**	9.76	0.00
EMPLOYMENT STATUS (Not employed omitted)								
Employed	-60.10	**	-53.85	-0.02	-55.39	**	-48.56	-0.03
GEOGRAPHICAL AREAS (North omitted)								
Centre	-16.05	**	-14.52	-0.01	-11.31	**	-10.08	0.00
South	-11.96	**	-10.87	0.00	-1.82		-1.63	0.00
TYPE OF MUNICIPALITY (Centre of metropolitan area omitted)								
Suburbs of metropolitan area	-14.19	**	-12.84	0.00	-16.09	**	-14.27	-0.01
Municipality <2,000 inhabitants	-26.08	**	-23.41	-0.01	-9.07	**	-8.13	0.00
Municipality >2,000 inhabitants	-11.70	**	-10.68	0.00	-16.80	**	-14.91	-0.01
ROLE IN THE HOUSEHOLD (Partner in couple without children omitted)								
Single	52.66	**	49.03	0.01	53.27	**	49.14	0.01
In couple with children (as partner)	-37.54	**	-33.91	-0.01	-28.10	**	-25.05	-0.01
In household with parents	61.25	**	56.56	0.02	63.83	**	57.95	0.02
Lone-parent	10.22	**	9.35	0.00	16.68	**	15.10	0.01
DAY OF THE WEEK (Weekday omissio)								
Saturday	30.98	**	28.38	0.01	21.84	**	19.67	0.01
Sunday	87.46	**	80.87	0.02	110.52	**	101.12	0.03

* $p < 0,05$; ** $p < 0.01$.

E = Marginal effect in the conditional expected value; P = Marginal effect in the probability of being uncensored.

Table 1.15 - Tobit regression model of minutes per day devoted to travels by men aged 3 years and over - Years 2002-2003, 1988-1989

	MEN							
	2002-2003				1988-1989			
	Coeff.	Signif.	E	P	Coeff.	Signif.	E	P
AGE GROUPS (55-64 omitted)								
3-14	-22.27	**	-14.01	-0.07	0.38		0.21	0.00
15-24	17.50	**	11.93	0.04	28.46	**	16.92	0.09
25-34	12.31	**	8.29	0.03	23.92	**	14.08	0.08
35-44	7.99	**	5.33	0.02	14.78	**	8.53	0.05
45-54	4.88	*	3.24	0.01	10.98	**	6.30	0.04
65-74	-12.02	**	-7.70	-0.03	-4.08		-2.26	-0.01
75 and over	-48.06	**	-28.00	-0.16	-35.83	**	-18.13	-0.14
LEVEL OF EDUCATION (Primary/no degree omitted)								
University	10.62	**	7.15	0.03	11.04	**	6.38	0.04
High school	14.20	**	9.49	0.04	9.05	**	5.17	0.03
Junior school	9.82	**	6.53	0.03	6.88	**	3.88	0.02
EMPLOYMENT STATUS (Not employed omitted)								
Employed	12.20	**	8.02	0.03	26.31	**	14.67	0.09
GEOGRAPHICAL AREAS (North omitted)								
Centre	5.81	**	3.86	0.01	3.49	**	1.97	0.01
South	7.70	**	5.09	0.02	-1.88	**	-1.05	-0.01
TYPE OF MUNICIPALITY (Centre of metropolitan area omitted)								
Suburbs of metropolitan area	2.37		1.57	0.01	-5.77	*	-3.19	-0.02
Municipality <2,000 inhabitants	-0.63		-0.42	0.00	-7.17	**	-4.04	-0.02
Municipality >2,000 inhabitants	-2.18		-1.44	-0.01	-9.74	**	-5.35	-0.03
ROLE IN THE HOUSEHOLD (Partner in couple without children omitted)								
Single	16.86	**	11.53	0.04	10.14	**	5.85	0.03
In couple with children (as partner)	-3.66	*	-2.40	-0.01	-4.53	*	-2.53	-0.02
In household with parents	14.65	**	9.75	0.04	10.27	**	5.80	0.04
Lone-parent	8.18	*	5.49	0.02	-3.45		-1.91	-0.01
DAY OF THE WEEK (Weekday omezzo)								
Saturday	14.79	**	9.86	0.04	-0.34		-0.19	0.00
Sunday	7.58	**	5.02	0.02	3.15	*	1.77	0.01

* p < 0,05; ** p < 0.01.

E = Marginal effect in the conditional expected value; P = Marginal effect in the probability of being uncensored.

Table 1.16 - Tobit regression model of minutes per day devoted to travels by women aged 3 years and over - Years 2002-2003, 1988-1989

	WOMEN							
	2002-2003				1988-1989			
	Coeff.	Signif.	E	P	Coeff.	Signif.	E	P
AGE GROUPS (55-64 omitted)								
3-14	0.63	**	-14.01	-0.07	0.38		0.21	0.00
15-24	26.11	**	11.93	0.04	28.46	**	16.92	0.09
25-34	23.23	**	8.29	0.03	23.92	**	14.08	0.08
35-44	18.58	**	5.33	0.02	14.78	**	8.53	0.05
45-54	9.40	*	3.24	0.01	10.98	**	6.30	0.04
65-74	-15.20	**	-7.70	-0.03	-4.08		-2.26	-0.01
75 and over	-51.83	**	-28.00	-0.16	-35.83	**	-18.13	-0.14
LEVEL OF EDUCATION (Primary/no degree omitted)								
University	11.79	**	7.15	0.03	11.04	**	6.38	0.04
High school	12.26	**	9.49	0.04	9.05	**	5.17	0.03
Junior school	7.45	**	6.53	0.03	6.88	**	3.88	0.02
EMPLOYMENT STATUS (Not employed omitted)								
Employed	13.23	**	8.02	0.03	26.31	**	14.67	0.09
GEOGRAPHICAL AREAS (North omitted)								
Centre	-1.23	**	3.86	0.01	3.49	**	1.97	0.01
South	-0.95	**	5.09	0.02	-1.88	**	-1.05	-0.01
TYPE OF MUNICIPALITY (Centre of metropolitan area omitted)								
Suburbs of metropolitan area	-1.40		1.57	0.01	-5.77	*	-3.19	-0.02
Municipality <2,000 inhabitants	-6.67		-0.42	0.00	-7.17	**	-4.04	-0.02
Municipality >2,000 inhabitants	-5.61		-1.44	-0.01	-9.74	**	-5.35	-0.03
ROLE IN THE HOUSEHOLD (Partner in couple without children omitted)								
Single	15.01	**	11.53	0.04	10.14	**	5.85	0.03
In couple with children (as partner)	-6.24	*	-2.40	-0.01	-4.53	*	-2.53	-0.02
In household with parents	16.89	**	9.75	0.04	10.27	**	5.80	0.04
Lone-parent	-1.60	*	5.49	0.02	-3.45		-1.91	-0.01
DAY OF THE WEEK (Weekday omissio)								
Saturday	10.09	**	9.86	0.04	-0.34		-0.19	0.00
Sunday	3.12	**	5.02	0.02	3.15	*	1.77	0.01

* $p < 0,05$; ** $p < 0.01$.

E = Marginal effect in the conditional expected value; P = Marginal effect in the probability of being uncensored.

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2. The boundaries of working time

2.1 - Desynchronization and permeability of working time?

Perhaps even more than the stopwatch, the time clock was the symbol of the industrial and bureaucratic age. The act of ‘punching your card’ at the beginning and end of work sharply divided the part of the day dedicated to paid work from that devoted to reproductive activities (eating, caring for oneself or others, resting, enjoying oneself, engaging in social relationships, etcetera). Moreover, the act was performed simultaneously by the large majority of dependent workers, and it marked out the rhythms of life and mobility of the inhabitants of large cities and the small villages included in metropolitan areas. The ‘rush hours’ which preceded ‘clocking in’ at the beginning of workday, and then marked its end, alternated with the ‘off-peak’ times when almost all employees were in their workplaces or engaged in reproductive activity in their homes or leisure amenities (shops, cinemas, bars, clubs). The cleavage between work and non-work times (and places) was matched by their close synchronization in the course of the working day.

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This organization of time reached its acme in the period of the great Taylorist and Fordist manufacturing firms, and the great bureaucratic apparatuses regulating and reproducing society, which required the simultaneous presence at work of large masses of blue-collar and white-collar workers.

The advent of the service society wrought profound changes in the forms, places and contents of work. The manufacture of material goods gave way to the supply of personal services and the processing of information and symbols, standard stock production gave way to 'personalized' and just-in-time production, large organizations to small units, and closed hierarchies to open networks. The variability and uncertainty entailed by the new modes of producing goods and services require flexibility in the technologies employed and in the use of the workforce. Whilst the former requirement has been met by the spread of information technologies, the latter has bred new forms of employment and new working time regimes, as well as the risk of new forms of marginalization in the allocation of work schedules (Chiesi, 1989). The new forms of employment comprise both fixed-term and freelance employment relationships which combine a dependent position into the organization with the extreme flexibility of a legally independent relationship. The new working time regimes comprise the various forms of part-time work, shift or out-of-hours work, flexible entry and exit times, total working hours calculated on an annual rather than weekly basis, jobs-on-call, etcetera. But the worker, especially if assigned to highly skilled tasks, is often required to show a commitment which may also partly involve his/her private life (Accornero, 2002; Reyneri, 2005).

Desynchronization of work commitment during the day and permeability between working and non-working time are therefore two aspects that should characterize today's way of working. Nevertheless, at least in Italy, empirical studies have not to date gone beyond analysis of the diffusion of specific working-time arrangements - part-time, shift work, work at night or at weekends - and have failed to consider whether the standard work day is indeed being destructured for a large number of workers. Besides addressing this question, the time use survey has enabled us to determine the extent to which work has 'invaded' non-work time, doing so also in ways which may evade the usual surveys of time budgets.

Finally, the two hypothesis were discussed considering not only certain traditional features of workers¹ (gender, education, skill level, etc.), but also their occupational status. The latter was defined so as to distinguish non permanent forms of employment from permanent ones, both dependent and independent. Dependent workers were distinguished between those on open-ended contracts and those on fixed-term ones, and independent workers between traditional ones - that is, professionals, artisans and shopkeepers with large clienteles ensuring high stability - from the new category of independent outsource workers - that is, freelancers, solo-self-employed or casual job holders - who are at serious risk of unemployment if the outsourcer does not renew the contract.² It is thus possible to determine whether the flexibility of occupational status is matched by flexibility in the work commitment across the day. In the sample used by the survey on the use of time, non permanent workers were slightly under-estimated with respect to the labour force survey (7.5 percent against 8.6 percent for fixed-term employees, and 1.6 percent against 2.2 percent for outsource workers), but comparative analysis is not affected.

In the second section we shall show that the distribution of actual working time across the average work day (from Monday to Friday) - i.e. the 24 hours monitored - vary for subjects who declared that they were in employment (and who had worked for at least one 10-minute episode) according to their structural and socio-demographic characteristics. This will enable us to address the question of the de-synchronization of working times. We shall see that, contrary to other sources, our time budget data yield a much less favourable take on the most widespread conjectures on de-synchronization and de-standardization (Gershuny, 2000; Bauman, 1996; Crespi, 2005) - as, for that matter, European life-course research has already warned (Brückner and Mayer, 2005).

The third section uses data from the individual questionnaire and concentrates on the boundaries between work and non-work. We shall show in particular which subjects most frequently declare that they work even out of working hours schedule and on non-work days, what type of

¹ Given the small number of cases, over-65s were excluded.

² To construct the typology, we cross-referenced information on the subordinate or independent nature of the work with information on the presence or otherwise of a time limit (for delivery of a product or a simple deadline).

out-of-hours activity they perform, and the reasons why they take work home with them, work at weekends, and prolong their work schedules.

The following section 2.4 analyses the phenomenon of permeability between leisure and working time, again using the time budget data. We shall set out the results for socio-demographic and occupational characteristics, and then seek, on the basis of a logistic regression model, to identify the characteristics of those subjects most likely to have a ‘piecemeal’ work pattern identified by a large number of transitions among ‘states’ - that is, different allocations of time among different activities.

2.2 - Patterns in the distribution of working time across the work day³

The quantity of time annually devoted to work in Italy has gradually diminished in the past thirty years - a period for which the international sources have relatively reliable data. But in regard to the magnitude of this decrease, the same international sources appear somewhat confused (Evans et al., 2001; Oecd, 2006), regardless of whether just dependent employees or all workers are considered. However, what seems to emerge from international comparisons is a more marked decrease in hours worked in Italy for the twenty-year period 1970-1990; whilst from the early 1990s onwards this decline seems to have slowed. The Oecd sources are contradictory, however, and the confusion increases when one considers the data on the average weekly hours worked (Eurostat, Lfs, cited in Istat, 2006). For 2004, the Oecd data show that Italy is a country in which, overall, the annual hours worked per employed person are among the highest in the Western Europe countries (1585): those countries in which people work most seem to be the English-speaking ones and the Mediterranean countries with labour-intensive economies. A partially different ‘snapshot’ emerges when one considers - as, for instance, Istat does in

³ In this section and in section 2.4 we shall refer to data from the daily diaries compiled on work days from Monday to Friday by subjects (aged 15-65) who had actually worked during the week in question: that is, they had undertaken at least one time slot (10 minutes minimum) of paid work. For this reason, the data reported may partly differ from other sources using the same time budgets. Excluded from our sample, in fact, were employed subjects who were on holiday or on sick leave, or those who, although in employment, did not invest any of their daily time in work.

its 2006 report - data from the Eurostat labour costs survey. In this case, Italy 'gains' hours worked (from employees of firms with more than ten workers in the private non-agricultural sector), although overall the Eurostat data confirm what we have just said: namely that Italy is a country in which the (annual or weekly) workload is by no means light.

Istat (2006) draws an interesting distinction between occupational regimes. It differentiates countries/work patterns which tend to divide (hourly) workloads among a large number of subjects of working age from the 'eastern Mediterranean' model where the relatively few who work do so much more intensely, that is, on longer schedules.⁴ Whatever the case may be, one can certainly endorse the report's observation that:

"The differences in the hours worked result from different combinations of structural characteristics of the employed. The average weekly schedules of full-time workers are almost double those of part-time workers, and the self-employed work more hours than do dependent employees. Employed males work around a quarter more on average than female workers" (Istat, 2006), and likewise for structural, socio-demographic and professional characteristics.

2.2.1 - The distribution of working time according to socio-demographic characteristics

Gender

Figure 2.1 shows the cumulated distribution of work measured in slots of ten minutes each, across 24 hours, for women and men. The activities performed have been re-aggregated into four types: work; travel for work purposes; care of oneself/others; other uses of time. Plotted along the x-axis are the 24 hours of the work day divided into slots of ten minutes each (from 4:00 a.m to 3:50 on the following morning). Given against each slot is the cumulated percentage of subjects (plotted along the y-axis) performing the different activities at that 'point' in time. For example, the figure shows that at 4:00 in the morning, 100 percent of the female employed interviewees were engaged in caring for themselves or others (sleep being put in this category).

⁴ The Annual Report (Istat, 2006) identifies a third model, in which "many work a great deal", but this concerns few countries whose specific features should probably be analysed.

Figure 2.1 - The activities across the day - Years 2002-2003 (cumulated frequencies in percentage)



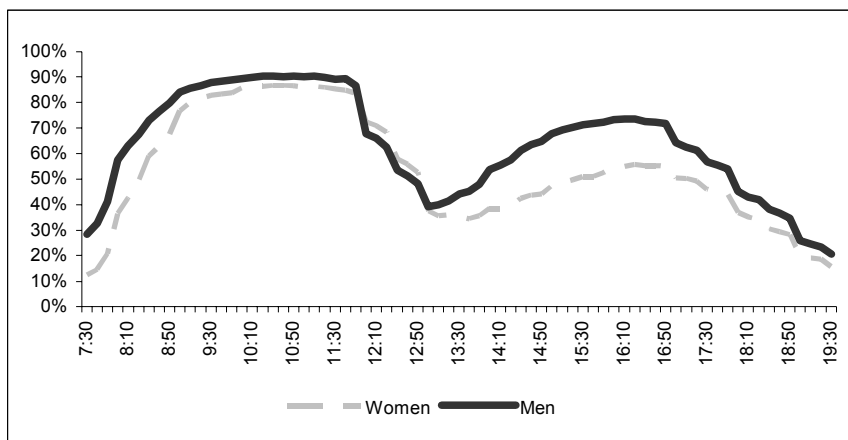
One therefore finds that the male allocation of time among the four activities substantially privileges work. The gender differences in the use of time concentrate in the afternoon, when fewer women are at work because of the greater incidence of part-time workers and teachers among them. For the same reason, a larger proportion of women with respect to men engage in care activities during the afternoon.

Figure 2.1 furnishes further extremely interesting information: 50 percent of the interviewees began work at around 8:00 in the morning and finished at around the 17:30 in the afternoon. More specifically, 50 percent of women began work between 8:20 and 8:30 and finished at 17:00; for men, the beginning of work was earlier - between 7:50 and 8:00 - and the end of the work day was between 17:50 and 18:00.

Minimum variations around these intervals of time substantially account for 80-90 percent of subjects. The time budget data therefore depict a society apparently highly standardized and synchronized in the allocation of work activities: the ‘tails’ of the distribution of work time outside the above-mentioned ‘temporal window’ are very small.

For this reason, we have decided to simplify the description by reporting the data on the distribution of working time with the observation window restricted to between 7:30 and 19:30 (Figure 2.2).

Figure 2.2 - Workers by unit of time and gender - Years 2002-2003 (7:30-19:30) (cumulated frequencies in percentage)



It thus becomes clearer that the greater amount of time worked by men compared with women relates to the lesser work participation by women in the afternoon.

Table 2.1 - Average time devoted to the various activities in a weekday by gender - Years 2002-2003 (in hours and minutes)

	Activity				Total
	Care of oneself/others	Work	Travel for work purposes	Other uses of time	
Men	11:20	8:21	1:08	3:11	24:00
Women	13:30	6:50	1:00	2:40	24:00

Table 2.1 shows the distribution of social production and reproduction tasks, although these are ‘compressed’ by the coding selected for the activities. On an average work day, women work 91 minutes less than men, but they devote much more time to family care activities (2 hours 10 minutes more).

A possible problem intrinsic to the cumulated frequencies set out in figure 2.1 (from which derives the graph in figure 2.2) is that the graphs depict, for each time interval, the ‘net result’ of in/out transitions among the different states considered.⁵ On its own, therefore, evidence on the temporal allocation of activities is not enough to state that, despite everything, Italy is still a ‘fixed’ and rather stably synchronized society. Table 2.2 responds to this possible limitation due to presentation of the data in aggregate form per unit of time.

⁵ The purpose here is to analyse the distribution of work: for a more detailed examination of social production/reproduction times see M.C. Romano “Tempi di vita e quotidianità: caratteristiche e tendenze”. Istat, Rome, December 2005.

Table 2.2 - Average daily transitions among different states in a weekday by gender - Years 2002-2003

	Types of transition	
	Among the four activities	To/from work
Men	11.6	3.9
Women	11.9	3.4

The table reports the average number of transitions among the various states, for a average work day. The data of most interest are those in the ‘to/from work’ column, in that they enable us to determine whether the organization of working time is more or less fragmented - that is, if work consists of a sequence of transitions among different states and activities or whether, besides being stably synchronized around the allocation within the 24 hours, it is also structured on the basis of a stable organizational scheme.

In theory, there are four transitions to and from work in a typical day: morning entry to the workplace; exit for the lunch break; return to work after lunch; exit at the end of the day. These ‘passages’ mark the rhythm of the standard worker’s ‘ideal-typical’ day. A large number of transitions may indicate the presence of “ever more compressed and evanescent temporal spaces” (Leccardi, 2005), that is, ways in which time is allocated and overlapping, individualized and fragmented activities are organized.

Table 2.2 depicts a decidedly stable and still largely ‘standardized’ allocation of time. Four transitions are the standard value (average and modal) for men, while the number of transitions is slightly lower for women - as one would expect, given their larger share of part-time work, which reduces transitions to and from work.

Birth cohorts

The birth cohort is a source of social inequality in Italy (Schizzerotto, 2002), given the characteristics of the institutional context and the model of labour-market regulation, and above all deregulation, implemented since the mid-1990s (Esping-Andersen and Regini, 2000; Reyneri, 2002; Barbieri and Scherer, forthcoming).

For this reason, analysis of working times cannot ignore their allocation by cohort. Such analysis (Figure 2.3 and Table 2.3) shows that, although there seems to have been no major change in the time devoted to work between the pre- and post-war cohorts (around eight hours a day), the allocation of time across the work day seems to have been progressively 'compacted' into a pattern roughly of the type '8:00-12:30/14:00-17:30', with a shortening of the lunch break, more frequent returns to work in the mid-afternoon, and a flattening of the extreme tails of the distribution. This pattern is evident if one compares the curve of the cohort born before 1945 with the curves of the other cohorts (Figure 2.3).

To be noted, instead, is the (albeit slight) prolongation of working times for people born after 1960, whilst there is no change in the time taken to travel to and from work.

In regard to transitions to and from work, one notes a significant stability for workers born after 1945 (Table 2.4). Hence, the oft-discussed de-standardizing and de-structuring is not borne out by our data, which instead show that - besides the substantial immobility of the post-war cohorts - the only individuals who today experience a large number of transitions to and from work are more elderly persons, generally independent workers who remain longer in employment. This is an extremely interesting result, because it shows a world of work with scant fragmentation, and in which few individuals frequently alternate work time with time devoted to other activities.

Figure 2.3 - Workers by unit of time and birth cohort - Years 2002-2003
 (7:30-19:30) (cumulated frequencies in percentage)

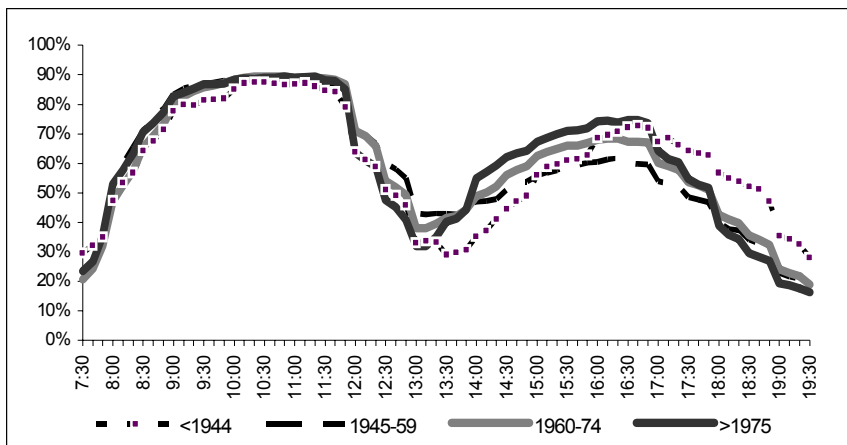


Table 2.3 - Average time devoted to the following activities in a weekday by birth cohort - Years 2002-2003 (in hours and minutes)

	Activity				Total
	Care of self/others	Work	Travel for work purposes	Other uses of time	
Until 1944	12:20	7:40	1:00	3:00	24:00
1945-59	12:20	7:40	1:00	3:00	24:00
1960-74	12:10	7:50	1:02	2:58	24:00
Since 1975	11:19	7:51	1:00	3:50	24:00

Table 2.4 - Average daily transitions between different states in a weekday by birth cohort - Years 2002-2003

	Types of transition	
	Among the four activities	To and from work
Until 1944	11.8	4.2
1945-59	11.7	3.7
1960-74	11.9	3.7
Since 1975	11.5	3.7

Educational level

Disaggregation by educational levels (together with occupational position: see below) yields a noteworthy, and somewhat unexpected, picture of the allocation of temporal workloads.

One finds, in fact, that in Italy work is still substantially a 'burden' distributed in inverse proportion to the human capital (and, as we shall see, the occupational position) possessed by individuals. The lowest-educated work the longest (35 minutes a day more than graduates) and therefore have less time to devote to themselves and/or to social and leisure activities.

We find, in fact (Figure 2.4), that both individuals possessing only an elementary school certificate and those who have completed compulsory schooling begin work earlier in the morning than do the others (between 7:30 and 7:45 is the median time), and they finish work at around 18:00, more or less like all the others. By contrast, the most educated workers begin work later in the morning (50 percent of graduates begin between 8:30 and 9:00), they move their lunch breaks forward, but they do not stay longer at work in the evening than the others.

Figure 2.4 - Workers by unit of time and educational levels - Years 2002-2003 (7:30-19:30) (cumulated frequencies in percentage)

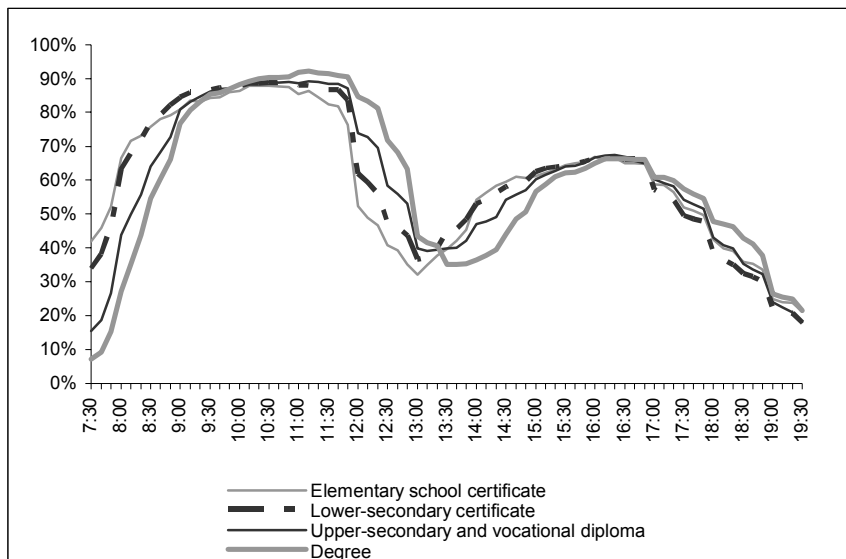


Table 2.5 - Average time devoted to the various activities in a weekday by educational levels - Years 2002-2003 (in hours and minutes)

	Activity				Total
	Care of self/others	Work	Travel for work purposes	Other uses of time	
Elementary school certificate	12:18	8:05	1:05	2:42	24:00
Lower-secondary certificate	12:03	8:00	1:00	2:57	24:00
Upper-secondary and vocational diploma	12:05	7:40	1:05	3:10	24:00
Degree	12:00	7:30	1:10	3:20	24:00

In short, the image depicted by the time budget data seems to be more of a society still profoundly conditioned by class than of a society in which work - and its times - constitute a 'marginal' variable with respect to the set of memberships and dimensions that structure people's lives (and therefore their days, measured also temporally).

Table 2.6 - Average daily transitions between different states in a weekday by educational levels - Years 2002-2003

	Types of transition	
	Among the four activities	To and from work
Elementary school certificate	10.9	3.8
Lower-secondary certificate	11.4	3.7
Upper-secondary and vocational diploma	11.9	3.7
Degree	12.6	4.0

Finally to be observed is that also the data on transitions to and from work, distinguished by education, are by and large stably distributed around the 'ideal-typical' value represented by the four 'canonical' transitions (Table 2.6).

2.2.2 - The distribution of working time according to socio-professional characteristics

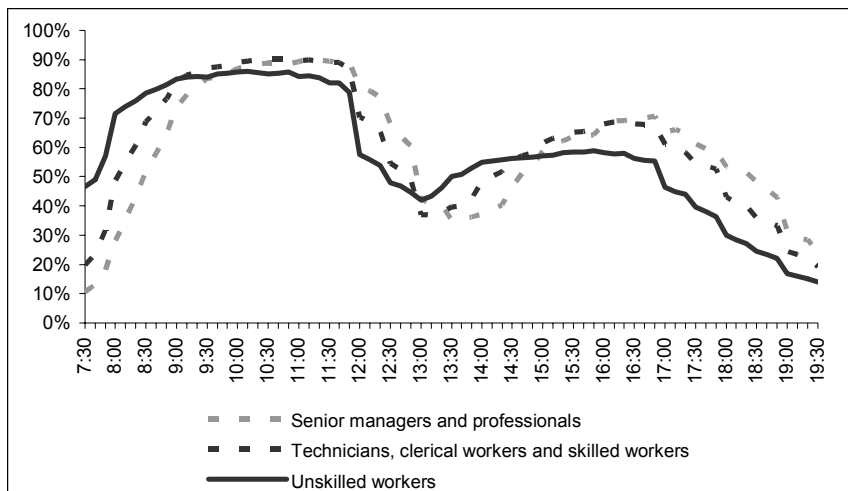
Occupational position

As said in the previous section, Italy is still a country profoundly structured - as regards working time - by class. Figure 2.5 and Tables 2.7 and 2.8 show the quantities and allocations of time worked by occupational category. We have recoded the Istat-Isco classification of occupations into three broad classes: managers and professionals (Isco 1 and 2); technicians, clerical workers and skilled workers (Isco 3-6); and unskilled workers (Isco 7 and 8) in order to assess whether and to what extent, in present-day Italian society, the occupational category determines temporal workloads as well as the hourly allocation of working time.

Overall, unskilled workers are those who work longest (almost eight hours), while the amount of time worked diminishes as one moves up the occupational scale. It should be added, however, that the difference is not particularly marked: managers and professionals work on average only around one quarter less than do manual workers (Table 2.7).

More interesting is the distribution of work-time across the day: unskilled workers begin decidedly early the morning (the median is around 7:30) while managers and professionals reach their median value around an hour later.

Figure 2.5 - Workers by unit of time and occupation - Years 2002-2003
(7:30-19:30) (cumulated frequencies in percentage)



One thus observes a progressive shift forward of working times by occupational level, so that the highest-qualified workers begin their work days later, have later lunch breaks and afternoon re-entries, and - consequently - leave work later in the day: around 50 percent of managers and professionals are still at work at 18:30, as opposed to around 25-30 percent of unskilled workers.

The greater articulation of working hours as occupational level increases is also evinced by Table 2.8, and in particular by the higher number of transitions to and from work made by higher-qualified workers. Their working times are more often mixed and more often interrupted than those of other occupational categories, so that they seem more fragmented and 'piecemeal'. Hence, highly-qualified workers - whether dependent or independent - have temporal boundaries among their activities across the day which are more mobile than those of the other occupational groups. Because the quantitative weight of this group of occupations is constantly increasing, we may say that, overall, the boundaries between their work and non-work are attenuating.

Table 2.7 - Average time devoted to the various activities in a weekday by occupation - Years 2002-2003 (in hours and minutes)

	Activity				Total
	Care of self/others	Work	Travel for work purposes	Other uses of time	
Unskilled workers	12:05	7:55	1:00	3:00	24:00
Technicians, clerical workers and skilled workers	12:08	7:48	1:00	3:04	24:00
Senior managers and professionals	11:59	7:41	1:10	3:10	24:00

Table 2.8 - Average daily transitions between different states in a weekday by occupation - Years 2002-2003

	Types of transition	
	Among the four activities	To and from work
Unskilled workers	10.6	3.4
Technicians, clerical workers and skilled workers	11.8	3.7
Senior managers and professionals	12.5	4.1

We may conclude that there are signals in present-day Italian society that the boundaries between work and non-work are fading. But this attenuation is not widespread; even less is it equally distributed among the social groups involved in the labour market. Those affected are only workers with high human capital, in high-skilled occupations, and with broad professional autonomy. Still to be determined is whether this is a new phenomenon, or whether instead the 'elite' occupations have always possessed these features in regard to working time.

The employment typology

As already mentioned, we have drawn up a typology of employment relationships in order to determine the connection between the flexibility of occupational status and the amount of time worked during the day.

The typology distinguishes dependent workers on open-ended contracts from those on fixed-term contracts, and among independent workers, between traditional ones (professionals, artisans and shopkeepers, which are extremely stable categories from the point of view of professional and work continuity) from the new category of outsource workers (freelancers and quasi-subordinate workers, i.e. workers who are 'formally independent' but at risk of economic dependence).

As Figure 2.6 and the following Tables 2.9 and 2.10 show, the largest amounts of time are worked by the more 'typical' occupational categories - traditional independent workers and permanent employees - which testifies to the existence of a trade-off between job security and guarantees and a propensity to commitment and extra investment (in this case of time).

Yet Figure 2.6 shows that independent workers, both traditional and freelance, have work schedules distributed across a longer time span. Whilst this type of work arrangement is typical of traditional independent workers - who are by definition 'masters of their destinies' and therefore also of their working time - the situation of the 'new' self-employed workers may be different. Indeed, as regards the allocation of working time across the day, the latter display a pattern midway between that of dependent workers and the traditional self-employed. They start work in the morning at exactly the same time as employees (which demonstrates their scant control over their own work schedules); their mid-day breaks are the same as those of typical independent; while in the afternoon their allocation of working time lies exactly midway between that of dependent and independent workers. Like the latter, they finish work later the evening, and overall they exhibit a rather marked fragmentation of time, exactly like the traditional independent workers - as confirmed by the results on their transitions to and from work (Table 2.10).

Figure 2.6 - Workers by unit of time and occupational status - Years 2002-2003 (7:30-19:30) (cumulated frequencies in percentage)

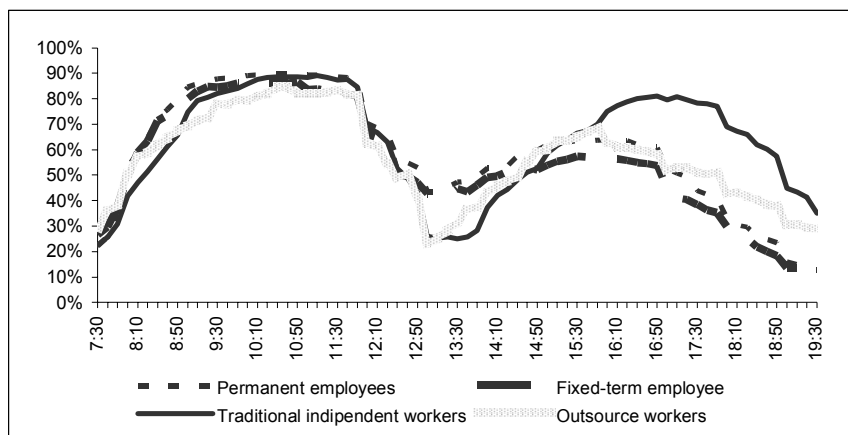


Table 2.9 - Average time devoted to the various activities in a weekday by occupational status - Years 2002-2003 (in hours and minutes)

	Activity				Total
	Care of self/others	Work	Travel for work purposes	Other uses of time	
Permanent employee	12:10	7:40	1:00	3:10	24:00
Fixed-term employee	12:07	7:07	1:06	3:40	24:00
Traditional independent worker	12:00	8:15	1:00	2:45	24:00
Outsource worker	11:25	7:29	1:10	3:56	24:00

Table 2.10 - Average daily transitions between different states in a weekday by occupational status - Years 2002-2003

	Types of transition	
	Among the four activities	To and from work
Permanent employee	11.6	3.5
Fixed-term employee	11.6	3.4
Traditional independent worker	12.1	4.4
Outsource worker	12.5	4.4

For this typology, we plotted graphs showing the combination of the activities undertaken across 24 hours (Figure 2.7). Whilst traditional independent workers have the longest work days (see the white area in Figure 2.7), the days of outsource workers have extremely ‘jagged’ and mobile time boundaries among the various activities. The graphs illustrate in different ways the data set out in Tables 2.9 and 2.10, and in particular the number of transitions to and from work.

Hence, although outsource workers do not work a particularly large number of hours, they form the category with the most frequent overlaps between working time and time devoted to the other activities. This is a finding that warrants further investigation, for it may be indicative of a lack of control over working time (and over work conditions as a whole) or, conversely, of greater freedom in managing and allocating working time across the day (Fullin, 2004).

Finally, we estimated the probability⁶ of having a number of transitions to and from work higher than the ‘standard’ value of four. That is to say, by means of a logistic regression, we sought to determine the individual characteristics making it more likely that a person will experience a ‘con/fusion’ between work and non-work times, an overlap between the two domains that may be indicative of permeability between work and non-work as areas which have lost their traditional ‘Fordist’ characteristics of separate and distinct ‘ambits’.

Our results (Table 2.11) are explicit: the subjects with the largest number of transitions to and from work, and therefore potentially experiencing close promiscuity between work and non-work times, are principally males, living and working in the northern regions of Italy, particularly the North-East, endowed with high human capital (graduates), and with independent occupations both traditional and outsourced.

⁶ Put in methodologically more correct terms, the logistic regression model transformed a non linear equation into a linear one estimating the natural logarithm (ln) of the probability relationship of $(P / (1-P))$ to be analysed: $\text{Logit}(P) = \ln((P/1-P))$. The regression equation thus became: $\ln(P / (1-P)) = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 \dots$

Figure 2.7 - The activities across the day - Years 2002-2003 (cumulated frequencies in percentage)

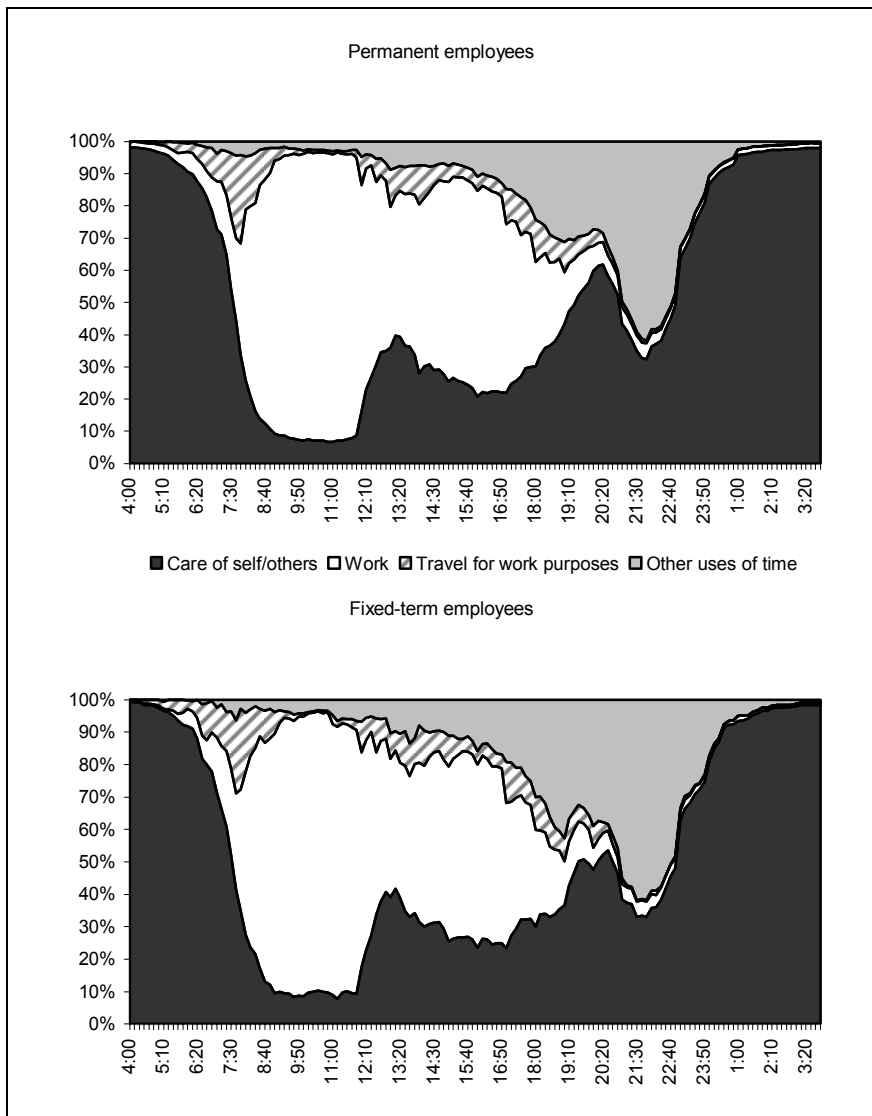


Figura 2.7 continued - The activities across the day - Years 2002-2003
(cumulated frequencies in percentage)

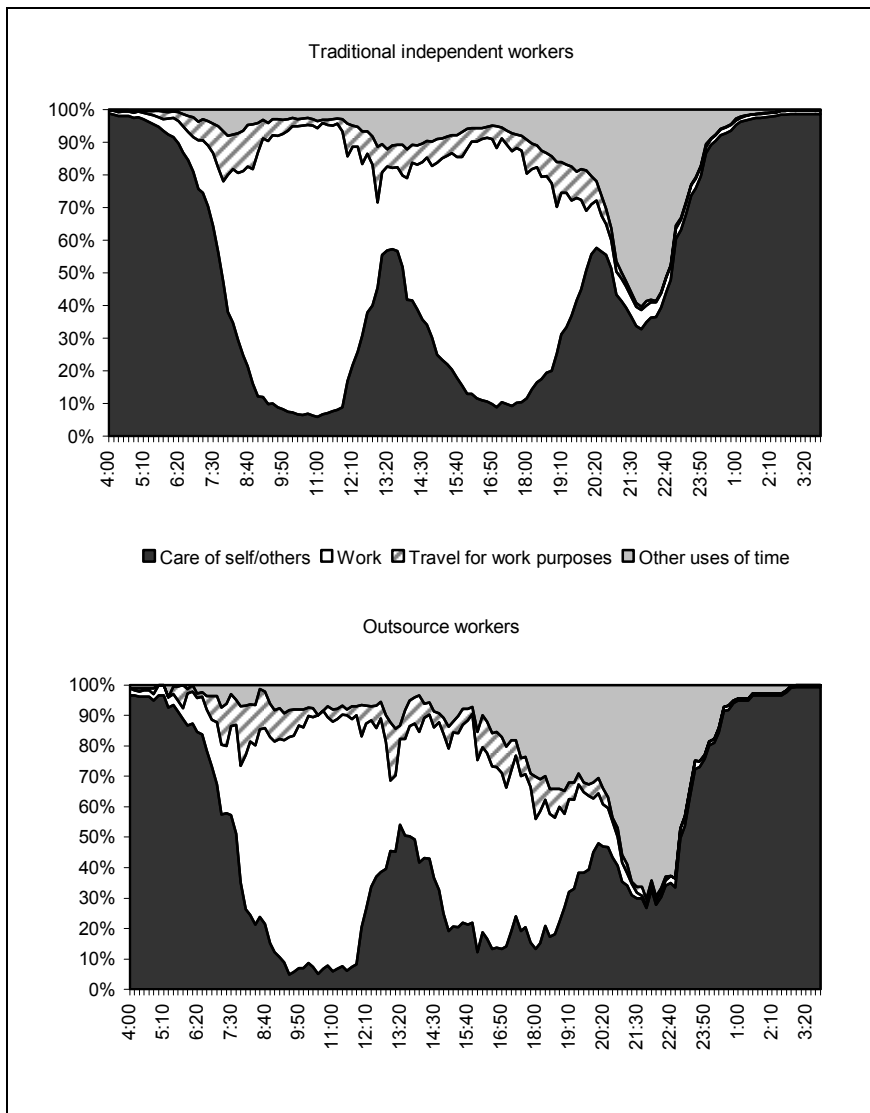


Table 2.11 - Logistic regression model of the likelihood of having more than four transitions to and from work - Years 2002-2003
(regression coefficients and significances)

	Coefficient	Significance
GENDER		
Men	-	-
Women	-0.49	***
AGE GROUPS		
15-24	-	-
25-34	0.24	
35-44	0.31	
45-54	0.16	
55-64	0.32	
LEVEL OF EDUCATION		
Elementary school certificate	-	-
Lower-secondary certificate	-0.12	
Upper-secondary and vocation diploma	-0.09	
Degree	0.42	***
MARITAL STATUS		
Married/cohabiting	-	-
Single	0.08	
OCCUPATIONAL STATUS		
Permanent employee	-	-
Fixed-term employee	0.42	***
Traditional independent worker	1.25	***
Outsource worker	1.39	***
OUT-OF-HOURS WORK		
No	-	-
Yes (every day or some times a week)	0.90	***
GEOGRAPHICAL AREAS		
North-West	-	-
North-East	0.30	***
Centre	-0.21	
South	-0.17	
Constant	-3.01	***
Number of cases	6257	
R ²	0.10	

(a) * = 10% significance, ** = 5% significance, *** = 1% significance

Traditional employees on open-ended contracts are least likely to experience con/fusion between work and non-work times, which is further evidence that the flexibility/precariousness (Barbieri and

Scherer, 2005, 2007) of employment relationships also impacts on people's time and how they organize the other aspects of their lives. To be noted is that age classes do not significantly influence the probability of overlaps between work and non-work times, once the above-mentioned characteristics have been controlled for. This is probably due to the fact that it is the occupation, as well as the manner in which it is regulated, that determines the organization of non-work and work times.

The probability of having high turnover to and from work may be significantly influenced by the propensity to do 'extra' work - that is, work outside the schedule for the main job. This concerns subjects who declared that they worked (habitually or several times a week) outside their normal work schedule, during their leisure time or by bringing work home. As is obvious, this commitment to the job has a direct impact on the probability of experiencing overlaps between work and non-work, as we shall see in section 2.4.

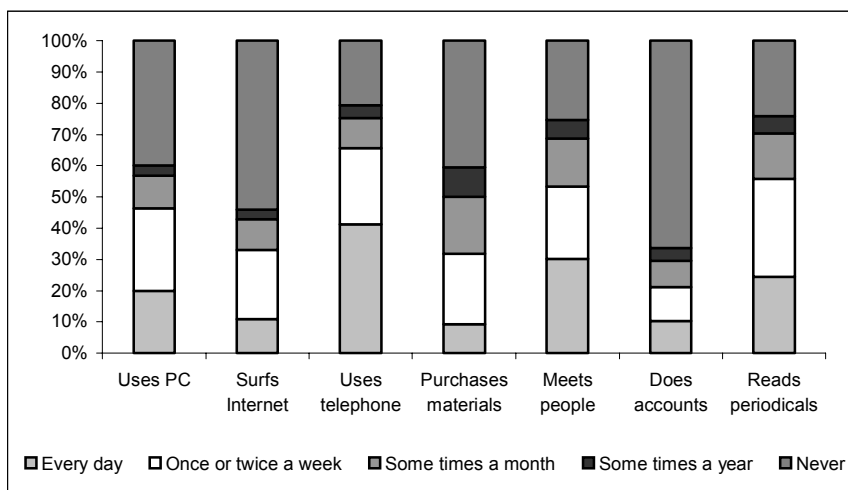
2.3 - When the boundaries blur: out-of-hours work

The hypothesis that the traditional distinction between work and non-work times is attenuating was addressed mainly by means of the individual questionnaire included in the survey on the use of time. In fact, this phenomenon, which had already emerged from the Istat survey on leisure time, is not fully grasped by analysis of the time budgets, because the purpose of some activities (personal relations, reading, making telephone calls, using the computer) performed outside working hours was not stated in the database used for the analyses, although they may have been related to work.

As also reported by the Istat annual report (2006), fully 23.2 percent of subjects in employment declared that they worked out-of-hours (i.e. outside the normal working hours schedule) by taking work home with them, or by working during their free time, and 14.2 percent declared that they did so every day or on some occasions during the week. Moreover, 14.4 percent frequently worked at weekends as well. The out-of-hours activities were principally relational work and self-training. As Figure 2.8 shows, 65 percent of subjects working out-of-hours declared that they used the telephone at least once a week, 54.6 percent read periodicals and books, and 51.7 percent met people for the purposes of work. There followed use of computer tools (47.2 percent

used a computer and 33.9 percent surfed the Internet) and, to a lesser extent, administrative activities (31.1 percent purchased materials and 20.9 percent did accounting work). The intensity of such off-schedule work is confirmed by the fact that more than 45 percent of subjects declared that they did four or more of the seven activities envisaged by the questionnaire.

Figure 2.8 - Employed declaring that they engaged in certain activities for work purposes out-of-hours, by activity - Years 2002-2003 (percentage)



Also to be noted is that one employed subject in every ten believed that his/her work time and leisure time were difficult to separate, or even that they completely overlapped. However, since this is a subjective evaluation, we preferred to restrict the analysis to behaviours, even if they were reported by subjects. We accordingly considered three objective dimensions of work commitment outside its traditional boundary: the probability of working out-of-hours, the probability of doing so often, and the probability of also working on non-work days.

In order to ascertain how the phenomenon was distributed among the employed subjects, we constructed binomial logistic regressions to determine how these three probabilities differed according to certain

characteristics of the worker (gender, age, education level), his/her work (occupational status according to the twofold alternative dependent/independent and permanent/non permanent, professional qualification, economic sector, presence of other jobs), and the socio-economic context (geographical areas). As far as employees are concerned we considered also the usual recourse to overtime while for independent workers we considered the presence of fixed working hours. For both employees and independent workers we took into consideration also the differences between full-/part-time workers..

Other context indicators - degree of urbanization and type of household - were instead discarded, because they had no discernable influence on the phenomenon, and indeed there was no reasonable hypothesis that they might do so.

Preliminary analysis on the whole sample, and on the two sub-samples of dependent and independent workers, found that the probability of working out-of-hours was much higher among teachers, among subjects who had another job, and among employees who habitually worked overtime. This raised a semantic problem concerning the concept of 'working time' for some subjects. The teachers may have considered 'working time' to be only hours spent actually in the classroom and therefore classified the preparing of lessons and the correcting of exercises - usually done at home - among out-of-hours activities. This required analysis of the diffusion of the phenomenon when teachers were excluded. To control for other risks of semantic confusion, a similar solution was also adopted for the very few double-jobholders (only 3.6 percent of employed subjects) and the many employees (fully 36.1 percent) who customarily put in overtime, presumably at the same workplace. In fact, one may ask whether, for these subjects, the out-of-hours activities that they declared coincided with the second job or with overtime, or whether they were additional to them. If the question asked is taken in its literal sense, one would think that they were additional activities, but a control seemed opportune.

Given that it is impossible to reproduce all the analytical models here,⁷ we have chosen the principal ones, which are presented in Tables 2.12 and 2.13.

⁷ Separate logistic regression models were developed for the overall sample (Table 2.12), for dependent workers excluding teachers, double-jobholders, and subjects habitually working overtime (Table 2.13), and for independent workers.

Table 2.12 - Logistic regression models. Total workers aged 15 to 64 Years 2002-2003 (regression coefficients and significances)

	Probability of working out-of-hours		Probability of often working out-of-hours		Probability of working also on non-work days	
	Coeff.	Signif. (a)	Coeff.	Signif. (a)	Coeff.	Signif. (a)
GENDER						
Men	-	-	-	-	-	-
Women	-0.14	***	-0.19	***	-0.22	***
AGE GROUPS						
15-24	-	-	-	-	-	-
25-34	0.43	***	0.49	***	0.36	***
35-44	0.71	***	0.69	***	0.69	***
45-54	0.70	***	0.75	***	0.72	***
55-64	0.63	***	0.74	***	0.69	***
LEVEL OF EDUCATION						
Elementary school certificate	-	-	-	-	-	-
Lower-secondary certificate	0.19	**	0.05	-	0.25	***
Upper-secondary and vocational diploma	0.66	***	0.52	***	0.65	***
Degree	1.16	***	0.96	***	1.17	***
OCCUPATIONAL STATUS						
Permanent employee	-	-	-	-	-	-
Fixed-term employee	-0.34	***	-0.26	**	-0.33	***
Traditional independent worker	1.26	***	1.36	***	1.44	***
Outsource worker	1.11	***	1.21	***	1.41	***
OCCUPATION						
Managers and entrepreneurs	-	-	-	-	-	-
Intellectual professionals	0.22	**	0.12	-	0.14	-
Technical Professionals	-0.12	-	-0.18	*	-0.25	***
Clerical workers	-0.77	***	-1.04	***	-1.12	***
Sales and services personnel	-0.99	***	-0.98	***	-0.90	***
Skilled workers	-0.78	***	-0.88	***	-0.69	***
Semi-skilled workers	-1.14	***	-1.35	***	-1.13	***
Elementary occupations	-1.51	***	-1.58	***	-1.43	***

Table 2.12 continued - **Logistic regression models. Total workers aged 15 to 64 - Years 2002-2003** (*regression coefficients and significances*)

	Probability of working out-of-hours		Probability of often working out-of-hours		Probability of working also on non-work days	
	Coeff.	Signif. (a)	Coeff.	Signif. (a)	Coeff.	Signif. (a)
SECTOR OF ACTIVITY						
Agriculture	-	-	-	-	-	-
Industry	-0.42	***	-0.59	***	-0.74	***
Construction	-0.30	***	-0.49	***	-0.65	***
Shops and hotels	-0.23	**	-0.41	***	-0.51	***
Transport and communications	-0.44	***	-0.55	***	-0.56	***
Finance and business services	-0.22	**	-0.44	***	-0.62	***
Public administration	0.01		-0.27	**	-0.17	
Education	1.10	***	1.19	***	0.70	***
Health	-0.68	***	-0.95	***	-0.93	***
Other services	-0.18	*	-0.36	***	-0.45	***
SECOND JOB						
No	-	-	-	-	-	-
Yes	0.75	***	0.80	***	0.75	***
GEOGRAPHICAL AREAS						
North-West	-	-	-	-	-	-
North-East	0.13	***	0.20	***	0.19	***
Centre	-0.29	***	-0.24	***	-0.31	***
South	-0.30	***	-0.21	***	-0.24	***
Constant	-1.01	***	-1.68	***	-1.63	***
Number of cases	20458		20458		20458	
R ²	0.27		0.27		0.25	

(a) * = 10% significance, ** = 5% significance, *** = 1% significance

It was possible to make a restricted choice without removing information because the result of all the regressions conducted on the entire sample and the sub-samples, constructed excluding the possible sources of semantic misunderstandings, was unequivocal.

Table 2.13 - Logistic regression models. Dependent workers excluding teachers, double-jobholders, and habitual overtime workers - Years 2002-2003 (regression coefficients and significances)

	Probability of working out-of-hours		Probability of often working out-of-hours		Probability of working also on non-work days	
	Coeff.	Signif. (a)	Coeff.	Signif. (a)	Coeff.	Signif. (a)
GENDER						
Men	-	-	-	-	-	-
Women	-0.08		-0.18		-0.23	
AGE GROUPS						
15-24						
25-34	0.45	*	0.06		-0.08	
35-44	1.05	***	0.84	***	1.23	***
45-54	0.89	***	0.93	***	1.04	***
55-64	1.06	***	1.24	***	1.25	***
LEVEL OF EDUCATION						
Elementary school certificate	-	-	-	-	-	-
Lower-secondary certificate	0.34		1.29	**	1.37	***
Upper-secondary and vocational diploma	0.86	***	1.93	***	1.65	***
Degree	1.53	***	2.69	***	2.50	***
OCCUPATIONAL STATUS						
Permanent employee	-	-	-	-	-	-
Fixed-term employee	-0.30	*	0.17		-0.01	
OCCUPATION						
Managers and entrepreneurs						
Intellectual professionals	-0.15		-0.08		-0.26	
Technical professionals	-0.70	***	-0.87	***	-1.20	***
Clerical workers	-1.20	***	-1.81	***	-1.76	***
Sales and services personnel	-1.65	***	-1.90	***	-1.71	***
Skilled workers	-1.20	***	-1.71	***	-1.55	***
Semi-skilled workers	-2.19	***	-2.65	***	-2.68	***
Elementary occupations	-1.92	***	-2.13	***	-2.37	***
SECTOR OF ACTIVITY						
Agriculture	-	-	-	-	-	-
Industry	-0.69	**	-0.95	**	-1.25	***
Construction	-0.44		-0.69		-1.20	***
Shops and hotels	-0.17		-0.60		-1.08	***
Transport and communications	-0.55		-0.35		-1.04	**
Finance and business services	-0.22		-0.53		-1.29	***
Public administration	-0.27		-1.03	**	-1.19	***
Education	0.50		0.40		-0.16	
Health	-0.48		-1.05	**	-1.08	***
Other services	-0.12		-0.06		-0.61	*

Table 2.13 continued - **Logistic regression models. Dependent workers excluding teachers, double-jobholders, and habitual overtime workers - Years 2002-2003 (regression coefficients and significances)**

	Probability of working out-of-hours		Probability of often working out-of-hours		Probability of working also on non-work days	
	Coeff.	Signif. (a)	Coeff.	Signif. (a)	Coeff.	Signif. (a)
WORK SCHEDULE						
Full-time	-	-	-	-	-	-
Part-time	-0.05	-	0.04	-	-0.19	-
GEOGRAPHICAL AREAS						
North-West	-	-	-	-	-	-
North-East	0.08	-	0.34	*	0.22	-
Centre	-0.33	**	-0.52	**	-0.37	*
South	-0.31	***	-0.27	-	-0.18	-
Constant	-2.96	***	-3.97	***	-4.06	***
Number of cases	8827		8827		8827	
R ²	0.15		0.21		0.18	

(a) * = 10% significance, ** = 5% significance, *** = 1% significance

Analysis revealed one single pattern in the differences among workers in their distribution of work during non-work time in light of the three dimensions used to describe it. In fact, all the regressions showed the following variations in the probabilities of working out-of-hours, often doing so, and working on non-work days:

- they are less for women, who obviously must undertake family work;
- there is an inverted U or L-shaped pattern in regard to age: hence it is adults (aged over 34) who work the most. This is the effect of the classic ‘life cycle squeeze’ already reported by research on double jobholding (Gallino, 1985), and whereby work commitment is greatest in the phases of the life-cycle in which workers have most need to earn income for their families;
- for education the trend is monotonic: the probabilities increase with the education level;

- also as regards professional qualification, the highest levels (senior managers, entrepreneurs, intellectual professionals) are most likely to work out-of-hours, while the probabilities are decidedly lower among the lower-skilled occupations, both manual and non-manual.⁸ Because also double jobholding and recourse to overtime are more common among the most educated subjects and the higher occupational levels, confirmation is provided that, in the contemporary service society, the phenomenon of ‘workaholism’ concerns intellectual work above all (Lallement, 2003);
- as regards occupational status, it is obvious (as shown by the analysis of the time budgets) that independent workers are more likely to work out-of-hours than dependent ones. But it is interesting to note the lower probabilities in these two areas for workers in non permanent employment: fixed-term workers among employees, and outsource workers among independent ones. This is the downside of flexibility: uncertainty curbs activism, which requires the full involvement of workers;
- the sector does not exert a significant influence (with the exception of education), and more than anything else can be considered a control variable. Nevertheless, one notes a slight tendency for the phenomenon to be more common in the public services (except healthcare) and in services to businesses, and vice versa in manufacturing industry. This confirms that the constraints imposed by the organizational context perform a role somewhat similar to that of double jobholding (Gallino, 1985);
- Central Italy and the South exhibit probabilities that are invariably lower than those of the two areas into which northern Italy has been divided: this, too, may be indicative of the different degree of work activism present in Italy.

In conclusion, the figure of the ‘workaholic’ displays the same characteristics whatever dimension is considered: double-jobholding, overtime, out-of-hours work, and work on non-work days. The workaholic is a male, aged between 35 and 55, with a high level of education, and a high-skilled job; he is usually a traditional independent worker but may also be a fixed-term employee, and he is resident in the northern regions. Some of these characteristics suggest that work

⁸ We shall return to this result, which seems partially to contradict the results of the analyses conducted on the time budgets, in the next section.

activities undertaken in leisure time are increasing, because intellectual work is greatly expanding. But other characteristics indicate the reverse: consider the increasing labour-market presence of women, whose crucial concern is reconciling work with care responsibilities, and the progression precarization of jobs, which reduces work commitment and therefore also its extension outside working hours. Some additional information may be yielded by analysis of the diffusion of the various extra activities and of the reasons for working out-of-hours.

The fact that the large majority of such workers report that they engage in a plurality of activities makes it difficult to identify a typology that connects the activities performed off-schedule with the characteristics of the worker. However, by grouping the activities into four broad areas and using binomial logistic regression models (Table 2.14), we sought to determine how the probability of performing particular activities was connected, or otherwise, with the personal characteristics of workers, the work performed, and the geographical context. Various aspects emerged: some of them obvious, others requiring further investigation. It is evident that the probability of frequently using a computer for work performed out-of-hours or at home will be greater among young people, better-educated workers, and ones in high-skilled occupations. It is less obvious that this probability is also higher among independent workers than among permanent employees.

This is explained by the fact that many outsource workers - especially freelancers - are highly educated and have intellectual jobs. Traditional independent workers and outsource workers are more likely than subordinate employees to do out-of-hours work and to engage in self-training (reading books and/or periodicals), both of which activities are essential for such workers to maintain competitiveness in the market. As to be expected, also the probability of doing administrative work out-of-hours is much higher among independent than among subordinate employees, and it does not display any significant difference by age, educational level, or occupational qualification.

Table 2.14. - Activities undertaken for work purposes but out-of-hours. Logistic regression models (a) relative to the probability of performing a specific activity - Years 2002-2003 (regression coefficients and significances)

	Probability of using internet and/or PC		Probability of purchasing materials and/or doing accounts		Probability of making telephone calls and/or meeting people		Probability of reading books and/or periodicals	
	Coeff.	Signif. (b)	Coeff.	Signif.	Coeff.	Signif.	Coeff.	Signif.
GENDER								
Men	-	-	-	-	-	-	-	-
Women	-0.56	***	-0.08	-	-0.33	***	-0.06	-
AGE GROUPS								
15-24	-	-	-	-	-	-	-	-
25-34	0.40	**	0.16	-	0.23	-	0.06	-
35-44	0.18	-	0.29	-	0.19	-	0.11	-
45-54	-0.09	-	0.14	-	0.30	-	0.16	-
55-64	-0.49	**	0.12	-	0.15	-	0.13	-
LEVEL OF EDUCATION								
Elementary school certificate	-	-	-	-	-	-	-	-
Lower-secondary certificate	0.35	-	0.00	-	0.33	*	0.28	*
Upper-secondary and vocational diploma	1.13	***	0.10	-	0.46	***	0.72	***
Degree	1.65	***	-0.15	-	0.60	***	1.40	***
OCCUPATIONAL STATUS								
Permanent employee	-	-	-	-	-	-	-	-
Fixed-term employee	-0.02	-	0.24	-	-0.02	-	0.29	*
Traditional independent worker	0.56	***	1.44	***	1.46	***	0.73	***
Outsource worker	0.71	***	1.25	***	1.25	***	0.66	***

(a) The model controls for sector of activity and the presence or otherwise of a second job.

(b) * = 10% significance, ** = 5% significance, *** = 1% significance

Table 2.14 continued - **Activities undertaken for work purposes but out-of-hours. Logistic regression models (a) relative to the probability of performing a specific activity - Years 2002-2003 (regression coefficients and significances)**

	Probability of using Internet or PC		Probability of purchasing materials and/or doing accounts		Probability of making telephone calls and/or meeting people		Probability of reading books and/or periodicals	
	Coeff.	Signif. (b)	Coeff.	Signif.	Coeff.	Signif.	Coeff.	Signif.
OCCUPATION								
Managers and entrepreneurs								
Intellectual professionals	0.04		-0.23		-0.46	***	0.22	
Technical professionals	0.09		-0.18		-0.41	**	0.14	
Clerical workers	-0.08		-0.21		-0.90	***	-0.40	**
Sales and services personnel	-0.68	***	0.11		-0.82	***	-0.15	
Skilled workers	-0.97	***	0.07		-0.87	***	-0.63	***
Semi-skilled workers	-0.88	***	0.04		-0.91	***	-0.79	***
Elementary occupations	-1.40	***	-0.15		-1.14	***	-1.34	***
GEOGRAPHICAL AREAS								
North-West								
North-East	0.00		-0.01		0.25	***	-0.05	
Centre	-0.13		0.24	**	0.32	***	-0.15	
South	0.09		0.69	***	0.58	***	0.31	***
Constant	-0.61	***	-0.33	***	1.06	***	0.02	
Number of cases	4668		4668		4668		4668	
R ²	0.22		0.21		0.17		0.23	

(a) The model controls for sector of activity and the presence or otherwise of a second job.

(b) * = 10% significance, ** = 5% significance, *** = 1% significance

Moreover, the probability of performing relational and self-training activities out-of-hours, or at home, is higher for young people than for adults, and it increases with education level and occupational qualification. Finally to be noted is that the probability of undertaking relational, administrative and self-training activities is relatively higher in the southern regions of Italy, where the probability of working out-of-hours is much lower. This suggests that a segmentation effect typical of

the South is in operation: few subjects work out-of-hours but they do so very intensely.

As regards the reasons for working out-of-hours and at weekends, or for taking work home (Figure 2.9), over half of the subjects stated that this was required by the job, over 30 percent referred to heavy workloads, and almost 15 percent to a sense of duty. In the first two cases, therefore, this was a form of work imposed upon the subjects, while a certain degree of voluntarism is implied by those who cited a sense of duty.

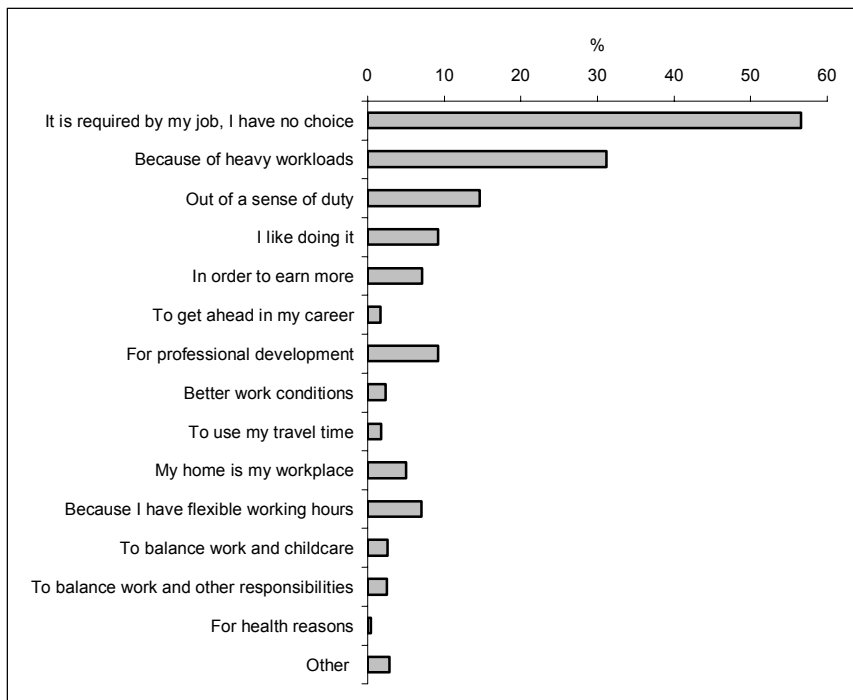
On the other hand, however, there were also subjects who took work home or worked out-of-hours because they liked to do so (9.2 percent), for personal development (9.2 percent), and for other reasons to do with their careers (1.7 percent) and to increase earnings (7.1 percent). These were closely followed by subjects who used their homes as workplaces (5 percent) or worked there because they had flexible schedules (7 percent). The need to balance work and the family - particularly in regard to child care or other responsibilities - was cited rather infrequently (respectively 2.6 percent and 2.5 percent) and mainly by women.

Given the high frequency of multiple and contradictory answers,⁹ we decided to concentrate on certain reasons - or groups of reasons - which covered a sufficiently large number of cases.¹⁰ The logistic regression models - although they did not appear particularly robust - brought out some patterns in the characteristics of those subjects who cited their type of job, workloads, personal or career development, and increased earnings, among the reasons for working out-of-hours, at weekends, and/or at home.

⁹ To be noted is that the relative question was somewhat ambiguous because it referred simultaneously to the reasons for working out-of-hours, at weekends, and/or at home, thereby preventing separate analysis of the three phenomena.

¹⁰ Because the subjects were not asked to express an order of preference that would allow identification of the reasons that they considered most important, we first sought to construct a typology on the basis of a factorial analysis. This, however, did not yield satisfactory results and was used only as support for interpretation of the replies and for aggregation of the reasons.

Figure 2.9 - Reasons for working out-of-hours, at weekends, and/or taking work home - Years 2002-2003 (percentage)



Firstly, the probability pattern by educational qualification shows that as education increases, so the probability decreases that it is the type of job which induces subjects to work out-of-hours, at weekends, or at home; while in parallel the probability increases that such behaviours are induced by heavier workloads. The distinction in this case is a subtle but interesting one: high-skilled jobs, in fact, do not impose out-of-hours work because of structural characteristics to do with the type of work (as may instead be the case of seasonal work or of certain commercial and/or personal services), but rather the greater intensity of work rhythms.

If instead the occupational qualification is considered, one finds that the probability of working out-of-hours because of job commitments is highest among managers and entrepreneurs and

decreases for all lower job grades, while, as to be expected, the desire to increase earnings and to advance in one's career are more important for subjects at the lower levels of the occupational hierarchy and who therefore have a greater desire to 'get ahead'. Also to be stressed is the case of the traditional independent workers, who are structurally more likely -because of the nature of their activity -than subordinate employees to be required to work out-of-hours and at weekends, and to take work home with them, whereas, unlike the latter, they give little importance to higher earnings and to personal and career development. Finally, the data show that age only plays a significant role as regards the desire for professional development: hence, it becomes more likely that the willingness to work more intensely to invest in personal growth, and to improve one's job classification and economic circumstances, will diminish as seniority increases.

Finally, we sought to determine how the subjects reacted subjectively to being obliged to work out-of-hours. The individual questionnaire contained, in fact, a question on job satisfaction, the replies to which showed that 22.1 percent of subjects were dissatisfied with their jobs. A logistic regression¹¹ (Table 2.15) confirmed that the probability of being dissatisfied was significantly higher for women and for those interviewees in precarious employment -that is, fixed-term employees or outsource workers -but it also showed that this probability was significantly lower for those who worked out-of-hours.

Contrary to what might be expected, working in leisure time did not at all imply greater dissatisfaction with the job; rather, it was more likely to be accompanied by satisfaction with it.

¹¹ Controlled for age, educational qualification, occupation, sector, and geographical zone.

Table 2.15 - Reasons for working out-of-hours, at weekends, and/or taking work home. Logistic regression models (a) relative to the probability of a specific reason being cited -Years 2002-2003 (regression coefficients and significances)

	Probability that the reason is "It is required by my job, I have no choice"		Probability that the reason is "Heavy workloads"		Probability that the reason is "For personal development, career, or earnings"	
	Coeff.	Signif.(b)	Coeff.	Signif.	Coeff.	Signif.
GENDER						
Men	-	-	-	-	-	-
Women	-0.41	***	0.09		-0.13	
AGE GROUPS						
15-24	-	-	-	-	-	-
25-34	0.09		0.10		-0.63	***
35-44	0.15		0.16		-0.96	***
45-54	0.49	***	0.07		-1.05	***
55-64	0.30		0.09		-1.20	***
LEVEL OF EDUCATION						
Elementary school certificate	-	-	-	-	-	-
Lower-secondary certificate	-0.64	***	0.45	**	0.05	
Upper-secondary or vocational diploma	-0.69	***	0.73	***	-0.15	
Degree	-0.75	***	0.85	***	-0.02	
OCCUPATIONAL STATUS						
Permanent employee	-	-	-	-	-	-
Fixed-term employee	-0.08		-0.01		-0.05	
Traditional independent worker	0.45	***	0.10		-0.77	***
Outsource worker	0.48	**	-0.34		-0.27	
OCCUPATION						
Managers and entrepreneurs	-	-	-	-	-	-
Intellectual professionals	0.34	**	-0.14		0.46	**
Technical professionals	0.23	*	-0.26	**	0.54	***
Clerical workers	-0.04		0.20		0.30	
Sales and services personnel	0.12		-0.47	***	0.49	**
Skilled workers	-0.03		-0.29	*	0.67	***
Semi-skilled workers	0.33		-0.71	***	0.74	***
Unskilled occupations	-0.32		-1.28	***	0.68	**
Constant	0.54		-1.26		1.60	
Number of cases	4453		4668		4668	
R ²	0.14		0.06		0.07	

(a) The model controls for sector of activity and the presence or otherwise of a second job.

(b) * = 10% significance, ** = 5% significance, *** = 1% significance

One would think that a job which involves a person to such an extent that s/he would devote free time to it must inevitably be a source of satisfaction.

2.4 - Out-of-hours work and time budgets

As we saw in the previous section, 'standard' out-of-hours work is significantly more common among subjects with high educational qualifications and high-skilled jobs. We also saw that the activities commonly undertaken during these times of 'covert work' have high knowledge content and, in many cases, require the mastery and use of information systems to codify, process and transmit information. In short, these are relational and communicative activities that involve the management and manipulation of data and information flows, as well as knowledge and skills not uniformly distributed among the working population. In this section we address some issues raised by the joint use of the questionnaire and the time budgets to explore the phenomenon of 'extra' work.

Our analysis of 'extra' work encountered a twofold problem of a methodological nature. Firstly, we had a relatively small number of cases (922 individuals, equal to 14.5 percent of the 6368 who filled the time budgets), which raised the problem of possible self-selection. Secondly, the activities considered to be 'extra' work were - above all for the most educated and qualified workers - difficult to separate from 'normal' activities. For these subjects it was probably the notion itself of 'normality' that fitted badly with the times and modes of combining work and non-work. This gave rise to a risk of under-estimation in reporting these work activities which - precisely because they are activities difficult to 'codify' and identify with specific work tasks - tend to become 'blurred' both as regards the times of their execution, and as regards their 'merging' with other social or relational activities undertaken for different reasons.

In this section we deal with this phenomenon by distinguishing, on the basis of the questionnaire information, between subjects who declared that they always or often undertook such 'extra' activities and those who instead declared that they never or almost never did so. Table 2.16 reports the specific averages of working times for these two groups, distinguishing by educational qualification and occupational

level. Since a specific occupational category - teachers - have fewer contractual working hours than the other categories - so that there was a risk of underestimating the working times of the most educated - we recalculated the specific averages of working times net of teachers.

We found that those subjects who declared that they did 'extra' work generally devoted a larger 'dose' of their typical work days to their jobs than did those who declared that they never or very rarely did 'extra' work. The datum was constant controlling both for education and for professional qualification, and therefore denotes an underlying consistency between the questionnaire information and that contained in the time budgets. Nevertheless, a feature is immediately evident: the ideal-type that emerged from the questionnaire as most likely to work 'extra' was a highly-educated and highly-qualified male. Comparison with the data on the daily time budgets showed that the total time devoted to work, 'extra' included, was decidedly greater for lower-educated workers with manual jobs.

At the present state of knowledge, we are unable to conduct more detailed analysis of this apparent contradiction between the questionnaire information (self-declared) and the time-budget information (self-compiled) of. On the one hand, it seems that this is a situation in which also amongst those subjects who declared that they worked 'extra' (and actually did so) it was the lower-educated manual workers who worked longest. This was also confirmed on observing the specific averages net of teachers.

In short: lower-educated and unskilled workers work longer than do other social classes. This is a clear signal of socio-economic differentiation in (temporal) workloads that recalls the distribution of working hours seen in the second section.

On the other hand, we would stress that the characteristics of these 'extra' activities correspond to work which is by its nature 'fuzzy' and markedly relational, and therefore much more difficult to specify with an instrument that tends to 'rigidify' activities, like time budgeting, in order to codify them. This intrinsically 'evanescent' and blurred nature of 'extra' activities, especially those performed by highly-educated and professionalized workers, may lead to their underestimation by managers and professionals, who therefore may not even bother to report (when compiling the questionnaire) that they have made a work-related telephone call out-of-hours, or that they have sent an email or read a paper connected with their work.

Table 2.16 - Average time devoted to work on a weekday, by education and occupational level, distinguishing between declaring that they worked or did not work out-of-hours - Years 2002-2003
(in hours and minutes)


	Does not work out-of-hours	Works out -of-hours	Excluding teachers	
			Does not work out-of-hours	Works out -of-hours
LEVEL OF EDUCATION				
Elementary school certificate	8:00	8:47	8:00	8:47
Lower-secondary certificate	8:00	8:22	8:00	8:22
Upper-secondary and vocational diploma	7:38	7:52	7:42	8:14
Degree	7:27	7:38	7:37	8:11
LEVEL OF OCCUPATION				
Unskilled workers	7:56	8:38	7:56	8:38
Technicians, clerical workers and skilled blue-collars	7:47	7:58	7:50	8:22
Managers and professionals	7:40	7:46	7:50	8:08

This is a result that should be deepened, and with other data which for the moment are not available. It is a matter of analysis that we leave to future research on working times.

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3. Time sequence analysis of activities as well as space and social context in large urban centres

3.1 - The social nature of time

Data on Daily Time Use by populations or social groups, obtained through Time Budget Surveys, can be analysed in two different and complementary ways:

- 1) cross-sectional analysis: based on average time devoted to each daily activity in a given day (weekdays, holidays, days off);
- 2) sequence analysis: based on the frequency at selected “time-points” (time lapses, time-courses or episodes in the 24 hours of a weekday or holiday) during the day of the population or social groups engaged in a given “activity”, or that are in given hours are in given “places”, or that in given hours are with “given people”.

The sequence analyses that allow to identify “the daily rhythm, the frequency by time-courses in which activities are performed, the places that are used, or the type of people that are present” are particularly important in time use surveys for several reasons.

The identification of the time sequence of activities as compared to the average duration of activities allows to know the diversity of different social groups in the performance of activities: although a given activity has the same mean duration for two different social groups - for instance the working activity of male and female - this activity is not necessarily carried out in the same way in the day of the survey. The times in which an activity is performed give an indication of the life of individuals as members of the society with own rules, schedules and daily habits. As Emile Durkheim (1925) said, time is a social construction that reflects the rhythm of the collective life. Time is not a constant flow: hours, days and weeks vary from one person to another and, from a statistical viewpoint, time varies from one social group to another according to their gender, age, employment condition, presence of children and their age, etc. Watches and calendars have been orienting individuals since the phenomenon of urbanism and since the establishment of life in cities in the XIV century, and subsequently since the introduction of the working day in specific places (factories, offices etcetera) with the industrial revolution; therefore, not essentially in the atmospheric, religious, and weather events, but rather in the planning of social life, in the collective rhythm influenced by the social and labour organisation and by the institutions in which individuals live (Sorokin and Berger, 1939). Weeks represent a merely social construction aiming at improving the coordination of collective activities (Sorokin and Merton, 1943; Elias, 1992).

In particular, on the basis of sequence analyses, it is possible to “compare, summarise and develop” empirical models of time use behaviour which are both “specific” (referred to one single activity) and “global” (referred to all the daily activities).

The analyses by time-courses can provide useful information for the solution of practical problems as those relating to the “urban environment and the use of the city”, such as the daily rhythm of urban traffic, opening and closing hours of shops, public services, supermarkets, entertainment and restaurants, etc.; problems related to the environment and to “sustainable development, “peak hours” and habits linked to “particular social consumption”, like the performance of

particular family activities entailing electricity and water consumption, etc.; the hours of use of mass media, ITC and IT (pc, internet, mobile phones, etc); problems linked to “health and lifestyle”, i.e. sleeping and insomnia, time and duration devoted to meals by the different groups of population, as well as obesity, bulimia, anorexia, and time devoted to physical exercise and travel.

Despite of their importance in social research, sequence analyses are often postponed, and even neglected, compared to the cross-sectional time use analyses based on the duration of activities; this is due to the high number and to the complexity of sequence data obtained by time budget surveys, both during the survey and during data statistical analysis, especially when intending to keep the analyticity and time continuity that are fundamental for this type of analysis¹. Additionally, sequence data - due to their analyticity and continuity - can only be obtained through time budget studies and the time use surveys.

Some of the main results obtained through the analysis of data collected by Istat in the *Multipurpose Survey on Time Use 2002-2003* are described below. The analyses taken into consideration concern sequence analyses, and aim at a first exploration and description of data which until today was not available for Italy, following the Istat survey on time use performed in 1988-1989. The quantity and complexity of data collected and processed, as mentioned below, imposed a first selection. Among the several variables available, the different frameworks of time use were analysed by total population and by gender, as well as according to the variables indicated in paragraph 3.2. In particular, time course sequences were analysed “separately” for the three time use contexts on: the type of activity, the place (irrespective of the activity carried out), the people met at different hours of the day (type of social relations irrespective of the activity carried out). In particular, analyses refer to:

¹ In order to draft the suitable tables and charts of frequencies for time-courses, specific data processing and analysis procedures are needed, comparing the two files of basic data characterising the time budget data: the file of episodes (events) and the file of individuals (socio-demographic characteristics of the day of survey, of the degree of satisfaction and dissatisfaction, and of time perception). The basic tables and charts shown in this work were processed by Mr. Elio Ascoli Marchetti del Codres (Cooperative for economic and social research and documentation) of Rome.

- 1) Primary activities²: classified in sixteen groups of activities comprehensive of all the daily activities carried out. In particular, the following two types of sequence analysis are analysed:
 - a) “specific” sequence analysis relating to five single activities. In particular, they include: professional activity, household activities and shopping; family care; mass media; travel. For these activities only, the analysis variables specified in paragraph 3.4 are taken into consideration;
 - b) “global” sequence activities referred to “all” the activities performed in the day taken into consideration (sixteen groups of primary activities comprehensive of all daily activities).
- 2) Places: classified in “ten types of places” visited, comprehensive of all places including the “non-place: on a means of transport/in movement”;
- 3) People: classified in “four types of people present (or personal relations)”, categories comprehensive of all the types of relations: alone; with family members; with acquaintances; with both family members and acquaintances.

In order to determine the time intervals (“time-points” or episodes) in which splitting the 24 hours, the maximum analyticity allowed by Istat data was selected (in diaries, the minimum time unit was ten minutes): therefore, 144 time intervals of ten minutes, each one starting from 4:00-4:10 (indicated with the “time-point” 4:10), 4:10-4:20, 4:20-4:30, etcetera, up to the last time interval of 3:50-4:00 of the day after.

The three contexts of time use, that is to say the time sequences by activity, places, and people, will be analysed separately, since they do not refer to the analysis of the “time, space and social” context of each activity, but rather to the time of performance (daily rhythm) of activities, the use of space (in this case the large urban centres, cities), meaning the place attended in the different hours of the day of survey irrespective of the activity carried out, and the type of social relations (considered as people present), that is to say the people met in the different hours of the day of survey irrespective of the activity carried out. Through different analysis techniques and multidimensional and space charts, it is possible to analyse the activities carried out according

² Activities can be either primary or secondary: primary activities are those activities carried out alone or if performed with other ones, primary activities shall be considered by respondents. In this document, reference to primary activities alone will be made. In particular, here they are classified at the one or two digits level, following the Istat classification.

to the different dimensions characterising the activity (duration or sequence, place, people, subjective-perceptive aspects), which however this document will not analyse in detail.

The complexity of the daily time use of individuals certainly includes the sharing of tasks in the performance of activities “between” individuals belonging to a given social group - for instance, in the family framework, the distribution among the family members of household work, shopping, childcare, etcetera. The diachrony or synchrony in the performance of these activities is also one of the relevant aspects in the analysis of gender difference and equal opportunities in the daily time use. It is not easy, however, from the statistical viewpoint (referring to social groups and not to single individuals) to perform this analysis, particularly as regards the “aggregate sequence analysis for the members of specific social groups” (for instance two cohabiting partners, the members of the family with a given structure such as father, mother, child/children of a given age, etc). In this framework, partners’ daily time use rhythms will be analysed by considering separately their time sequences in the performance of the sixteen activities mentioned above. It is a comparison of the “collective” time sequences of male and female living in a couple or married; therefore, from this comparison it is possible to have an indication on the similarities (or non-similarities) of the daily time use of partners, and only indirectly - through the comprehensive time use charts - of the synchrony-diachrony in its use. In order to analyse in further detail the diachrony-synchrony in daily time use, it is necessary to refer to the individual time-course sequences, the individual paths, in the performance of a given activity by each of the members of the social groups taken into consideration, as well as their reorganisation in the social group of belonging. They will be mentioned through examples of applications.³

³ Recent applications in this sense were carried out by Kajsa Ellegard and Matthew Cooper (2004), Lesnard Laurent (2004) and by Andrew Abbott (1986, 1990, 1995, 2000) as regards the methods used in biology and called Oma (Optimal Matching Analysis), as imported in sociology. Cf. bibliographical references.

3.2 - Characteristics of data analysed

The main characteristics of data analysed in this paper can be summarised as follows:

Source of data: Time Use Survey carried out from April 2002 to April 2003, in the framework of the Multipurpose Family Survey, on a sample of 21,075 families with a total number of 55,773 individuals.

Territorial domain: metropolitan areas⁴.

Total population: N=8,410,791 units living in metropolitan areas, with 3,985,206 male and 4,425,585 female.

Analysis variables: socio-demographic characteristics of the population and variables on the perception and degree of satisfaction in time use⁵.

As regards *activities*, 16 main activities were considered, exhaustive of all the daily activities (according to Istat classification of activities (2002-2003) with single or double-digit codes)⁶.

AS regards *places*, ten types of places were considered, comprehensive of all the places visited in the day of survey⁷.

⁴ According to Istat classification.

⁵ In particular, the following variables were taken into consideration: *Socio-demographic:* 1. *Gender:* M= male, F= female e T= Total crossed with; 2. *Age:* E<25=under 25; E25-44= 25-44 years, E45-64=45-64 years, E>65=over 65; 3. *Level of Education:* IstEl= high level (university degree, second class degree, high school degree of 4-5 years), IstMd= medium level (high school degree of 2-3 years; grammar school), IstBa= Low level (elementary degree, able to read and write, illiterate); 4. *Working condition:* Oc= employed, Other condition; 5. *Cohabiting children:* SenFg= without children, ConFg= with cohabiting children aged between 0 and 5, Fg>5= cohabiting children over 5.

Perception and degree of satisfaction of time use: 1. Overall satisfaction or dissatisfaction of present life; 2. Satisfaction or dissatisfaction of how shares household work with the partner; 3. Satisfaction or dissatisfaction of how shares childcare with the partner; 4. Would you like to spend more time alone (variable used for the sequence analysis of personal relations); 5. Would you like to spend more time with other people (variable used for the sequence analysis of personal relations); 6. If you had more time, where would you spend it (variable used for place sequence analyses).

⁶ 1. Sleep and personal care; 2. Other private activities (healthcare, private and personal activities); 3. Eating (meals); 4. Education, study; 5. Professional work; 6. Household work and shopping; 7. Family care (childcare; care of the elderly of one's family) ; 8. Social activities (Volunteer work, aid to other families, social and religious participation); 9. Communication (pc, internet, e mail, chat, dvd, cd-rom); 10. Mass media (tv, video, radio, music); 11. Sports activities; 12. Games and sports activities 13. Socialising (social life, entertainment and culture); 14. Reading; 15. Other leisure time activities; 16. Travel (for any reason).

⁷ 1. At home; 2. At work; 3. At others' homes; 4. Outdoor in the street; 5. Indoor services; 6. Indoor recreational, cultural and sports activities; 7. Outdoor recreational, cultural and sports activities; 8. Restaurants; 9. Other places; 10. Non-places (travel).

As regards *social interaction*, four types of personal relations were considered, exhaustive of all the types of individuals that were present in the date of survey: 1. Alone; 2. With family members; 3. With acquaintances; 4. With family members and acquaintances.

Finally, both weekdays (Monday to Friday) and holidays (Sunday) were considered, given the huge diversity of behaviour and social organisation in these days of the week.

3.3 - Time use summary indexes: average time and variability of time devoted to activities in a weekday and in a weekend day

In order to set the context of the sequence analyses below, and to collect the general characteristics (mean and variability) of the “16 activities” taken into consideration, the main summary indexes of time use were calculated: the general means (Mg), the specific means (Ms), the variation coefficient (Cv) and the percentage of those that performed the activity both by the total of population and by gender, for weekdays and holidays. Here it follows the main results by classifying the 16 primary activities considered in five thematic areas (see fig.3.1).

In the *framework of physiological activities*, the activity of “Sleeping and personal care” performed in nearly 42-46 per cent of the 24 hours is a rather inelastic activity: general and specific mean durations are equivalent, since they are carried out by 100 per cent of the population involved, and variability is very low both in weekdays and holidays ($C_v = 23$ percent nearly in weekdays and even less $C_v = 20$ percent in holidays) and in the difference between the two genders. Even “Eating” - that is performed in 7-8 per cent of the 24 hours - is an activity with a very low variability both between genders and in the two types of days, and has the same general mean duration as the specific one, since 100 per cent of the individuals surveyed perform this activity.

In the *framework of public activities*, “Professional work” shows very low and little significant mean durations compared to the specific ones because the percentage of those that actually perform this activity extensively varies both between the two genders and in the two types of days: 48 per cent male, 26.6 per cent female in weekdays and 12.9 per cent male and 9 per cent female in holidays; the specific mean duration of the activity amounts therefore to 28-34 per cent out of the 24 hours in weekdays and with a low variability ($C_v = 27.5-36$ per cent) and 23-30

per cent in the 24 hours of a holiday with a higher variability compared to weekdays, especially as far as women are concerned $C_v = 58$ percent compared to men $C_v = 49$ percent.

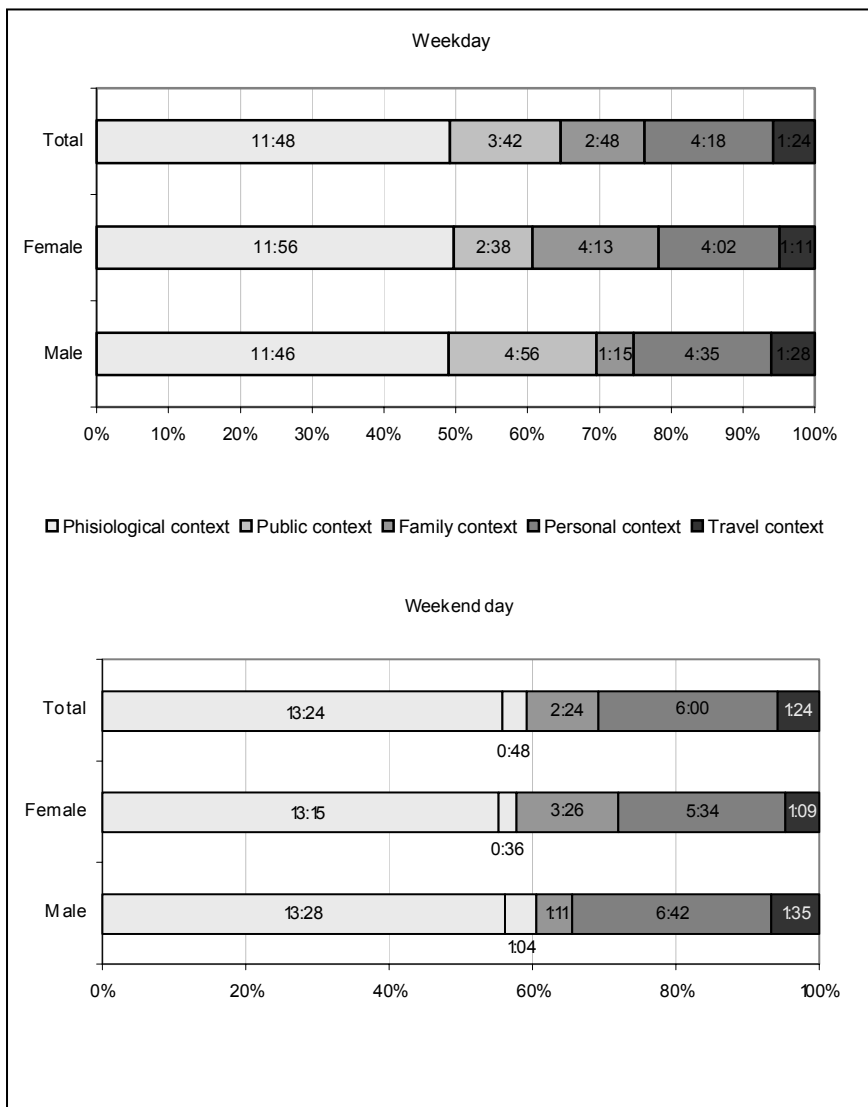
In the *family framework* "Household activities and shopping" include female percentages performing this activity both in weekdays and holidays that exceed by far male percentages (87.9 per cent against 63 per cent in weekdays and 85 per cent against 61.6 in holidays). These activities are performed in 7 per cent out of the 24 hours by men and in 18 per cent by women in weekdays, whereas 6 per cent and 15 per cent in holidays, respectively. Variability is higher among male than among female, and mostly during holidays: $C_v = 63$ percent for women in weekdays against $C_v = 96$ percent for male, and in holidays values amount to $C_v = 63$ percent for female and 100.2 per cent for male, respectively. Different results were obtained for "Family care" activities, with less marked percentage differences between male and female performing this activity, amounting to 25 per cent for female and 13 per cent for male in weekdays, and to 18 per cent for female and 11.7 per cent for male in holidays, respectively. This activity is performed in 3.9 per cent of the 24 hours by male and 6.2 per cent of the 24 hours by female in weekdays, and in holidays 6 per cent for both male and female. Furthermore, this activity shows a strong variability of nearly 90 per cent for both male and female.

In the *personal framework* there is a high percentage of performance amounting to 81-86 per cent in weekdays and holidays, and of time devoted to "Mass media" activities: 9.5 per cent out of the 24 hours for both women and men in weekdays and 11-13 per cent in holidays, with a 70 per cent variability for the two genders and in the two different days.

In order to obtain a better outline of time use in the 24 hours, the 16 activities classified in five *thematic frameworks* were considered. Figure 3.1 shows the time budget for the total of population and by gender, in a weekday and in a holiday, which allows to evaluate the influence out of the 24 hours of the time devoted to the five frameworks of activity.

Time budgets clearly show gender differences and in particular the already identified longer time devoted to the family framework by women both in weekdays and holidays (4h12' in weekdays and 3h24' in holidays) and the lower leisure time of women in both days (4h00' against 4h24' of male in weekdays and 5h36' against 6h42' in holidays). The public and transport areas are higher in male in both days.

Figure 3.1 - Time use by population aged 3 and over in a weekday and in a weekend day by gender - years 2002-2003 (percentage and hours and minutes)



From the mean duration, however, both general and specific, it is not possible to infer how activities are carried out in the 24 hours: in other words, what is the rhythm at which the activity is performed in the social group surveyed (modal hours, the general trend, etc.). Furthermore, given the same duration - since the performance of an activity is not a constant flow as it may appear by analysing mean durations only - there can be different ways of performing an activity whose duration is always the same. By means of the following *sequence analyses* these aspects of time use will be analysed.

3.4 - The daily collective rhythm - weekdays and weekend days - of some activities: specific empirical models of time use

As regards the analysis of time sequences of activities, a first analysis was made on some specific activities that mostly influence the organisation of the daily social life; subsequently, the sequence analysis of all the activities considered was performed, by also setting the context of the specific ones (Paragraph 3.5).

In particular, the daily activities selected are the following:

- 1) Professional work;
- 2) Household activities;
- 3) Childcare;
- 4) Mass media;
- 5) Travel.

At the beginning, the frequency distribution relating to specific hours of the day was examined for each of the five activities above: in particular, the frequencies in 144 time intervals obtained by dividing the 24 hours =1440 minutes in equal intervals of ten minutes each, from 4:10, 4:20, 4:30, 4:40, 4:50, 5:00 etcetera, up to 4:00 of the day after, both in weekdays and weekend days, by male and female according to the different analysis variables.⁸ Here, in particular, the distributions of 28 categories of population were considered and analysed, as obtained

⁸ In particular, the gender has been crossed with other variables: age, education, professional situation, marital status, type of partner (with married partner, married living with partners with other marital status), with children over six or aged less than six, overall satisfied or unsatisfied with one's life, satisfied or unsatisfied of how household work is shared with the partner, satisfied or unsatisfied of how childcare is shared with the partner. Overall, 63 distributions referred to weekdays and 63 to holidays.

by matching the gender variable with the variables already mentioned in paragraph 3.2⁹.

In order to compare the main characteristics of the 28 distributions of hour frequency for the 5 activities taken into consideration, the 'box plots'¹⁰ were analysed; Figure 1.2 only shows those concerning *House work and Shopping* and *Mass-media*.

In particular, 'box plots' allow to briefly examine the main characteristics of a simple statistical distribution and are particularly useful when several distributions have to be compared at the same time.

By briefly commenting charts, it is possible to note the following:

- for *House work and Shopping*, the degree of distributions does not differ in the weekdays and weekend days, but there is a remarkable difference in the variation fields of female distribution compared to male, hence confirming the difference already detected in the mean duration of the activity. Also in this case, frequency curves are bimodal for the different groups of population, although in weekend days or in case of children under 6 this bimodality is less marked, highlighting the continuity of the daily engagement for this activity.

⁹ The 28 categories of population were obtained by crossing gender (M, F) with: age (4 age brackets: *E<25*; *E25-44*, *E45-64*, *E65ol*); level of education (3 groups: *IstEl* = high level (university degree and more, second class degree, high-school degree of 4-5 years), *IstMd* = medium level (2-3 year high-school diploma; grammar school degree), *IstBa* = low level (elementary degree, reading and writing, illiterate); the working condition (2 groups: *Oc* = employed, *other condition*); with children by age (2 groups: *ConFg* <6 = with children aged between 0 and 5, *Fg*>6 = children over 6; overall satisfied or dissatisfied of present life (2 groups: overall satisfied in life; overall dissatisfied in life). In total: $2 + (2 \times 4) + (2 \times 3) + (2 \times 2) + (2 \times 2) + (2 \times 2) = 28$.

¹⁰ In particular these charts show:

- the variation field, the width of distribution given by the minimum and maximum values indicated by the two sides (whiskers) of the continuous line containing the box;
- the median (dividing the distribution into two equal parts compared to frequencies whose 50 per cent below and 50 per cent above; in this case the median coincides with one of the time intervals of the distribution) indicated by the line included inside of the box: if it is not at the centre of the box, it means that the distribution is asymmetrical; in particular, if close to the bottom, there is a positive asymmetry and it is close to the top there is a negative asymmetry; with some software the arithmetic mean is also indicated by means of a cross.
- the two sides of the upper and lower box indicate respectively 25 per cent (percentile or 1st quartile) and 75 per cent (percentile or 3rd quartile) of the distribution considered.

Figure 3.2 - Box plot of time sequence distribution in a weekday and in a weekend day of 28 categories of population for the Household work and shopping activity

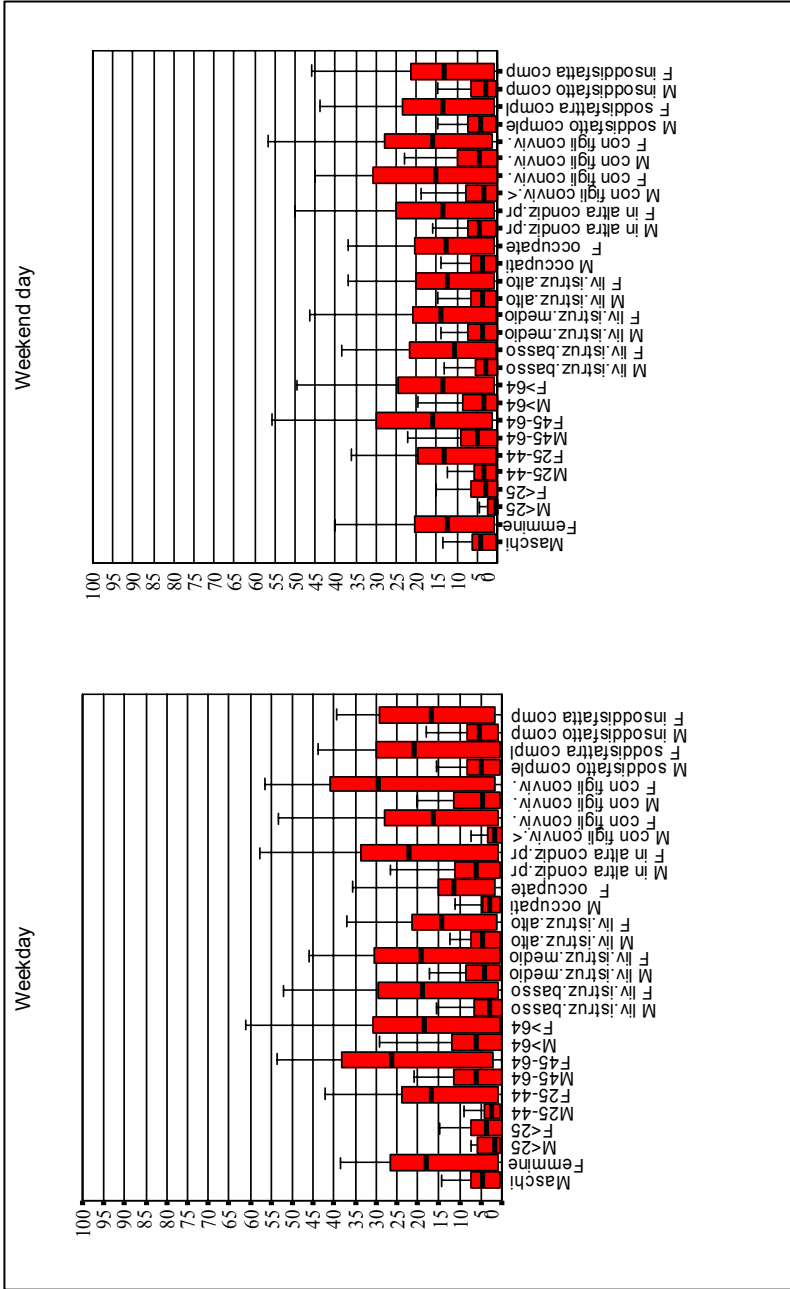
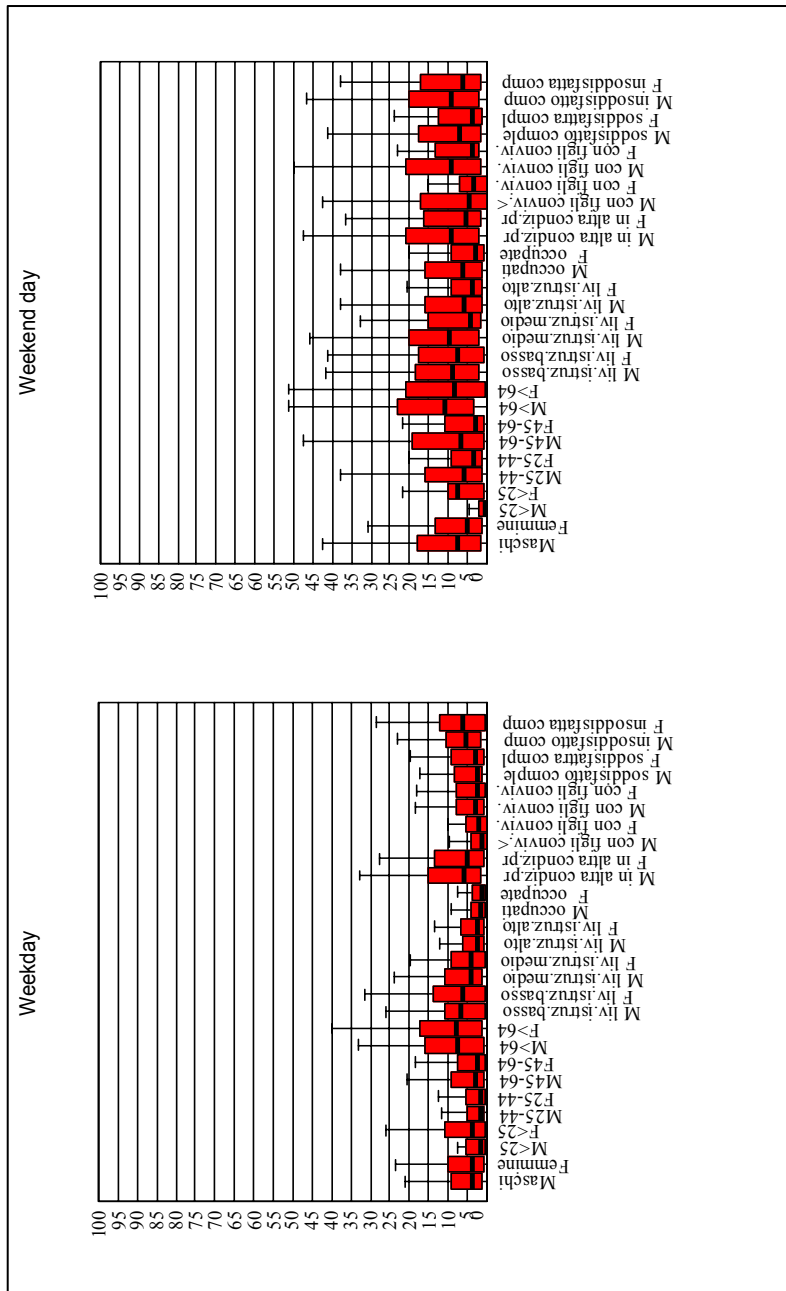


Figure 3.2 continued - Box plot of time sequence distribution in a weekday and in a weekend day of 28 categories of population for the Mass-media activity



- for “*Mass-media*”, a strong negative asymmetry is reported for all the categories of population (willingness to perform this activity in the evening) as well as a higher duration of distributions (participation) in weekend days, with a lower participation for youngsters and a higher participation of men compared to women both in weekdays and weekend days. By examining the curves of distributions of the 28 groups of population, it is possible to note a unimodal and asymmetric form in the evenings at 8-9-10 p.m., and a scarce variability as the categories taken into consideration change. Weekend days record, without any particular “peaks”, a higher extension of those that perform the activity in the morning hours as well.

In order to summarise data and identify the *typical time sequences* for the 28 categories of population considered, a Multivariate Statistical Analysis - *cluster analysis* was performed through an explorative - descriptive-reductive approach.

In particular, for each of the five activities, 28 time sequences were analysed through the cluster analysis¹¹, related to the 28 groups of population, and for each of them the percentage frequency for all the 144 time-points was considered (4:10, 4:20, 4:30, 4:40, 4:50, 5:00 etcetera, up to 4:00 of the following day), both for weekdays and weekend days.

For each of the five activities, types of daily rhythms of activity were recorded, both for weekdays and weekend days, that allow to identify *specific empirical models* of time use through the similarity or diversity in the framework of the groups of population considered in the times of performance of the activities. In particular, through the cluster analysis, types having both typical time frequencies (clusters barycentre) for each activity, and analysis variables (groups of population) which were *more significant* in determining the diversity in the “rhythms” of performance of the activity, were identified. Here it follows the main results obtained for the **two** activities: Household work and shopping and Mass media.

¹¹ In particular, several aggregate hierarchical methods were applied on each table, and once the number of clusters was chosen on the basis of the analysis of dendrograms and of the inertia indexes *within* and *between* the different partitions, the aggregate non-hierarchical method of k-means was applied to have the standard time sequence (barycentre) of each cluster. Software used: Spad and Spss.

1) As regards *house activities and shopping*, two types of daily hour rhythms emerge (corresponding to the cluster barycentre, hour mean sequences) both in weekdays and weekend days, and in both cases the gender difference is relevant.

The following clusters were identified:

Table 3.1 - Cluster for weekdays (household work and shopping)

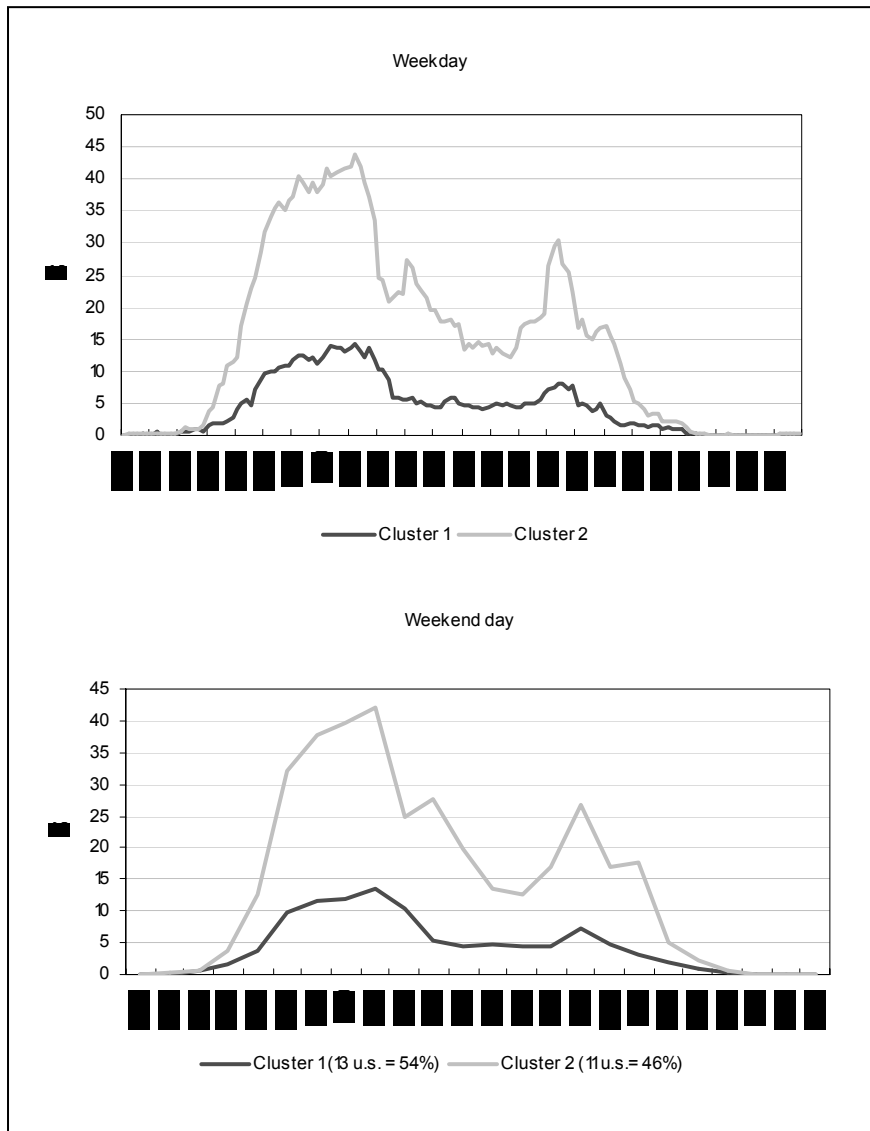
CLUSTER 1	CLUSTER 2
1 M	2 F
3 M<25	6 F 25-44
4 F<25	8 F 45-64
5 M 25-44	10 F>64
7 M 45-64	12 F low level of education
9 M>64	14 F medium level of education
11 M low level of education	16 F high level of education
13 M medium level of education	18 F with children <6
15 M high level of education	20 F with children >5
17 M with children <6	22 F overall satisfied with their lives
19 M with children >5	24 F overall unsatisfied with their lives

Table 3.2 - Cluster for weekend days (household work and shopping)

CLUSTER 1	CLUSTER 2
1 M	2 F
3 M<25	6 F 25-44
4 F<25	8 F 45-64
5 M 25-44	10 F>64
7 M 45-64	12 F low level of education
9 M>64	14 F medium level of education
11 M low level of education	16 F high level of education
13 M medium level of education	18 F employed
15 M high level of education	20 F in other condition
17 M employed	22 F with children <6
19 M in other condition	24 F with children >5
21 M with children <6	26 F overall satisfied with their lives
23 M with children >5	28 F overall unsatisfied with their lives
25 M overall satisfied with their lives	

with typical hour sequences (barycentre, mean sequences of clusters) for weekdays and weekend days, respectively, shown in Figure 3.3.

Figure 3.3 - Time sequences of the household work and shopping in a weekday and in a weekend day of 28 groups of population - Years 2002-2003 (cluster barycentre – participation rate in percentage)



2) As regards the *mass media* activity considered as TV, radio, and video, time sequences highlight a difference between the different categories of population in the performance of the activity that was not found in mean durations (see paragraph 3.3). What emerges is that in a weekday young people or those that are engaged with children watch TV less than the other ones. In weekend days this diversity increases and presents a cluster 2 exclusively made up of very young or employed people or individuals with a high level of education or with children <6 years. Please note the strong asymmetry and unimodality of the curve in night hours that is common to both types of days and to all clusters. Sundays, however, also in morning hours, show an increase in the watching of TV. In general, watching TV in the morning is lower than expected after the appearance of private televisions and the development of programmes 24 hours a day compared to the previous Istat survey on the time use in Italy carried out in 1988-1989.

In particular, the following two clusters were identified for the weekdays:

Table 3.3 - Cluster for weekdays (mass media)

CLUSTER 1	CLUSTER 2
1 M	3 M<25
2 F	4 F<25
7 M 45-64	5 M 25-44
8 F 45-64	6 F 25-44
9 M>64	15 M high level of education
10 F>64	16 F high level of education
11 M low level of education	17 M employed
12 F low level of education	18 F employed
13 M medium level of education	21 M with children <6
14 F medium level of education	22 F with children <6
19 M in other condition	24 F with children >5
20 F in other condition	
23 M with children >5	
25 M overall satisfied with their lives	
26 F overall satisfied with their lives	
27 M overall unsatisfied with their lives	

Table 3.4 - Cluster for the weekend day (mass media)

CLUSTER 1		CLUSTER 2
1 M	15 M high level of education	3 M<25
2 F	17 M employed	4 F<25
5 M 25-44	19 M in other condition	6 F 25-44
7 M 45-64	20 F in other condition	16 F high level of education
8 F 45-64	21 M with children <6	18 F employed
9 M>64	23 M with children >5	22 F with children <6
10 F>64	24 F with children >5	
11 M low level of education	25 M overall satisfied with their lives	
12 F low level of education	26 F overall satisfied with their lives	
13 M medium level of education	27 M overall unsatisfied with their lives	
14 F medium level of education	28 F overall unsatisfied with their lives	

with typical time sequences (barycentre, mean sequence of clusters) for the weekday and the holiday, respectively, as shown in figure 3.4.

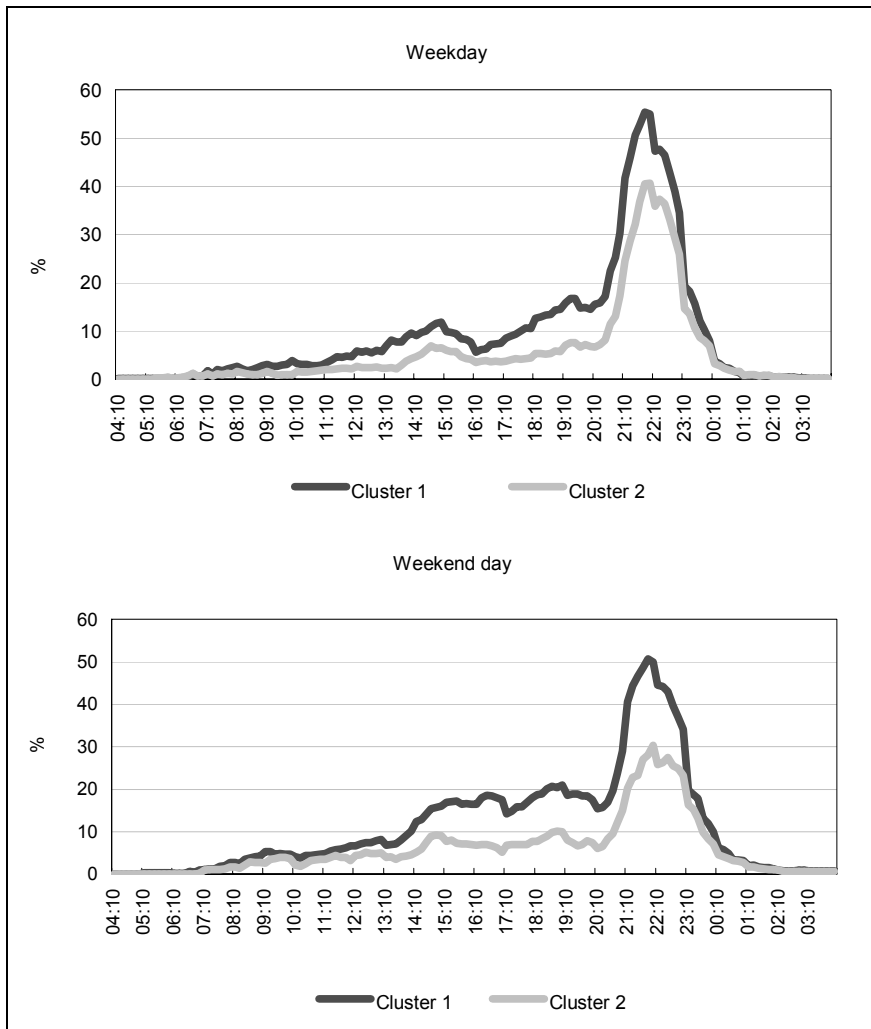
3.5 - Overall daily rhythm, both in weekdays and weekend days, in the performance of all daily activities: empirical models of time use

In this session, all the daily activities carried out¹² are analysed together with the frequency at given time intervals (the 144 time intervals of ten minutes each already used in the previous analyses) for different groups of population¹³ both in weekdays and weekend days. In this sense, “global” empirical models of time use are referred to compared to the “specific” models, concerning single activities and

¹² Classified in the 16 subgroups exhaustive of all the daily activities carried out and already used in previous analyses (Paragraph 3.2).

¹³ Overall, 63 distributions were obtained by crossing the gender variable with the variables already considered in paragraph 3.3, as well as with marital status (unmarried, married, other status), cohabitation situation (living with married partner, married person living with partners with other marital statuses) with the satisfaction-dissatisfaction for how household work and childcare are shared with the partner.

Figure 3.4 - Time sequences typical of the mass media activity in a weekday and in a weekend day of 28 groups of population - Years 2002-2003 (cluster barycentre – participation rate in percentage)



analysed in paragraph 3.4. These analyses demand in particular the calculation of the tables of frequencies relating to percentages and overall percentages for the 144 time-points and the 16 groups of activities, the aggregate frequencies in particular are necessary to build the “aggregate charts of time use”.

Please note that activities are ordered in a conventional way: the last one is generally the sleeping activity, which is generally included as a background of the figure.

The overall charts of time use allow an extraordinary grouping of the information contained in the numerical table and the possibility to easily make a comparison of the time sequence of all the activities performed in a given day by the social group considered as well as between different social groups.

Through this analysis, in fact, it is possible to “set the context” of each activity, compared to both the times of performance and thence the daily rate, and the times and rates of all the other activities. Charts in particular have a triple reading that will be briefly mentioned below while commenting on data of figure 3.5.

Figure 3.5 shows the overall charts for time use for the total of population in a weekday and in a holiday.

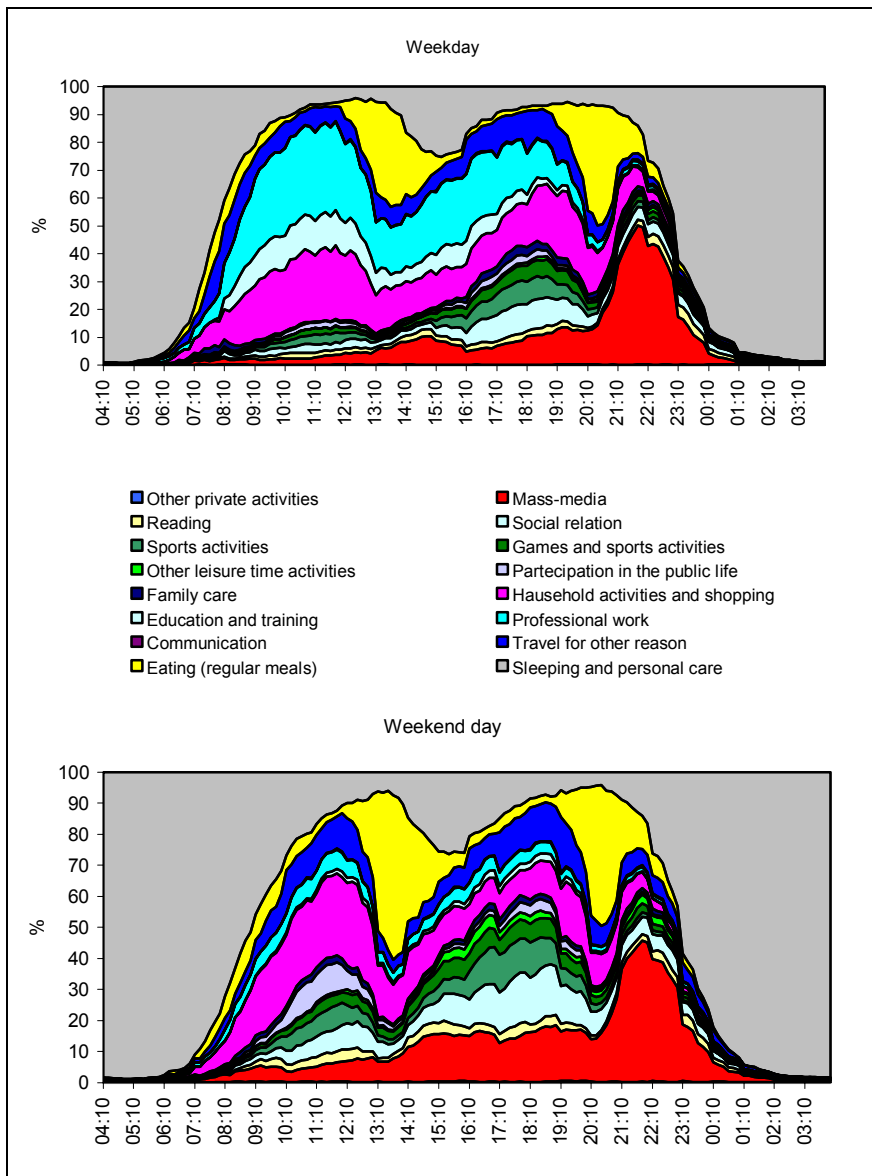
Here it follows a comment on the two charts, by also providing information on the basic elements that characterise them.

In the *background* there is the sleeping activity, and it is possible to see how in the early morning hours (04:10 and subsequent) and in the night hours (3:00 and subsequent) the percentage of those that sleep and do not perform any other activity basically amounts to 100.

This figure also has three possible readings:

- *horizontal reading* that allows, through the frequency given by the width of the band (each band has a colour that indicates a given primary activity) and through the trend in the 24 hours (form of distribution, modal hours, etc), to identify the rhythm of the activity, the time frequency in which it takes place in a given day and by the class of population taken into consideration. Please note that it is possible to identify the sequences of all the activities carried out and to examine them comparatively for each time interval in the 24 hours.

Figure 3.5 - Population engaged in the activities by type of day time - Years 2002-2003 (cumulated frequencies in percentage)



- *vertical reading* that allows to know at what time of the day how many people are engaged in which activities (distribution of frequencies among all the activities in a given interval). Since time frequencies are aggregate, it is possible to know (through the difference between the lower part of the band and the upper part of the previous one) what is the frequency of a given activity in a given time-course.

- *horizontal and vertical reading at the same time* allows to analyse the interdependence between activities (for instance some activities that “occupy” and “compress” the space of others), and although it is not a causality analysis, it is possible to know how the social group taken into consideration tends to organise and use one’s time.

Figure 3.5 for instance shows that the *eating* activity at around 1:00-2:00 p.m. and 8:00-9:00 p.m. shows the highest frequencies for the total population examined, more marked on Sundays compared to weekdays and furthermore the eating activity is present, although with very low frequencies, during the whole day: there is always someone who’s eating, both in weekdays and weekend days! The two time-courses relating to the *professional work* and *education and training* present a moderate frequency from 8:00 a.m. to 8:00 p.m. (with a decrease in frequencies around 1:00-2:00 p.m. in weekdays), whereas almost null are the frequencies of these two activities in weekend days. The band relating to *household work and shopping* is rather wide, and therefore shows a moderate (the figure refers to the total population) frequency in all time-courses up to late in evenings both in weekdays and weekend days. All the leisure time activities, on the contrary, exception made for mass media, show very low frequencies in the weekdays and higher frequencies in weekend days. As already highlighted in the analysis of specific activities, the mass media activity shows on the contrary a high “peak” of frequencies in evening hours (increasing from 8:10 to 10:00 p.m.) and in any case a certain ‘continuum’ of frequency during the whole day, both in weekdays and weekend days. It is also easily possible to see from the comparison between weekdays and weekend days how the two activities relating to the professional activity and education and training are those that in weekdays “compress” all the others including sleep and eating, exception made for house activities and shopping and mass media; please note that here reference is made to the total of population.

As it can be seen, with these aggregate time use charts it is possible to have an extraordinarily thorough and articulated and analytical

picture of daily time use, and compare different communities with a simple overlapping of charts.

Due to space constraints, however, only the charts relating to gender difference for the two types of days will be analysed, and the complete analyses of the different tables and charts relating to the 63 groups of population in the two days taken into consideration will be published in future works.

In particular, figures 3.6 and 3.7 show the percentage frequency of male and women engaged at different time-courses in all activities, both in a weekday and in weekend days, always on the basis of data collected during the Time Use 2002-2003 survey, and with a short comment.

An overview of figure 3.6 of both male and women already allows to identify a different daily “global” rhythm, in particular for “weekdays”, of the activities carried out, hence confirming the strong influence of gender difference has in the daily time use and articulating some of the results already obtained with the analysis of both duration and time-frequencies of the five specific activities analysed above (Paragraphs 3.2 and 3.3).

In particular it is possible to note how for male the professional work bracket compresses all the other activities, whereas for female the household work and shopping, together with the professional work, influence the quantity of time devoted to the other activities in weekdays. The frequencies of sports activities, especially in the afternoon for male, are markedly higher during the whole day, whereas family activities are slightly higher for women. Finally, mass media show the same trend in both genders.

In “Weekend days” shown in figure 3.7 the most evident gender difference in time use concerns household activities and shopping: they are strongly lower for male whereas are even higher compared to weekdays for women. All leisure time activities increase in weekend days for men (reading, sports, other leisure time activities), whereas social interactions alone increase for women (we will see this below, by analysing the

Figure 3.6 - Population engaged in all the activities in a weekday by gender - Years 2002-2003 (cumulated frequencies in percentage)

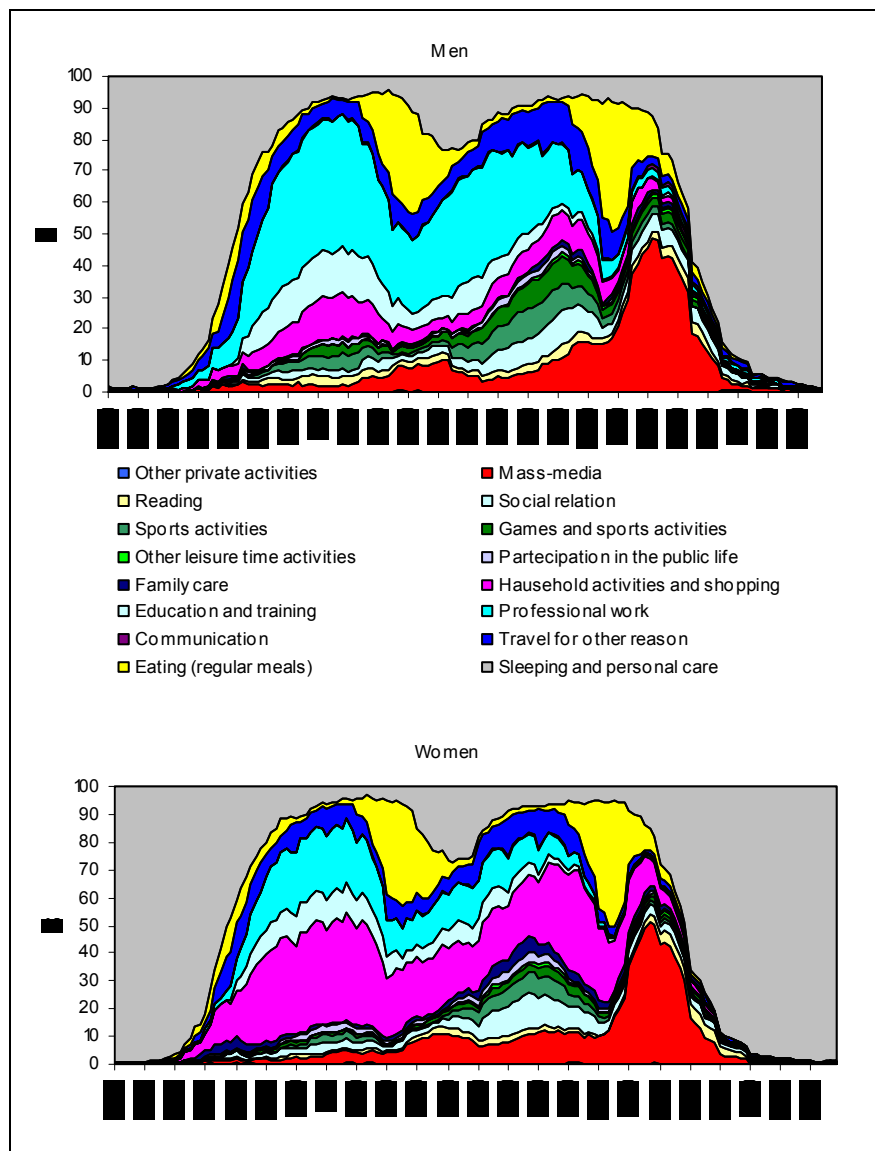
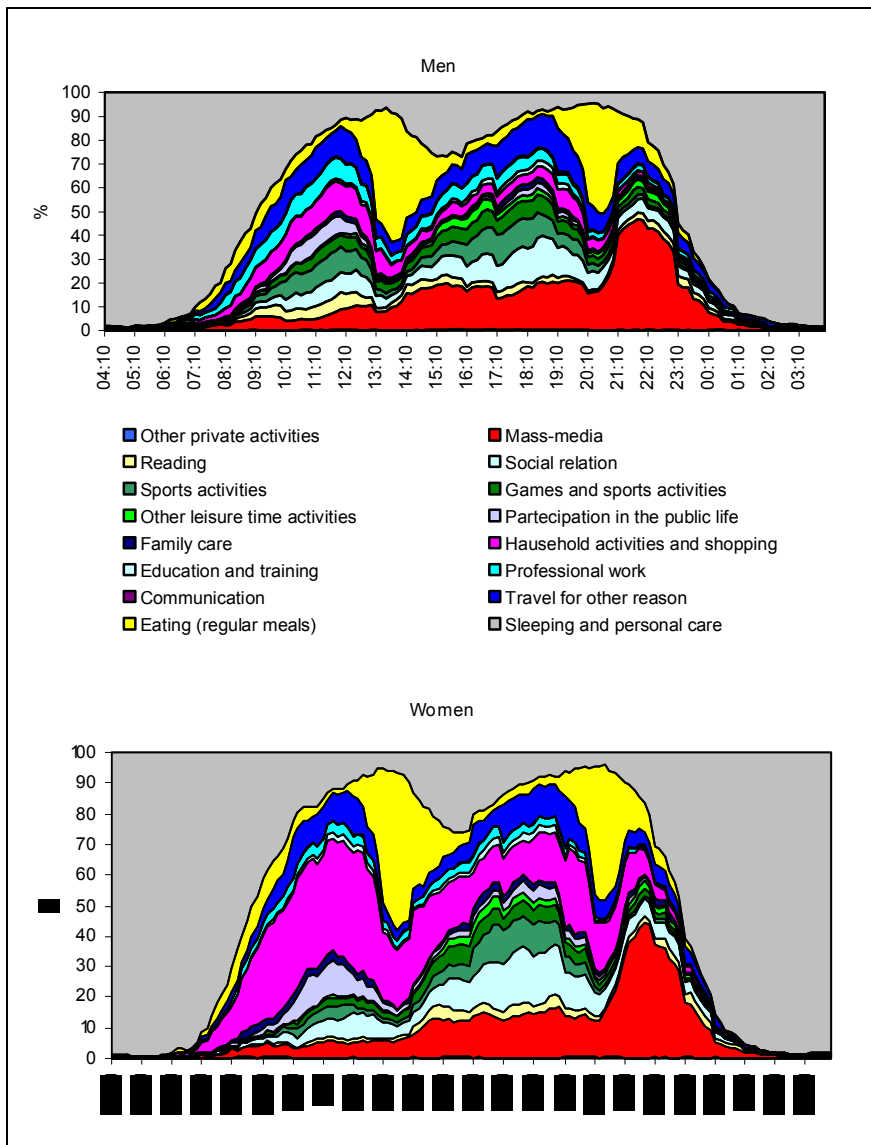


Figure 3.7 - Population engaged in all the activities in a weekend day by gender - Years 2002-2003 (cumulated frequencies in percentage)



time frequencies compared to the daily social activities, that is to say that for women, but also for men, social interactions in weekend days are mainly linked to the relations with the members of their families). In order to have a higher “summary of gender differences” in time use during weekdays and weekend days, it is possible to analyse the aggregate charts of time use also by *thematic frameworks* of activity rather than for the single 16 activities. The thematic frameworks of activity are the five ones used for the analysis of mean duration and time budget (see table 3.1-2 and figure 3.1 of paragraph 3.3) that for brevity reasons are not shown here.

3.6 - Daily rhythm of partner activities and a comparison with 1988-1989 data

Before moving on to the analysis of the space (place) and social (people) contexts characterising the daily time use, some of the results concerning the global sequence analysis of *time use among partners* are described below. In particular, in relation to a weekday and a holiday, a comparison with data of the Time Use survey of 1988-1989 is made.

To this purpose, a sub-file was developed starting from Istat data of 2002-2003 characterised by the following aspects¹⁴:

- sample of couples concerning mononuclear families without isolated members;
- municipalities of the large urban centres (the same as in 1988-1989) + the suburbs of the metropolitan area;

A similar sub-file had also been developed starting from the data of the 1988-1989 survey. Based on this data, the distributions of time sequences were developed and analysed for the 30 types of partners and for the 16 primary activities considered in the analyses mentioned above

¹⁴ The variables considered for mononuclear families were the following: *Day of survey*: weekday; dom. *Gender*: M;F ; *Average age of the couple*: E2035; E3650; Eol50. *Level of education*: IstEl (university degree, second class degree, high-school degree - 4-5 years); IstMd (high-school degree 2-3 years; grammar school); IstBa (elementary school, reading and writing, illiterate). *working condition*: EnOc (both work); UnOc (only one works); NsOc (none of them works). *cohabiting children*: SenFg (without cohabiting children); ConFg (with minor cohabiting children). *Age of the younger child*: Fg05 (children aged between 0 and 5); Fg611 (children aged between 6 and 11); Fg1218 (children aged between 12 and 18i). Overall, 30 types for weekdays and 30 for holidays, also considering total M and F.

(Paragraph 3.2). Due to space constraints only the charts related to male and female partners for the two type of days and years will be analysed.

Figures 3.12-3.13 show the aggregate charts of time use for male and female partners in a workday by also comparing them with data surveyed in 1988-1989, and figures 3.14-3.15 show the same charts referred to weekend days. Please note while reading charts that the initial time of 1988-1989 charts is 00:00 whereas in 2002-2003 charts is 04.00 a.m., therefore there is a slight gap to be taken into consideration while making the comparison.

The first thing detected is a general difference in time use of the overall time by male and female, mostly evident if the central part of the figure on professional work and household work: as expected, the latter are mainly performed by women than men, whereas the opposite applies for the professional work.

The difference is not remarkable between 1988 and today. Compared to the past, male partners show a lower frequency in the different hours of the day in the professional work and slightly more in household work and family care; this also applies to time sequences – not reported in this document for brevity reasons – of cases in which both partners work, or according to the other analysis variables considered and mentioned above. Also from a visual analysis, the time use charts show that for the two different periods - 1988-1989 and 2002-2003 – there is a higher complexity of male and mostly female days: in the case of women, the household work and childcare workload do not decrease during the 24 hours, but there is an increase in the number of daily activities performed, and they also include the activities devoted to “oneself”, belonging to the personal framework.

Furthermore, there is a general increase of night activities that in 1988-1989 were limited to male work whereas in 2002-2003 are also performed by the female population. The constitution of these activities is however different for the two genders: the activity mostly performed by men during the night is always professional work

Figure 3.10 - Weekdays of partners by gender - Years 1988-1989
(cumulated frequencies in percentage)

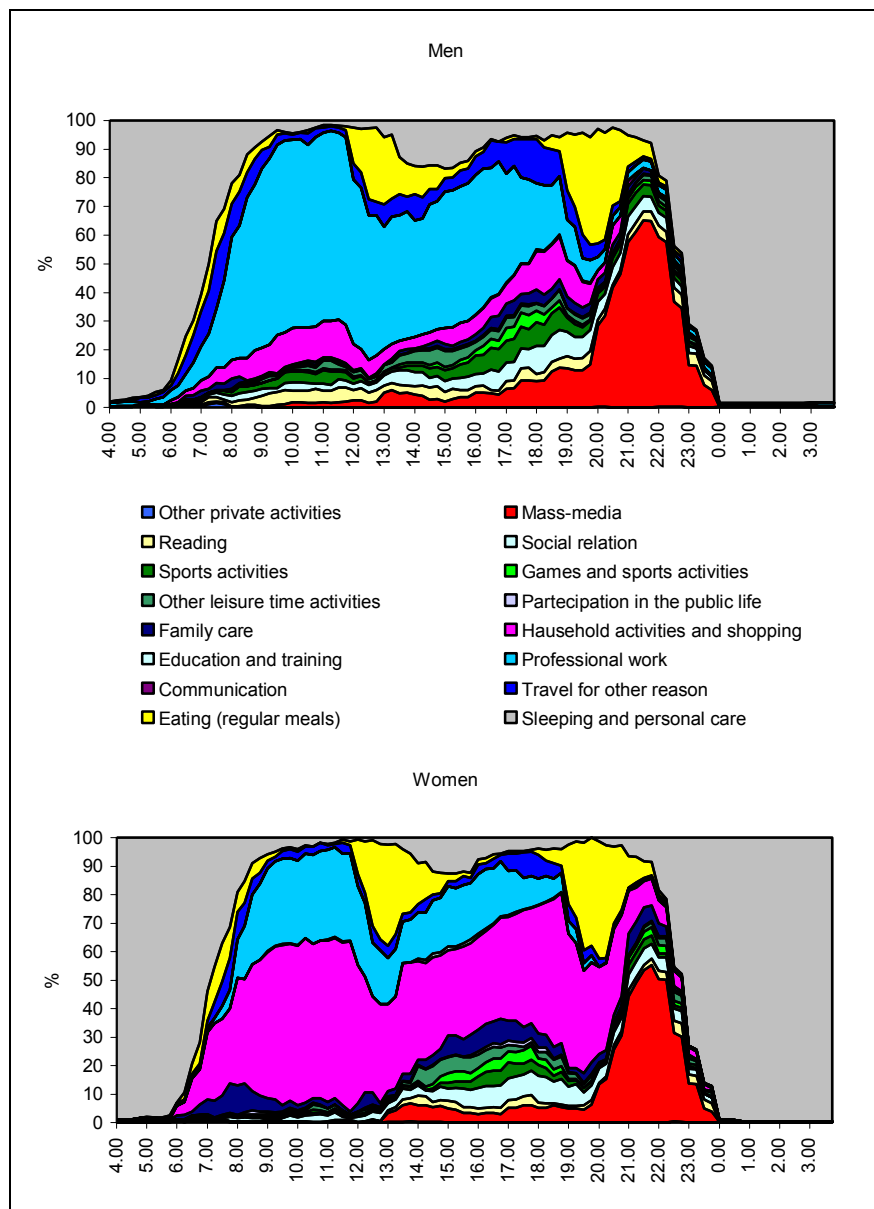


Figure 3.11 - Weekdays of partners by gender - Years 2002-2003
(cumulated frequencies in percentage)

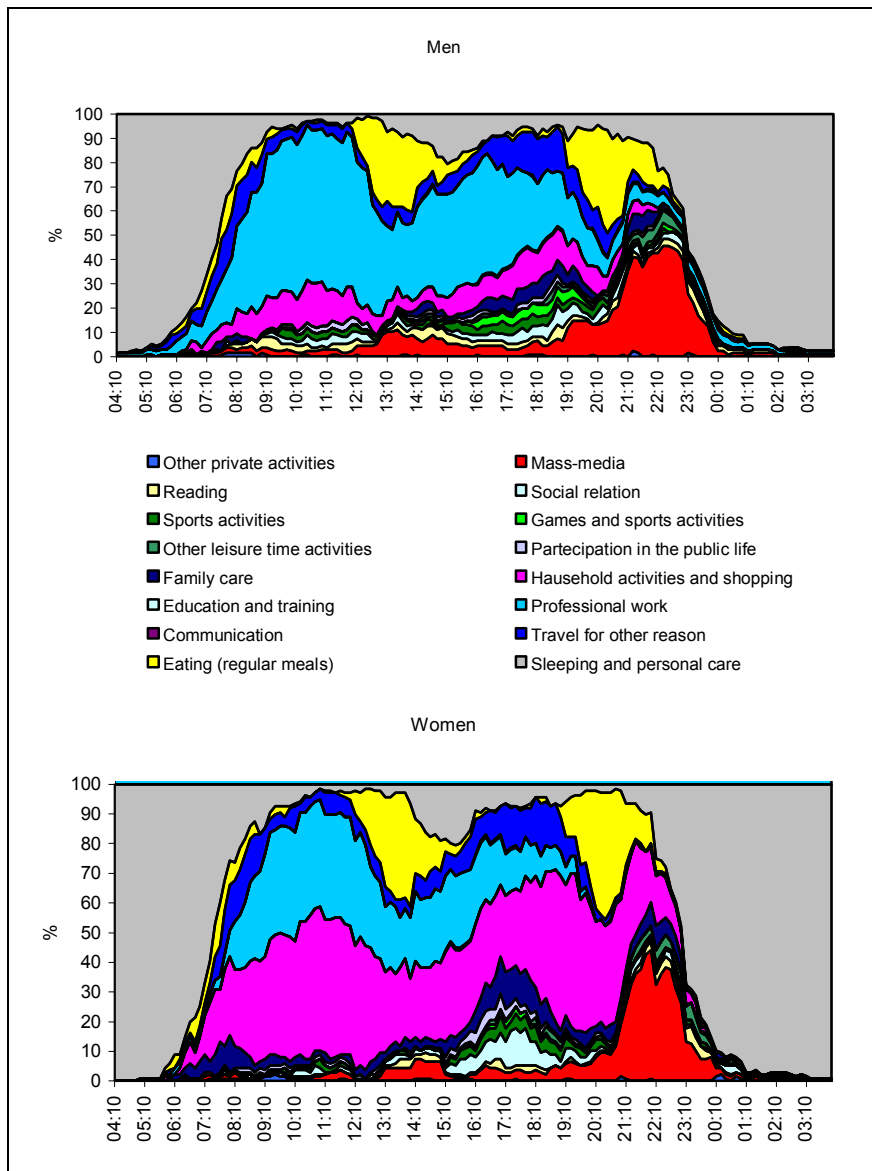


Figure 3.12 - Weekend days of partners by gender - Years 1988-1989
(cumulated frequencies in percentage)

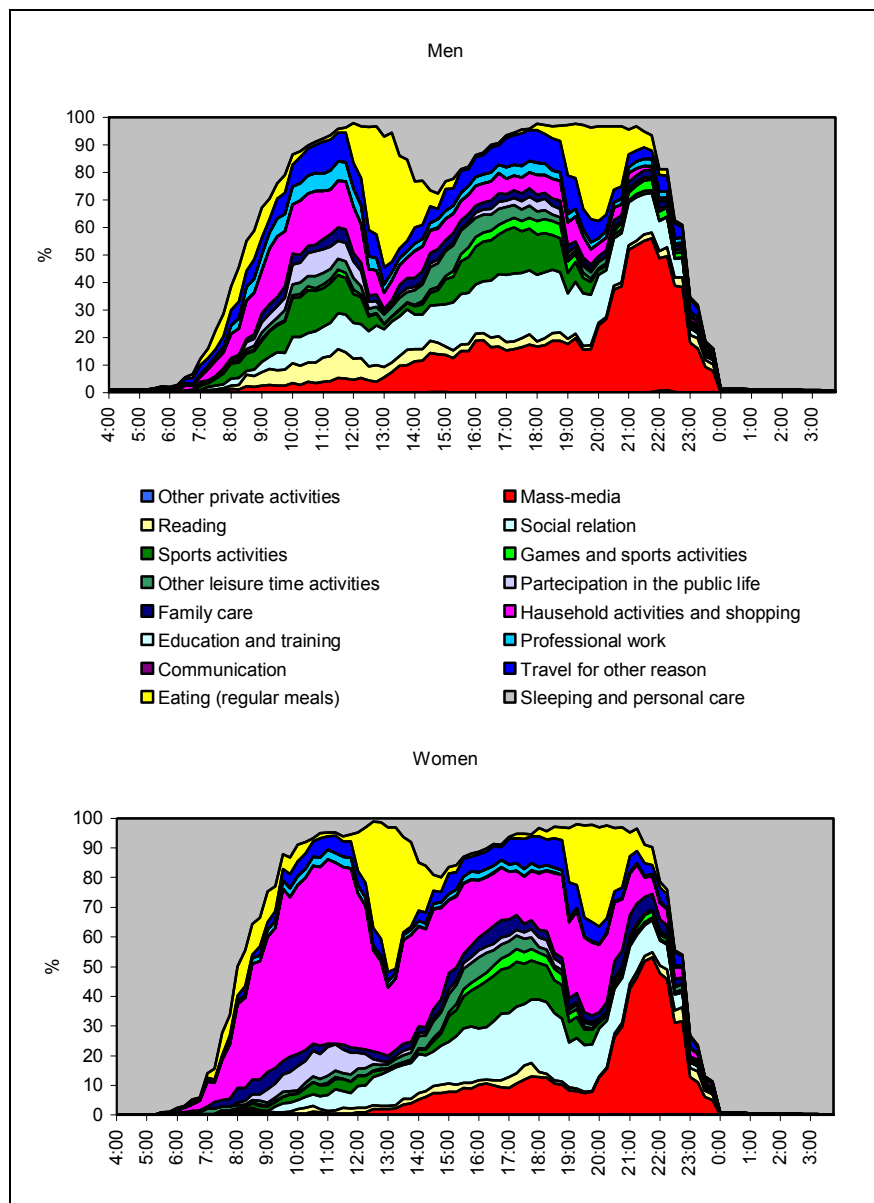
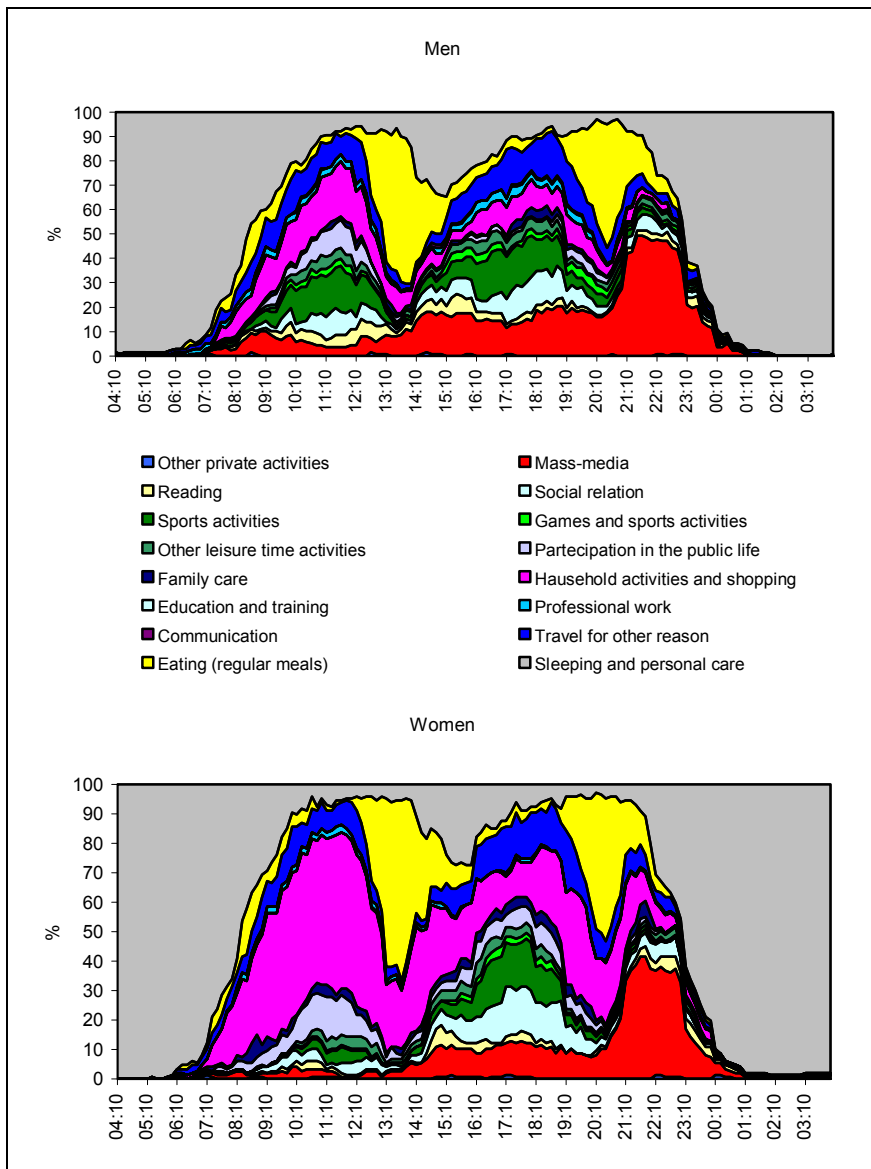


Figure 3.13 - Weekend days of partners by gender - Years 2002-2003
(cumulated frequencies in percentage)



followed by reading and mass media; women, on the contrary, devote their time to personal activities, in particular mass media, leisure time and socialising and activities in the family context, and family care. Another relevant difference reported in both genders is the decrease, in 2002-2003, in the use of mass media in the evenings, in favour of their generalised use during the whole day, and this can be explained by a higher spreading of personal computers and of the Internet, extensively used nowadays also at the workplace.

Finally, it is interesting to note that among these subjective-perceptive questions on time use at the bottom of Istat surveys of 2002-2003, when answering the question on whether respondents were satisfied on how they shared the household work with their partners, 79 per cent of partners (both male and female) said (2002-2003) they were moderately satisfied and 21 per cent said they were limitedly satisfied or not satisfied at all, both in weekdays and weekend days. Similarly to the same question referred however to childcare, 86 per cent of partners were very or moderately satisfied, and 14 per cent little or not satisfied at all, both in weekdays and weekend days.

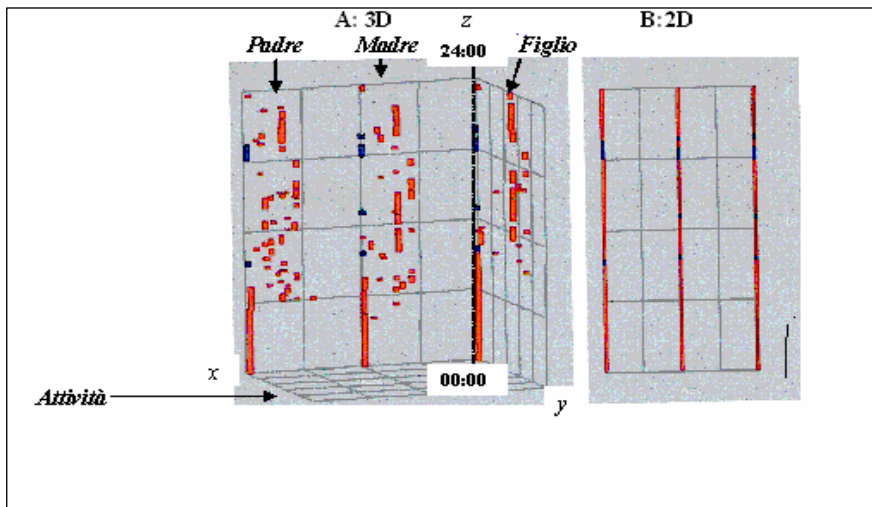
3.6.1 - Diachrony and synchrony in daily time use through the combined analysis of individual time sequences of specific social groups: an overview

In order to more specifically analyse the dyachrony-synchrony of daily time use by individuals belonging to specific social groups, it is necessary to refer to individual time sequences, individual paths, in the performance of a specific activity of each of the components of the social groups considered and their shuffle in the social group of belonging¹⁵.

An example: father, mother and a 14 years old son and the meals within the family. Figure 3.14 shows the eating activity in the daily framework of the three family members. The activity represented in blue is the eating activity.

¹⁵ As previously mentioned, recent applications in this sense were made by Kajsa Ellegard and Matthew Cooper *Complexity in Daily Life* (Eijtur 1, n.1 2004), 37-59.

Figure 3.14 - Individual time sequences of the family members of a family made up of three members: the eating activity (in blue) in the daily framework of the family activities



Source: Ellegard Kajsa, Cooper Matthew, Complexity in daily life, eIJTUR, 2004, Vol.1, No1: 37-59.
Data: Pilot Survey on Time Use by the Statistics Sweden 1996

If we flatten figure A:3D it is possible to easily see in figure B:2D how the eating activity is carried out twice by the father, four times by the mother, and four times by the son. Furthermore, only in some cases they can be synchronic (lunch and dinner), whereas in the other cases they are performed diachronically compared to the activities carried out by the other family members.

Always in the Swedish experience, the attempt was made to try and shift from a representation referred to categories of population rather than individuals. To this purpose, it was sufficient to represent is a 2D perspective as the one mentioned above all the individual paths of individuals belonging to the category of population taken into consideration: therefore, several individual paths represented vertically as the three examples in figure B:2D and then, through a specific software developed for this type of description of the individual sequence paths, the activity of interest was coloured. The result is figure 3.15 below, that we include as an example of the activity itself and of

the population according to the gender and age, having included for each gender the age as well, showing on the right side the youngest and on the left side the oldest individuals. For instance, by tracing a horizontal line at a given time-point it is possible to see whether a dyachrony (few points aligned) or a synchrony (several points aligned) prevail in the performance of the activity taken into consideration – for instance ‘eating’, as age changes.

As it can be seen, however, the chart is not immediately readable, although it is possible to see the frequency at different hours of the day of the synchronic moments that are present in individual paths by the categories of population taken into consideration for a given activity.

3.7 - The space context of time use: the frequency of population in the different places at different times of a weekday and a weekend day

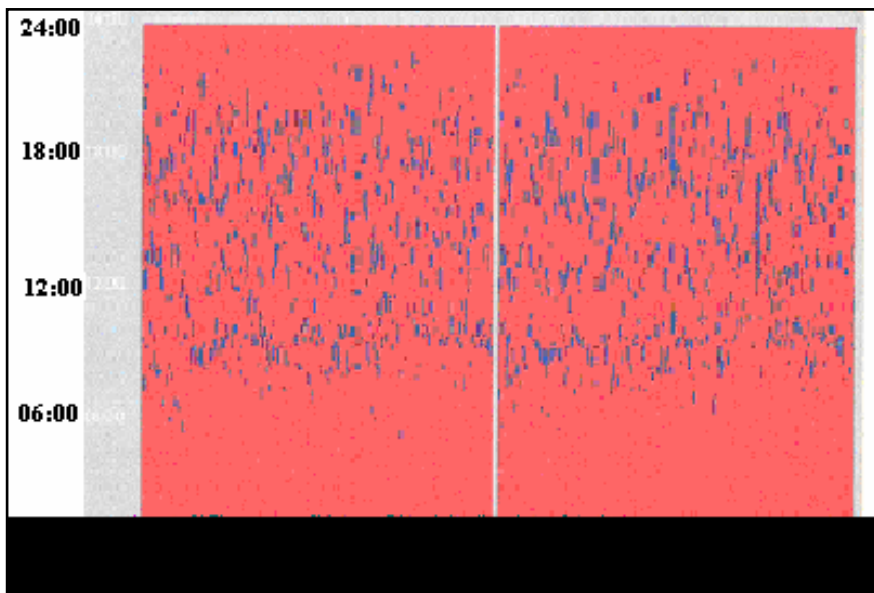
While analysing the space context of time use considered as a place where individuals spend time at different hours of the day, irrespective of the activity performed, and similarly to the sequence analyses carried out for the activities, sequence analyses for places were performed. In particular, an analysis is made of the aggregate percentage frequencies out of the total of male and female population in the different places and at different time courses in a weekday and in a holiday¹⁶. Frequencies were calculated for the same 144 time intervals of ten minutes each in the 24 hours spent for the different activities, although here they are referred to the ten types of place exhaustively classified compared to all the types of places attended in the day of the survey. In particular, the following classification was considered:

1. Home; 2. At the workplace; 3. at others' house; 4. Open air in the street; 5. Indoor services; 6. Recreational, cultural and sports activities indoor; 7. Recreational, cultural and sports activities outdoor; 8. Restaurants; 9. Other places; 10. Non-places (while travelling).

Please not that these analyses refer to large urban centres.

¹⁶ Also in this case, 63 time frequencies were analysed according to the frequency in the different places of the 63 overall figures obtained by crossing gender with all the socio-demographic analysis variables and the perceptive variables as already mentioned above.

Figure 3.15 - Synchrony-asynchrony of the “eating” activity for men and women by age



Source: Ellegard Kajsa, Cooper Matthew, Complexity in daily life, eIJTUR, 2004, Vol.1, No1: 37-59.
Data: Pilot Survey on Time Use by the Statistics Sweden 1996

Figure 3.16 shows aggregate charts of time use compared to the frequency in the different places in a weekday and in a holiday, here limitedly to the population by gender.

The background of the figure represents the percentage of those that are at “their home”, and it is possible to see that in weekend days this percentage is far higher than in weekdays at different hours of the day, but that in the evening of the holiday this percentage decreases. In weekdays the places more frequently attended at different times of the day are those linked to work, indoor services, restaurants and movements. The width of the band relating to the frequency in workplaces that shows in Italy as well the characteristic of continued working hours or in any case with a majority of individuals that are at the workplace in the morning. In weekend days, on the contrary, much

time at different hours of the day is spent at one's home, in restaurants and outdoor in the street.

It is interesting to note that among these subjective-perceptive questions on time use included in the survey, when asked about spending more time at home or outside in weekdays, 21 per cent of respondents said they would like to spend more time at home, whereas 79 per cent outside. When asked the same question for the holiday, 18 per cent of respondents said they would like to spend more time at home and 82 per cent outside.

If we analyse the gender difference in the frequency of different places at different times of the day, figures 3.17 and 3.18 show male and female frequency in different places at different hours of a weekday and a holiday.

In the *weekday* the main gender difference concerns the higher attendance of women that, at different hours of the day, stay at their home or at others' places; conversely, there is a higher frequency of men at different hours of the day in workplaces, followed by restaurants and outdoor in the street. As regards *weekend days*, gender differences concerning the staying at home decrease, whereas there is a slightly higher percentage of women that stay at others' places and a lower percentage of men that stay outdoor in the street, especially in the morning. It is also interesting to note that the frequency in workplaces, although with frequencies lower than weekdays, are constantly present for the whole holiday both for men and women.

Figure 3.17 - Men and women in different places at different hours of a weekday - Years 2002-2003 (cumulated frequencies in percentage)

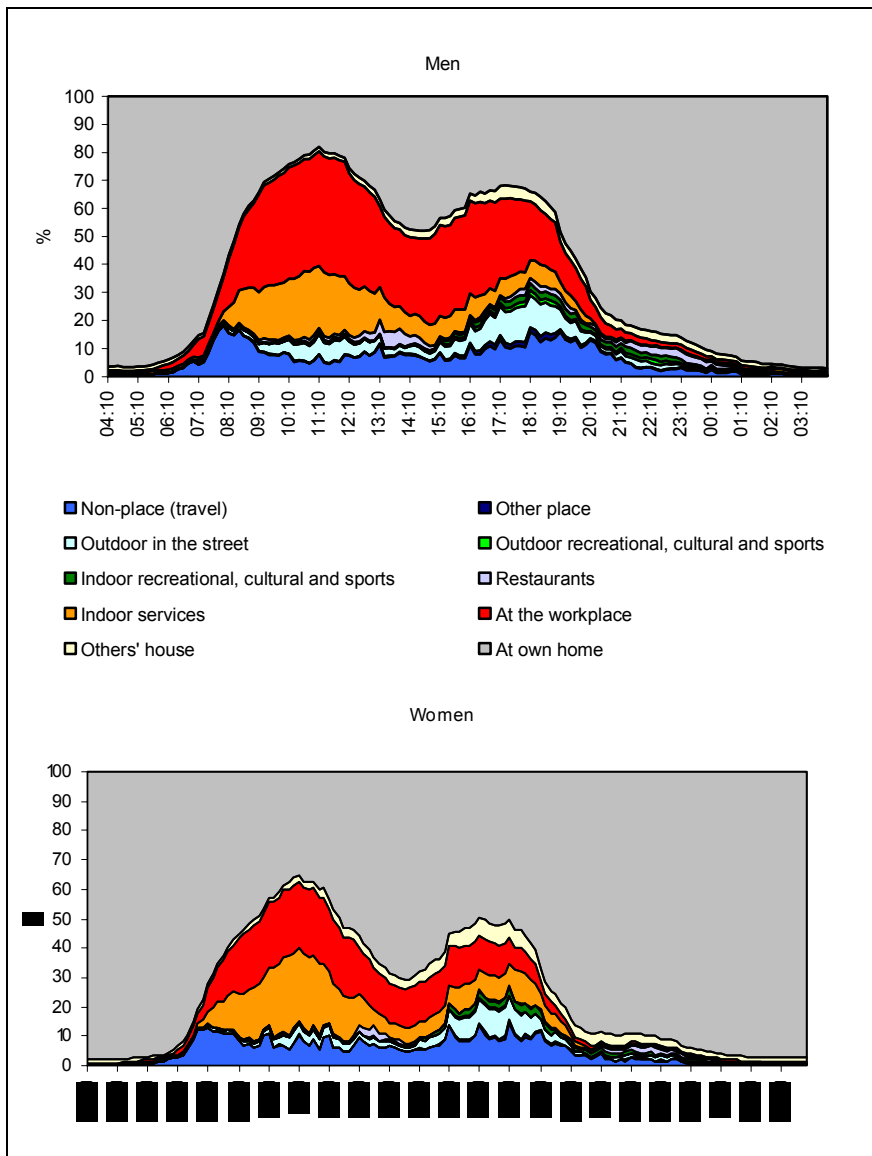
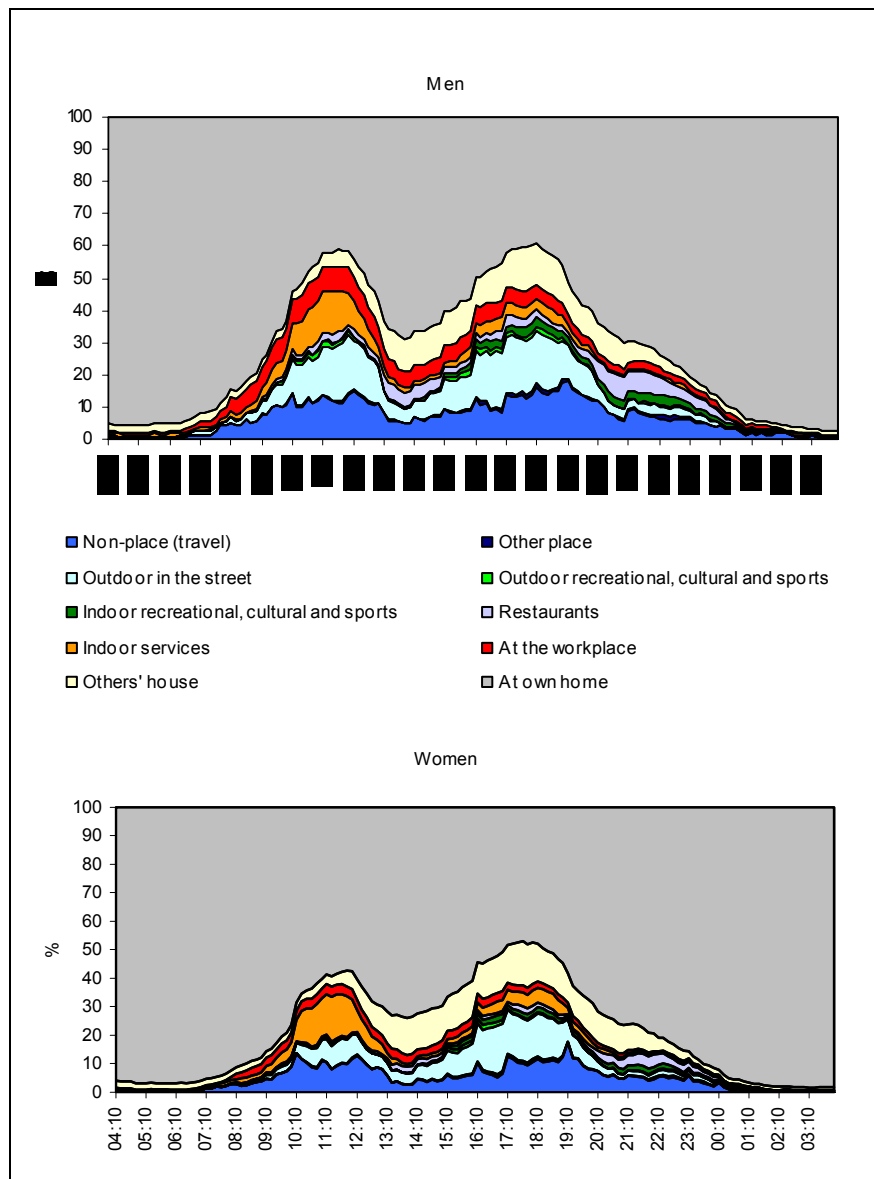


Figure 3.18 - Men and women in different places at different hours of a weekend day - Years 2002-2003 (cumulated frequencies in percentage)



3.8 - The social framework of time use: frequency of population according to different types of social relations at different hours of a weekday and a weekend day

Finally, in the framework of analysis of the social context of time use, considering here by social relations the types of people present in the 24 hours in the performance of the various activities irrespective of the activity carried out, sequence analyses were carried out by considering the (aggregate) frequencies at the same 144 intervals of ten minutes each by the different categories of population¹⁷, according to the four types of people present in which all the types of socialising surveyed were exhaustively classified. In particular, the types of social interactions considered were the following: 1. Alone; 2. With family members; 3. With acquaintances; 4. With family members and acquaintances.

Figure 3.19 shows the aggregate charts of time use compared to the frequency at different hours of the day of different types of social interactions in a weekday and in a holiday for the total of population.

The background of the figure corresponds in this case to the several non-replies that in weekdays are higher than in holidays. It must be specified however that respondents were not obliged to indicate the people present during the time spent at school or at the workplace, besides the time spent in bed. It is evident how in holidays compared to weekdays there is a huge increase in all the hours of the day of the social relations with the family members and also a moderate increase of the social relations with family members and acquaintances, although markedly lower than the one with family members alone.

Furthermore, the frequency of those that stay alone at any time of the day stay alone is not negligible (nearly 20 per cent).

Finally, figures 3.20 and 3.21 for the analysis of gender difference also of the social context of time use, here is follows the aggregate charts of male and female frequency according to the different types of social relations at different hours of weekdays and holidays.

Also for these charts, the background shows the non-replies with the clarifications made above. Both in weekdays and holidays the

¹⁷ Also in this case, as for activities and places, 63 groups were analysed and obtained for the total population by crossing gender with all the socio-demographic analysis variables and the perceptive variables taken into consideration.

Figure 3.19 - Population according to four types of social relations (people present) at different hours of a weekday and a weekend day - Years 2002-2003 (cumulated frequencies in percentage)

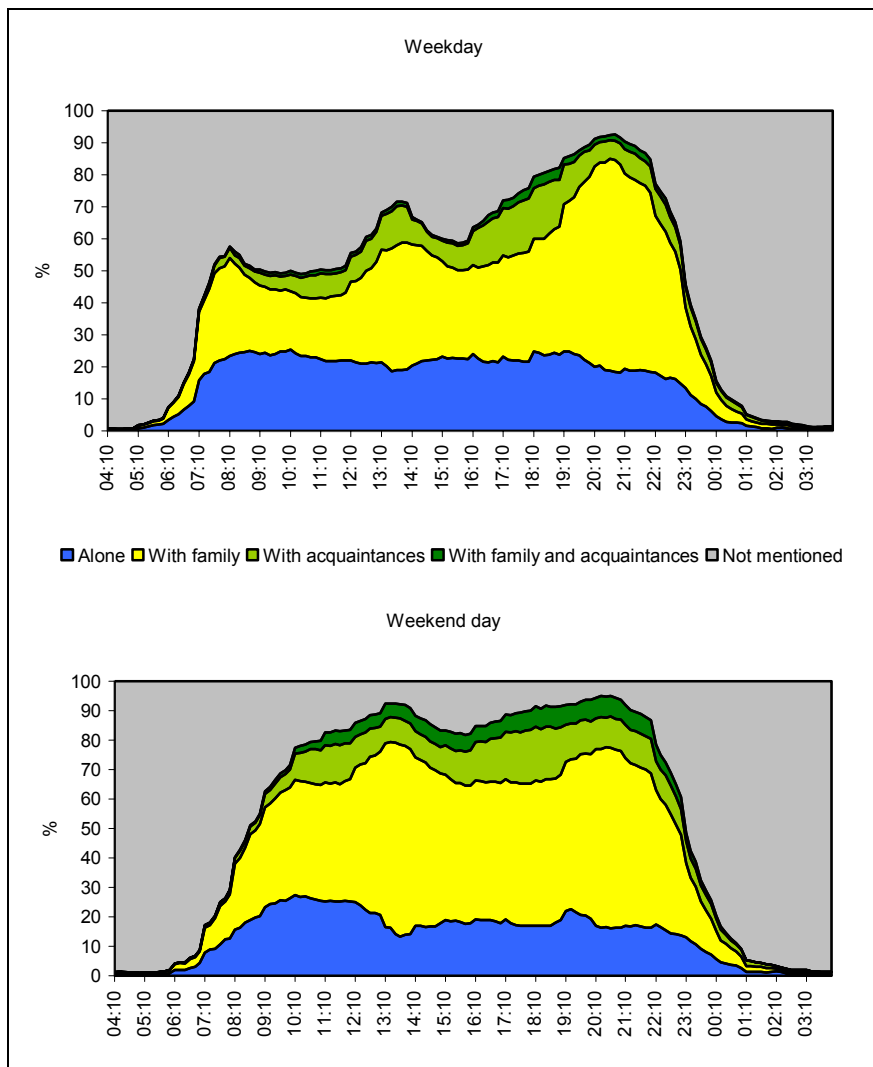


Figure 3.20 - Men and women according to four types of social relations (people present) at different hours of a weekday - Years 2002-2003 (cumulated frequencies in percentage)

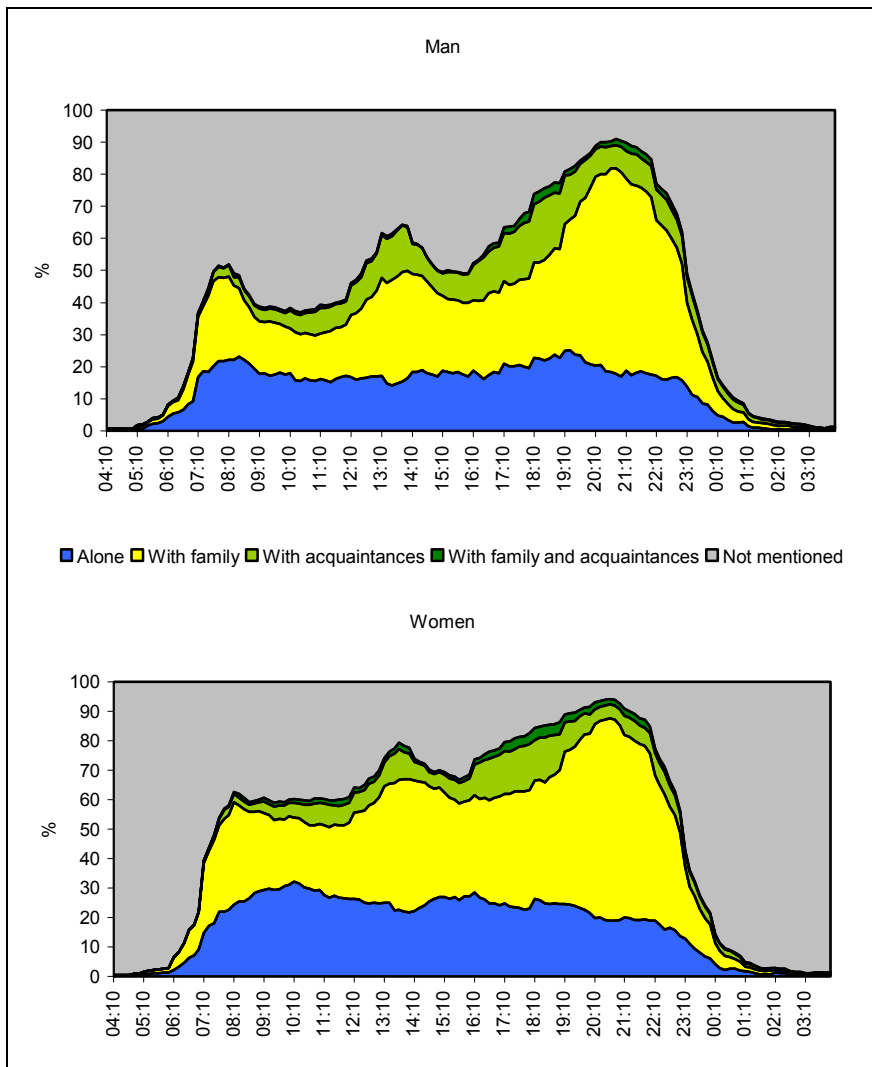
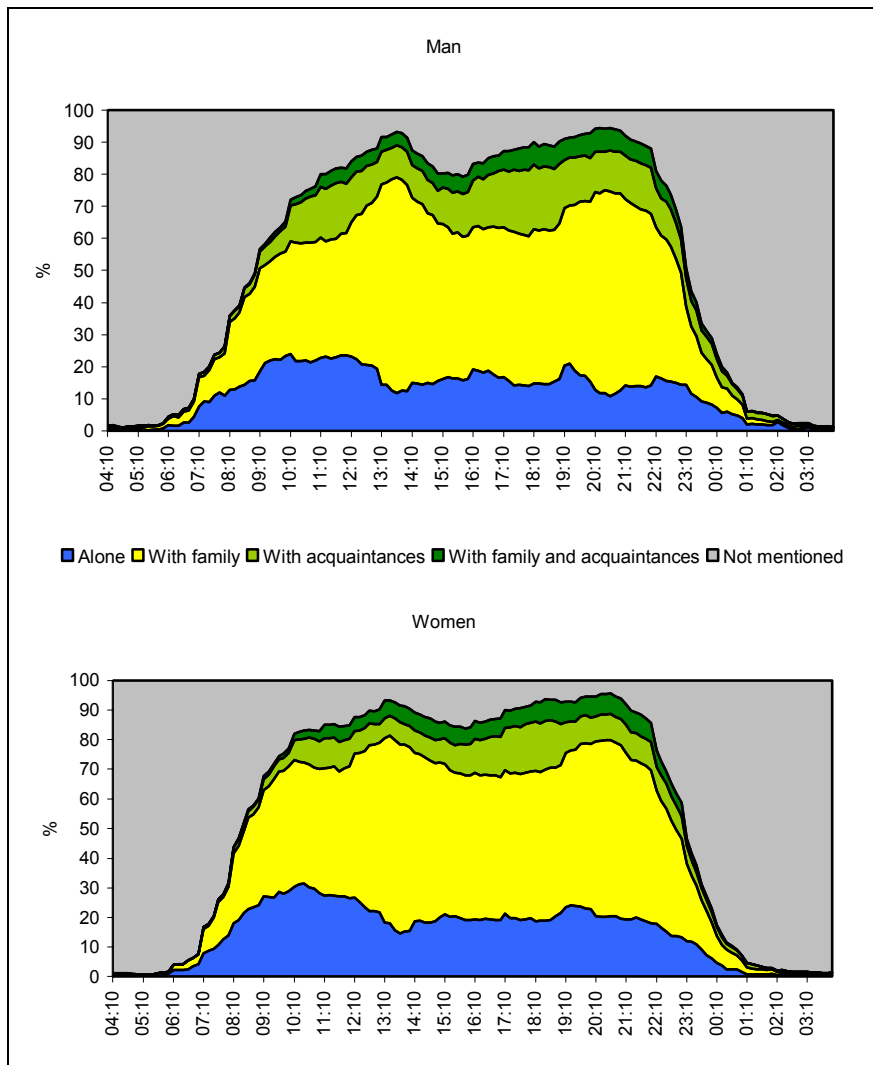


Figure 3.21 - Men and women according to the type of social relations (people present) at different hours of a weekend day - Years 2002-2003 (cumulated frequencies in percentage)



number of people who stay alone at any hour of the day is also confirmed in gender analysis; only in case of male in holidays this percentage decreases. Very high remains the frequency for the two genders of the social relations linked to the family both in weekdays and holidays. It must be noted that for male social relations are linked to acquaintances in weekdays and they limitedly increase compared to the higher frequency of the working activity characterising them in these days.

Also in this case, in the framework of these subjective analyses on time use it is interesting to note that when asked if they wanted to spend more time alone, 76 per cent of respondents stated that they would not spend more time alone and 76 per cent stated they would spend more time in company, both during weekdays and holidays.

3.9 - Conclusions

The analyses performed until now show the wealth, the importance and the usefulness - as well as the novelty - of data collected in the survey carried out by Istat - Time Use for a better knowledge of the social life of our country but also for a comparison with other countries and their way of living through time use. In particular, the quantity and complexity of the analyses of data that still have to be performed deserve further testing that have begun with the development of the research protocol "Time use of the Italian families" for the thematic area "Multidimensional approach to time use. Time use in a lifestyle perspective", which this work belongs to inside of this volume.

As regards in particular the sequence analyses presented in this paper and that represent if not a novelty in the framework of time use analyses at least a rarity and an aspect which is often neglected for the complexity of processing and the difficulty of synthesis of the huge amount of data collected, during this work some choices had to be made. In particular, it was decided to analyse the three contexts of time use - activities, places and people - for the total population and according to gender difference, hence leaving aside, especially for places and people, the other variables in order to systematically perform the analyses presented and presented as basic, explorative and descriptive statistical analyses, useful for a future and more complete analyses of the time use sequence through multivariate statistical

analyses used in a data mining perspective, suitable for the quantity and complexity of data available, in order to identify predictive models, typologies and structures of data on the lifestyles of time use.

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4. Children's time

4.1 - Why a phenomenology of children's time

4.1.1 - Time use surveys and childhood sociology

Conducting surveys on non-adult populations, classified as childhood and pre-adolescent, can contribute to our knowledge of a population that is rarely investigated, if not neglected, by sociological analyses.

New Childhood Studies have introduced a sociological and socio-ethnographical approach to surveys on children, reversing the traditional point of view about childhood generally expressed by family and gender sociology. In these, in fact, children are only considered with relation to adults, whether as a constraint within the household - particularly as regards women and the labour market - or as an indicator of negotiation between partners, or as a possible source of poverty, especially in single parent families.

This chapter was written by Maria Carmen Belloni (paragraphs 4.1 and 4.3) and Renzo Carriero (paragraph 4.2), Department of Social Sciences, University of Turin.

On the contrary, what we could call a new paradigm of childhood, which contrasts, in psychology, with the approach to growth and in sociology, with that of socialization, considering the child not as an imperfect social form but as a real social actor, who is able to create a specific culture, also able to influence adult culture and able to take decisions with relation and in response to the constraints of his environment.

Without entering into the merits of the various approaches within this multidisciplinary field of study (encompassing geography, demography, anthropology, jurisprudence, sociology etc.), what is important is that, in this way, childhood joins sociological analysis, as it is considered a phase in the course of life. Children become subjects analysed per se and not only in relation to others, as occurred previously with research on other minorities, such as immigrants, women, young and old people. However, a certain number of studies on childhood and adolescence conducted fairly recently, mainly in North European countries and in the UK, often regard specific problems, such as culture, consequences of the divorce, poverty, rights etc. There are very few studies on “normal” children’s way of life in Western societies: everyday life, range of action, behaviour in the family and urban organisation. Time use surveys are now becoming increasingly common in a number of Countries, demonstrating their utility in the study of everyday life and comparative analysis, although up until now, mainly for adults. Thanks to the Eurostat Project, in many national surveys the age range has been lowered to 10-12 years old, although only Italian surveys include the entire household, and therefore all children, even infants. There are very few other time use surveys that adopt the standard protocol and focus on children: we can cite the American Cds-Psid (University of Michigan, 1997 and 2001) and the Italian local survey, conducted in parallel with the national Istat survey.¹

In any event, the available data on children’s time still presents difficulties due to the absence of interest (mainly in Italy) in a sociological approach to children from their own point of view. The main problem is undoubtedly linked to the fact that these surveys generally do not go beyond a simple description of everyday activities, and do not involve more in-depth statistical analyses. The first national

¹ We refers the survey carried on in Turin, 2003, in parallel with the Istat survey. For some results and the adopted methodology see M.C.Belloni (2005). For the USA survey, see <http://psidonline.isr.umich.edu/CDS/>.

Time Use Survey (1988-89) is one example of that and it is largely under-utilised. In other cases, the problems are more methodological. In the American Survey it was the parents that recorded the children's activities: this not only excluded the child's perspective, but also ignored many micro-activities, the analysis of which is important to explain a child's world.

This survey contains a lot of useful data which helps to outline a kind of phenomenology of children's everyday life today. First of all, we would like to underline an important methodological aspect of this survey, namely the opportunity to record children's behaviour within their family organisational framework. In the Italian survey, the whole family keeps diaries and this ensures that the everyday life of children is included in the complex system of the family organisation, of which children are a significant and fundamental part. In fact, on the one hand, the family's rhythms and temporal organisation are conditioned by childcare and children's school schedules, and on the other, children's activities, leisure and recreational choices are conditioned by the parents' constraints and opportunities (job schedules, the amount of housework, the urban context and its organisation, the level of welfare services, the presence of family networks and relatives). In brief, the mass of data available to us is fundamental and essential to obtain a comprehensive description of the activities.

Lastly, establishing the age range of children for data analysis is not an easy task. The fixed age, starting from three years old in the Italian survey, covers two populations: babyhood and full childhood. However, while in the first case we can gain some useful descriptions about the daily life of children and their integration in the family organisation (the parents complete the diary), only in the second case we do have direct information. This is why we chose to start from the age of seven in our study. The upper limit in international literature is fairly uncertain and in some cases childhood extends (not without criticism) to when children come of age. We chose to adopt a mixed criterion that includes cognitive skills (language and speculative), biological aspects (pre-pubertal age) and social factors (period in the course of life related to the construction of social and gender roles). This led us to adopt belonging to primary and middle school as social indicators of clear-cut phases in the course of life.

4.1.2 - The everyday life of children: an interesting field for sociological studies

Why should sociology study the everyday life of children? A legitimate question, given the scarce amount of research on the subject. Even though sociology has denied children a social status for long time, interest in them is now increasing. We should therefore consider if and how their everyday life can be explored by calculating the time spent doing activities, in the same way as time use surveys. New Childhood Sociology, considering children as a group with its own cultural identity, able to differentiate itself from adults, justifies analyses of behaviour, strategies of reacting to the constraints of the social-parental environment and ways of interacting with disparate groups. In this way, studies on children's everyday life can be considered similar to that of other social groups, sharing a kind of culture and a social status, such as young people and women.

First of all, everyday behaviour can be considered as a good proxy of the current childhood condition. We actually know very little about how children live today in Western post-industrial societies. Very few in-depth analyses have been made about the strategies children resort to in our societies and cities where they are a real minority group with places that they mostly cannot access on their own. A situation in which they have to conciliate between a focus on the system of adult roles and a possible children's field of action, while society expects them to gain experience and internalise social roles through relationships with adults and peer groups, through play and space relations.

In our brief introduction to some results of the Italian survey, we will present some appropriate topics in order to better understand this so-called new social actor.

Even using a merely descriptive approach, and more through in-depth statistical analyses, we can highlight some characteristics of children's everyday life that sociological analysis cannot consider independent of their parents. The first and maybe main proof of this is the fact that children's and adult's daily organizations are strictly parallel, although not completely conformable. In fact, children share repetitive and highly structured patterns of daily organization with adults: strictly scheduled hours, highly selective activities at the different times of day, fragmented times, very few "prolonged hours", a prevalence of institutional, domestic and inside spaces as opposed to outside and freely accessible ones. School represents a pivotal time-

giver for children, equivalent to an adult's job, and hence conditions the choice and arrangement of the other daily activities. These must be strictly regulated firstly due to the high prescriptive value of school schedules and secondly, because children must conciliate other timetable systems relating to themselves in the residual time: parents' schedules, other educational or leisure organizations/institutions, services. Within the family's daily organisation, there is therefore a big clash between school and other timetables, mainly work-related ones, while the child's choice of activities is conditioned and cannot be performed self-sufficiently, and families, mainly mothers, have a very great struggle to conciliate different hours, often giving up paid jobs or working fewer hours. In any event, children suffer organisational strategies, hierarchical values and the internalised roles of their parents. Fathers with more "traditional" job schedules, for example, as we will later illustrate, are more able to take their children to extra-curricular courses (if not, they would remain longer at school); children with a full-time working mother are more likely to spend time out of the home, playing out of the home or visiting other people's houses.

For children, just like adults, spending time is of course connected to the places they frequent. In the city, however, the majority of urban spaces and private places (such as friend's or relative's houses) aren't accessible without adults. This is recorded explicitly in the diaries: after school time, children mostly stay at home or, at best, in institutionalised/regulated/controlled spaces, where they only do organized activities. Children's use of space is therefore consistent with their scarce autonomy indicated by the Childhood Studies (Hooloway, Valentine 2000). Travelling in the urban area is linked to staying in places: how and when they go out, how they travel, using means of transport. Here, we propose a dual approach. On one hand, children's behaviour depends on functional priorities of the post-industrial societies and local organizations, on the other hand they acquire cultural values and habits from their families.

We'll illustrate the second one later. As regards social organization, we refer to what we said above and add something. The dominance awarded to productive functions necessarily weakens people who aren't (more or yet) able to be a part of them. We can find some indicators of this in the everyday life recorded in the children's diaries: they have little chance of choosing activities in which they are competent (such as playing or relations with their peer group) and accessing outside spaces,

and they must interiorise scheduling as a general social rule. Other sources of different children's daily life are connected to the various services and school times distributed in different geographical areas and sizes of towns. It is the meaning of Saturday that especially changes in this case. It is a freer, less scheduled day (though constrained by the family organization) where there is full-time school (in the North and cities), while constrained by school time (besides family organization) elsewhere. Sports activities are connected to the different offer of services too, as we can see in the more widespread courses and organized activities in the North and in the cities.

Lastly, children's use of time highlights the mechanisms through which national cultures transmit and consolidate social habits and role identities. We can provide give two examples of this.

The first and more conspicuous one highlighted, from infancy, is a gendered division of labour, that shapes a hybrid and ambiguous female model. Girls actually share the same opportunities with boys (biorhythms, extra-curricular courses, sports, mobility, interpersonal relationships), but replicate gendered familiar inequalities in doing more housework and spending more time on it. The general model of gendered roles is confirmed by the different activities mothers and fathers do with their children (Belloni, 2005), despite the small increase in father's participation in recent years. With mothers children mostly do housework, while with fathers entertainment and leisure, with whom the boys (only) commence using new information technologies. Generally speaking, it seems that role gendered models and stereotypes are deep-rooted in the culture of Italian families – in contrast to the other European countries (Romano, Sabbadini 2006) - and are present even with high levels of education. The lowering of the age range in the Eurostat survey provides a good opportunity for comparative analyses.

The second example of how family habits are transmitted to children regards how children travel. Children, just like their parents and Italians in general, mostly travel by car, in towns just as in cities, on weekdays just as on Saturdays or Sundays. From these habits, we can assume (although this hypothesis should be tested!) that they may suffer from this delayed control of their space, a patchy and fragmented knowledge of the city and late independence and self-reliance in open spaces. From the diaries we can in fact infer that children are generally “under the tutelage” and highly controlled by parents, they are almost never alone or without adults, they can't do activities outdoors without

adults. Comparative analyses, even on this topic, could contribute to understanding if there are cultural models, specific to Italian families or (adding other indicators) whether there are particular environmental risks that produce insecurities when children are outdoors.

4.2 - Main factors of variability in children's use of time

In an explorative analysis of this nature, we lack independent variables which are closely related to strong theoretical hypotheses. It is a common situation in secondary analyses of data collected for various purposes and not directly linked with the subject of this analysis. In fact, the questionnaire attached to the diary contains questions addressed mainly to adults, regarding various aspects of working time and family care (work-life balance). It does not contain detailed questions on childcare or relationships with them, parents' educational choices, etc. Furthermore, we do not know what are the educational opportunities are or even what the care solutions and arrangements after school hours are, which would be very important in determining children's time use options.

Within these limitations, we tried to assess the potential impact of certain variables on children's time use. These variables essentially regard parents' characteristics in terms of social and working status: educational level, social class, type of working hours (typical/atypical)², mother's occupational status. Education is expressed in three levels: university, high-school diploma (5 years), compulsory education or less (reference category). Social class is derived from professional position and is broken down into bourgeoisie, employed middle class, self-employed workers, blue-collars (reference).³ Given the relative homogeneity of the sample examined (children aged 7-13) and the poor

² We considered *typical* the working hours of those who answered they *never* work at shifting hours, at evening, at night and at most *occasionally* on Saturday and/or Sunday.

³ More exactly social classes have been defined on the basis of the variable "father's professional position" and "number of subordinates" (for entrepreneurs only). Where the father was retired we used the last occupation. It's the classical subdivision by Sylos-Labini (1974), except for the case of parents retired from work: through the father's last occupation we attributed a social class to the child. The social classes are made up of the following professional position:

- bourgeoisie (top manager, professional, entrepreneur with more than 6 subordinates);
- employed middle class (managerial staff, teacher, employee);
- self-employed workers and entrepreneurs with less than 6 subordinates;
- blue-collars (all levels and types).

theoretical interest of the variable “parents’ age” we decided not to include it in the models.

On first sight, differences correlated with urban and geographical settings could be considered simple control variables. In reality, as we will see, they are important factors that influence several time use options. Indeed, on the one hand, the known differences in living conditions between large urban centres and small towns and on the other, the widely documented diversities and inequalities between Italian regions (for instance in terms of public services availability and quality), give territorial factors the status of independent variables for some types of time use. Territorial variables have been given the following working definition: metropolitan district (e.g. Rome or Milan), municipality of metropolitan district, municipality with up to 10K inhabitants, municipality with more than 10K inhabitants (reference); geographical area: North, South and Islands, Centre (reference).

We choose two dichotomies as family structure variables: “with/without siblings” and “single/two parent family”. The latter was not found useful and was eventually discarded due to the low number of single parent families of children aged 7-13.

Lastly, the individual level variables, which better discriminate time use, as we will see, are the child’s age and sex. We did not use age in years (this form could be used when age is a simple covariate and not an independent variable of substantial interest). We created a dichotomy indicating not only a level of psycho-cognitive development but overall a child’s “social” status, that is whether s/he attends middle or elementary school (reference). The latter condition, incidentally, has an important impact when it involves “full time” hours.

The only variables we considered as simple controls are the data collection period (4 trimesters) and, with regard to models of the “average day”, the kind of day (weekday or Saturday with respect to Sunday). The data collection period is a proxy for the school year period. Since we designated July-September as the reference category, which covers the majority of school holidays, the other trimesters contains a variable but nevertheless large number of school days. We know that a substantial part of family’s time organization is centred around the school routine (for children) and work (for parents). When work days are “out of phase” with respect to school days (i.e. during

school holidays) many things are likely to change in the normal household's organization.

4.2.1 - Dependent variables

Diary data provide a large amount of information that needs to be condensed in order to analyse it by means of statistical models. The traditional way of doing this is to create the so-called time-budget from main activities. This is the approach we used here along with other methods. Time-budget categories often include activities originally classified to the 2nd or 3rd digit, but for many analyses we isolated specific sorts of activity from the general category.⁴

In a few cases we combined the main activity with the place, with co-present people or with the timing, as in the case of watching TV (for example "time spent alone viewing TV after 9 p.m."). Alternatively we assumed the time spent in specific places as a dependent variable. In that case we built a sort of space-time-budget, calculated using places (including transportation means) instead of activities. The main places we considered as categories of interest are:

- other people's homes;
- shops, supermarkets, hospitals and offices;
- sport facilities;
- libraries, theatres and entertainment facilities;
- public gardens;
- natural environment;
- streets and squares.

Travel is coded as an activity, but means of transportation have been coded as place categories. For the analysis of places we considered car trips and bike or foot trips. The latter would represent children's autonomous means of transport; however we cannot know from the diaries whether children were with friends or with adults during those trips.

Lastly, some remarks on the statistical models used. Multiple linear regression has been applied to dependent variables with at least half of

⁴ We used the following categories (codes in parenthesis): sleep and personal hygiene (01, 03); eating (02); domestic tasks and care (31-35, 38, 39); shopping (goods and services); formal and informal voluntary work (41, 42); social and religious participation (43); socializing (51); entertainments and culture (52); walking (611, 62, 63); sports (612-619); games and hobbies (7, except for 722, 733); videogames, computer use (733, 722, 841, 842); tv, radio (82, 83); reading (81, 843); all travels (90); filling in the diary, unspecified time use (99).

the cases participating in the activities (doers). Non-participating cases have zero value.⁵ When the percentage of doers is below 50 percent (for some categories, even to 2 digits, it barely reaches 10 percent), we can no longer meaningfully assess the impact in linear terms (i.e. more or less minutes for a unitary variation of the independent variable). Hence we estimated the impact of variables in terms of the probability of observing a certain activity in the diaries. Probabilities have been estimated by means of logistic regression using odds ratios, which are more easily interpreted than logistic regression coefficients. For both linear and logistic regression we calculated “robust” standard errors in order to take into account the correlation between cases from the same household.⁶ Finally, for some “intermediate” situations, when we have a moderate percentage of doers (around 30 percent or more) and a fair duration variability, we experimented the tobit model that, in recent time use literature, has been proposed as an alternative to OLS regression.⁷ In practice the tobit model estimates the impact of variables on the probability of observing the activity and the coefficients for the duration of the activity⁸ at the same time.

4.2.2 - *How much do territorial factors matter?*

Living in the North of Italy or in the South/Islands (hereinafter “South”) is a factor that most and most intensely influences the time a child spends at school. This is likely to be a matter of the different supply of school hours in the country’s Northern and Southern regions. Indeed, even controlling for family variables (parents’ education, social class and working hours), the models highlight the clear and substantial impact of territorial factors. To analyse time spent at school, we decided to treat elementary and middle school children separately, because of the

⁵ Even if there is not a clear norm nor a “best practice” in this field, it seemed correct to apply that “rule of thumb” for two reasons. The first one is that OLS regression is a robust technique and can tolerate such a violation of the error normality assumption. The second one is that calculating the impact of variables in terms of more or less minutes is interesting only when there is a fair variability of time spent in a certain activity.

⁶ We used the “robust/cluster” option of the Stata software.

⁷ About tobit regression see Breen (1996); Long (1997); Greene (2003); for a discussion and an application of tobit regression to time use data see Flood e Grasjo (1998) and in particular an application to children’s time use in Hofferth and Sandberg (2001).

⁸ Tobit coefficients are not directly interpretable because they are related to a *latent* dependent variable. It is easier to interpret the marginal conditional effects that refer to the *observed* variable (minutes spent on that activity). Tobit models and marginal conditional effects have been calculated with Stata *dtobit2* command.

very different hours between types of school. In fact elementary school children often attend school on a so-called “full time” basis (from the morning to mid-afternoon, Monday to Friday). Results are differentiated for weekdays and Sundays. At a descriptive level there are wide differences (see table 4.1): children from Northern or Central Italy spend about one hour more at school than their counterparts in the South.⁹ If we assess differences net of the other variables we notice that, during weekdays, an elementary school child, living in the South, spends less time at school (43’ less) and the same is true for a middle school child (47’ less).

Table 4.1 - Average school time, by geographical areas, type of municipality, type of school and type of day (in hours and minutes, participation rate in percentage)

	Elementary school				Middle school			
	Weekdays		Saturday		Weekdays		Saturday	
	Avg.	%	Avg.	%	Avg.	%	Avg.	%
North	4:22	72.1	1:24	32.7	3:48	67.0	2:57	59.2
Centre	4:22	70.9	1:42	35.3	4:33	82.6	2:23	46.5
South-Islands	3:32	69.5	2:53	61.4	3:52	73.1	2:57	60.4
Metropolitan district	4:25	68.0	0:50	18.0	3:44	65.3	2:31	50.0
Munic. of metropolitan district	4:11	70.2	1:43	35.6	4:15	73.2	2:38	52.9
Municipality 10K+ inhabitants	4:15	74.3	1:11	46.5	3:55	74.2	2:46	55.9
Municipality up to 10K inhabitants	3:32	68.0	2:35	55.8	2:01	73.0	3:11	62.7
Total	4:00	70.8	2:06	45.0	3:58	72.4	2:52	57.5

On the contrary, living in the North does not imply statistically significant differences in terms of time spent at school, maybe due to the significant differences in supply. Alongside this, the influence of the type of municipality regardless of geographic region emerges, which translates into differences in time spent at school depending on school type and type of municipality. In the municipalities of metropolitan districts (city suburbs), elementary school children spend on average half hour less, during weekdays. Perhaps they “make up for” this time by going to school on Saturdays (obviously this is a metaphorical

⁹ In the text we comment mainly results from regression models, pointing out the impact of independent variables considered in the analysis. In a few cases we reported descriptive statistics as reference point for readers, but it is useful to note that independent variables’ effects are not recognizable in the descriptive statistics.

argument to interpret the aggregate outcome of individual behaviour that differs between cases or at least between schools). Coming to middle schools, in municipalities of metropolitan districts and in small towns (less than 10K inhabitants) we see just the contrary: children spend more time at school, respectively about 1 hour (municipalities of metropolitan districts) and half an hour more (small towns). That could suggest the prevalence of Monday to Friday hours in these type of municipalities (net of other factors) or the presence of optional and non-optional extra-curricular hours which nevertheless have been coded under the category “school/lessons”.

On Saturdays we observe more evident territorial differences, mostly among elementary school children; where “full time” hours (or analogous form of long and concentrated hours) are widespread, the probability of going to school on Saturday is lower. The findings show that elementary school children living in the South and in small towns with less than 10K inhabitants are more likely to go to school on Saturday (odds ratios 3.0 and 2.1 respectively). Instead, those who live in large metropolitan districts, with respect to children living in medium sized urban centres (more than 10K inh.), are less likely to go to school on Saturday (odds ratio 0,29). Among middle school children significant differences related to territorial factors do not emerge. This means that, with respect to the supply of hours, the heterogeneity is such that it cannot be detected by the variables related to the child’s living location.

Table 4.2 - Logistic regression, dependent variable: presence of the activity "school and lessons" in elementary school children's Saturday diaries

	Odds ratio	Robust standard error	Signif.	Confidence interval 95%	
North	0.76	0.23	0.366	0.41	1.39
Centre	3.02	0.95	0.000	1.63	5.61
Metropolitan district	0.29	0.14	0.008	0.12	0.73
Munic. of metropolitan district	0.57	0.20	0.112	0.29	1.14
Municipality up to 10K inhabitants	2.11	0.54	0.003	1.28	3.49
Mother's atypical full time hours	0.74	0.24	0.354	0.39	1.40
Mother's typical full time hours	0.53	0.19	0.076	0.26	1.07
Mother's atypical part-time hours	0.61	0.27	0.261	0.26	1.44
Mother's typical part-time hours	1.01	0.39	0.989	0.47	2.16
Father's typical full time hours	0.95	0.24	0.829	0.58	1.55
Father not employed	1.19	0.49	0.674	0.53	2.66
Bourgeoisie	1.60	0.64	0.235	0.74	3.50
Middle class	0.85	0.24	0.547	0.49	1.46
Self-employed	0.66	0.20	0.171	0.36	1.20
Mother's university education	0.77	0.35	0.554	0.32	1.85
Mother's high school education	1.18	0.31	0.529	0.71	1.97
January-March	11.17	4.43	0.000	5.13	24.30
April-June	8.53	3.14	0.000	4.15	17.54
October-December	7.58	2.88	0.000	3.60	15.98

Pseudo R² = 0,194
N = 677

Time devoted to homework is related to territorial differences in school time. Actually, it would be plausible to imagine that an increase in time spent at school corresponds to a decrease in homework, even if not proportionally. However, we did not observe the expected results. On weekdays (the only days on which territorial factors matter), all else equal, children living in metropolitan areas (districts and municipalities) spend less time doing homework (27' and 15' less respectively; see table 4.3 for the bivariate descriptive figure). This is not consistent with the above data on school time: we have seen that in metropolitan districts children do not stay at school longer than in middle-large municipalities (more than 10K inhabitants), whereas this happens in municipalities surrounding metropolitan districts. Apparently a child living in Turin, Rome or Naples (just to mention a few metropolitan districts) spends less time at school and less time doing homework!

Table 4.3 - Average time devoted to homework, by school type and type of municipality, on weekdays (*in hours and minutes*)

	Elementary school	Middle school
Metropolitan district	0:38	1:27
Municipality of metropolitan district	0:50	1:31
Municipality 10K+ inhabitants	1:08	1:29
Municipality up to 10K inhabitants	0:57	1:27
Total	0:59	1:31

The influence of the geographic area and the type of municipality extends, although less obviously, to other activities and also to the experience of certain places. Looking at table 4.4, we see that, on an average day, 15.6 percent of children living in Northern Italy attended a place related to ecclesial institutions (a church or an oratory, probably, although not necessarily, belonging to the Catholic Church). In Central Italy the percentage falls to 8.4 percent, in the South it is 9.6 percent. This finding is confirmed by a logistic model that shows an increase in the probability of attending such spaces for Northern children with respect to children living in Central Italy (and also in the South, since the latter do not differ from the reference category). However, the place category is ambiguous because it cannot be disaggregated (“cult place”, in Istat classification, includes both church and oratory, the latter being typically a place for playing). If we address our attention to an activity better qualifying religious practice, that is going to Mass, we do not find significant differences between North and South (as shown in table 4.4 and following, reporting the logistic model).¹⁰ Hence we could assume that in Northern Italy ecclesial structures are more widespread, but perhaps families are not less close to the Church and its institutions than in other traditionally less secularized regions of the country. This finding does not fit background sociological knowledge concerning adults (see for instance Sciolla, 2004), but one should consider that the territorial breakdown available to us does not coincide with that generally adopted in Italian socio-cultural analyses.

¹⁰ “Going to Mass” is captured by a four digit code (4321) which is defined as “religious practice in a cult place”.

Table 4.4 - Attending cult places and religious practice, by geographical areas and type of municipality, on an average day and on Sunday (participation rate in percentage)

	Attending cult places on an average day	Religious practice in cult places on Sunday
North	15.6	41.8
Centre	8.4	29.4
South-Islands	9.6	40.3
Metropolitan district	8.0	29.8
Munic. of metropolitan district	11.8	34.9
Municipality 10K+ inhabitants	10.1	34.7
Municipality up to 10K inhabitants	14.9	49.3
Total	11.7	39.2

On the contrary, the presence of less secularized cultures in small towns with respect to large urban centres is quite consistent with expectations and sociological research. The evidence is that living in a municipality up to 10K inhabitants is associated with a higher probability of attending Mass on Sunday, regardless of family characteristics and geographic region. Attending religious places (churches and oratories) is also more frequent in small municipalities than in large urban centres. This finding could be interpreted with reference to the lower supply of custody and entertainment services for children in municipalities up to 10K inhabitants, where oratories could meet the same need.

Curiously, children from small towns and children from metropolitan areas tend to walk more (6'-7' more on average). If this effect is not spurious, it should at least occur for opposite reasons, given the extremely different environmental contexts. However, we can only speculate since walking in the company of adults cannot be discriminated from walking in the company of children of the same-age. Furthermore, in small towns and in the South it seems that children more frequently attend outdoor places like roads, streets and squares.

Table 4.5 - Logistic regression predicting the occurrence of “religious practice in a cult place”, Sunday diaries

	Odds ratio	Robust standard error	Sign.	95% confidence interval	
North	1.59	0.43	0.088	0.93	2.70
Centre	1.62	0.43	0.073	0.96	2.74
Metropolitan district	0.89	0.30	0.721	0.46	1.70
Munic. of metropolitan district	0.90	0.26	0.706	0.51	1.57
Municipality up to 10K inhabitants	1.89	0.38	0.001	1.28	2.80
Male child	0.90	0.14	0.478	0.66	1.22
Middle school	1.12	0.17	0.451	0.83	1.50
With siblings	1.22	0.32	0.453	0.73	2.05
Mother's atypical full time hours	0.92	0.23	0.750	0.56	1.51
Mother's typical full time hours	0.99	0.27	0.958	0.57	1.69
Mother's atypical part-time hours	0.79	0.25	0.472	0.42	1.49
Mother's typical part-time hours	1.30	0.44	0.429	0.68	2.52
Father's typical full time hours	1.22	0.23	0.293	0.84	1.76
Father not employed	1.27	0.48	0.526	0.61	2.65
Bourgeoisie	0.94	0.36	0.876	0.44	2.00
Middle class	1.13	0.29	0.636	0.68	1.86
Self-employed	0.76	0.18	0.234	0.48	1.20
Mother's university education	0.98	0.37	0.963	0.47	2.06
Mother's high school education	1.11	0.25	0.641	0.72	1.71
Father's university education	1.46	0.56	0.326	0.69	3.10
Father's high school education	0.84	0.20	0.459	0.52	1.34
January-March	3.53	0.90	0.000	2.13	5.83
April-June	2.18	0.58	0.004	1.29	3.69
October-December	2.74	0.73	0.000	1.63	4.63

Pseudo R² = 0,07
N = 1036

Playing out of their own home is an activity that children are more likely to do and for longer if they live in the South as well as in the North and in metropolitan cities. This is certainly a raw indicator because it does not discriminate the kind of place where playing occurs. In any event, it tells us something about children's chances of crossing over domestic walls to do typical (at least from an adult's point of view!) children's practices. We found higher frequency and longer duration of out-of-home playing among children from metropolitan centres (average duration is 48' in metropolitan districts vs. 36'-38' in other types of municipalities). This could indicate the use of child

custody and entertainment services after school hours and also the possibility of being taken to friends' houses.

Finally, there are differences associated to territorial factors in attending sports facilities. This indicator can certainly reflect territorial differences from the supply side but, from our point of view, it helps to better identify situations corresponding to participation in formally organized courses, rather than children playing sports informally. So we see that in Southern Italy and in small municipalities the probability of attending sports facilities decreases whereas in metropolitan districts it increases.¹¹

Lastly, it is interesting to note a non-negligible difference with respect to sleep associated with living in a metropolitan city. Usually it is maintained that physiological activities show low variability and, in the case of children, this is mainly due to aging. Instead, analysing separate models for type of day, we found that children living in metropolitan centres sleep on average half an hour more on Sundays than children living elsewhere (in absolute terms it amounts to 11h14'). It is difficult to demonstrate that this is a "direct" effect of the urban environment. For sure we know that, controlling for the same family characteristics (education, social class and working hours) as well as for a child's age, the impact is highly significant. At this level we can offer a simple conjecture: metropolitan children are more influenced by adults' rhythms; parents' working hours and leisure styles affect the biological rhythms of children living in large cities. In other words we can assume that on Sundays metropolitan children "recover" the sleep "lost" on weekdays and maybe on Saturday night when they are with their parents out-of-home.

4.2.3 - The weak effect of parent's education

At the beginning of this analysis we expected to find ample differences in time use related to parents' education. For example, we knew from other research that children of highly educated parents watch less television than others (Bianchi and Robinson, 1997; Hofferth and Sandberg, 2001; Calado Lopes and Coelho, 2002). This and other expectations were not supported by our analyses. Italian children on

¹¹ We must note that in the last two cases (out-of-home playing and attending sports facilities) the variables which are statistically significant in the tobit model are not always significant in the logistic model and hence results should be interpreted with caution. In other cases indeed, when results are more robust, we found sign consistency between models.

average watch TV for one and a half hours, but if we broke them down by mother's or father's education we do not see striking differences (see table 4.6). We put mother's and father's education in the linear and logistic regression models, but we did not find any significant effect on time exposure to TV, except for the particular and, from our point of view, interesting case of watching TV alone after 9 pm. Here we found an effect of having a university educated father (statistical significance 0.052); this characteristic seems to decrease the risk of the child watching TV alone in the evening. The same characteristics would have other "beneficial" effects such as considerably increasing the likelihood of attending extra-curricular educational courses (odds ratio 9.9) and playing videogames less (8' less in the tobit model, odds ratio 0.48 in the logistic model). Children of high school educated fathers are less likely to do housework.

Other effects of the father's education are evident in several activities performed on specific days. For instance shopping and the correlated presence in commercial spaces (shops, supermarkets, offices) are negatively associated by father's education on Saturdays, the day traditionally dedicated to shopping. This could be an indication that fathers prefer to play or do non-domestic activities with their children. In fact, our finding is that children of university educated fathers have more chance than others of frequenting open and natural spaces. Another important effect was found in the Sunday diaries, where middle school children with highly educated fathers devote on average about one hour more to homework.

The effect of the mother's education, again in contrast with other research, net of other factors, appears to be definitely weak or zero. On an average day it has a (marginally significant: 0.065) effect only on reading: children with university educated mothers are more likely to read (Table 4.6)

Table 4.6 - Media and videogame use, by mother's and father's education, on an average day (average time in hours and minutes, participation rate in percentage)

	Tv		Videogames		Reading	
	Avg.	%	Avg.	%	Avg.	%
Mother up to compulsory education	1:50	88.0	0:18	23.3	0:07	15.7
Mother high school diploma	1:38	87.6	0:21	28.5	0:09	17.7
Mother university degree or more	1:36	86.6	0:19	28.3	0:14	27.9
Total	1:45	87.8	0:19	25.5	0:08	17.4
Father up to compulsory education	1:48	87.6	0:19	24.6	0:07	15.3
Father high school diploma	1:39	87.1	0:21	27.4	0:10	20.1
Father university degree or more	1:30	85.4	0:14	22.0	0:13	24.0
Total	1:44	87.2	0:19	25.2	0:08	17.6

Children with high school educated mothers, on the other hand, are more likely to perform domestic activities. As far as homework is concerned, two opposite effects emerged: if the mother has a high school diploma the child does homework more quickly (24' less) while the effect of the father with similar education is more time spent doing homework (19' more)! This happens on Sundays. On Saturdays the effect of mother's high school diploma is quite the opposite. Indeed it is associated with 16' more with respect to children with less educated mothers, whereas it is not evident on weekdays. Having a graduated mother has no effect on time devoted to homework. We would argue that the "return" from time spent on homework of children with highly educated mothers is higher. We assume that graduated parents have higher expectations about children's educational outcomes but, at the same time, they can also transmit additional cognitive skills to their offspring, with respect to those provided by the school, needed to attain educational outcomes. If this is true then it would be likely that the same amount of time invested in homework corresponds to very different outcomes for children with parents of low (compulsory) and high (university) education.

To summarize, contrary to expectations, parents' education has a low impact on Italian children's time use. Certainly this is partly due to the low precision of time use categories in terms of cultural/educational content which is not well reflected by the current coding scheme. An example of such imprecision is the time spent watching TV: it would be

much more interesting to know its content rather than simple quantity. That is why we tried to combine information on watching TV with information on “when” and “with whom”.

4.2.4 - Parents' work hours

As far as the relationship between school time and parents' work hours is concerned, we found that if the father has “typical” work hours (i.e. office hours, Monday to Friday; see the above definition), with respect to “atypical” work hours, children spend less time at (elementary) school on weekdays (half an hour less). The mother's work hours with the most significant impact, with respect to a housewife mother, is the part-time “typical” and, contrary to expectations, it involves a good one hour more.¹² This finding could be interpreted thinking that a “typical” part-time work hours – normally a job distributed on five days per week for less than 30 hours – does not allow mothers to interrupt the daily schedule and hence children go to school longer (maybe taking advantage of the school refectory). The opposite effect of full-time father's work hours could be explained by the fact that, under this work arrangement, fathers can break their schedules to go and pick up children at school.

Mother's full-time work hours (both typical and atypical) are instead associated with less time spent on homework on weekdays (at elementary school), with an impact of about 20'. As far as middle school children are concerned, the only work hours with a non-negligible influence on child's school time is the mother's full-time “typical” one; it involves about one hour less on weekdays. The other kinds of work hours, although they did not involve shorter school time, were not found statistically significant.

The “organization problem” is most relevant on weekdays. Indeed on these days we see an influence of every kind of mother's work hours except for the part-time “typical” (in practice it is the same as if we were measuring the impact of a working mother). Maternal work hours are associated with higher probability that the child goes to other people's homes. We do not know whether it is relatives' or friends' homes, but we have good reason to believe that it is an organizational solution for

¹² By “part-time” we mean work hours of less than 30 hours, as reported in the answer to the question on normal weekly hours. We preferred this piece of information, more objective, with respect to interviewees' definition of own work time as “part-time” of “full-time”.

the custody or social needs of the child who has to be taken to these places.

Parents' work hours were also found to have a significant effect on activities that involve taking a child to a specific place. We noticed that a child whose father has "typical" work hours is more likely to attend an extra-curricular educational course (odds ratio 2.4). This does not represent a random or a spurious effect if we consider that a graduated father increases the probability of attending such courses. We could assume that out-of-school education is a responsibility that certain sorts of fathers are particularly concerned about. Sports courses, proxied by attending sports facilities, seem to be associated with "typical" part-time or "atypical" work hours of the mother. Maybe these two work schedules facilitate taking children: the first because it presumably involves working on weekday mornings; the second because, given the atypicalness (working at nights, evenings, shifts, on Saturdays or Sundays), it allows her to be free in the afternoon when children usually have training sessions.

Finally, we noticed an influence of maternal work hours, except for the typical part-time, on the probability and duration of out-of-home playing activities (on an average day). Also in this case the reason could be that the specific activity represented a parents' "organizational" solution. On a weekday, the significant effect is limited to full-time typical and atypical part-time work hours. This could be explained by the fact that out-of-home playing, contrary to sports sessions, does not have a regular schedule and therefore becomes an occasional solution. Mothers who plan daily activities taking into account that they have to take the child to a swimming course, for instance, could be advantaged if they have a full-time atypical or part-time typical work hours.

4.2.5 - Do social classes still matter?

Nowadays social class seems almost an unfashionable variable in sociological analysis because, as traditionally conceived, it appears to be a weak predictor of behaviour. Nonetheless, we tried to put it in the models as a regressor. More than a proxy for income (undoubtedly highly variable between and within social classes), this variable can be considered as an indicator of class [ceto] culture. The reference category is the working class (children with blue collar fathers). Results from regression analyses lead us to argue that the child's social class, even if not a decisive predictor of time use, is important for at least two sorts of

activities. Having a working class background does not encourage sports activities (Table 4.7).

Table 4.7 - Attending sports facilities by social class on an average day
(average time in hours and minutes, participation rate in percentage)

	Attending sports facilities	
	Avg.	%
Bourgeoisie	0:21	22.6
Middle class	0:20	20.2
Self-employed	0:19	19.6
Blue collars	0:13	12.5
Total	0:18	17.5

All other social classes (bourgeoisie, middle class, self-employed) exert a positive influence on the probability of doing sport, with a generally higher effect of the first two classes (bourgeoisie and middle class), meaning that maybe blue collar parents do not consider sport as a crucial activity for their children's development (Table 4.8).

Videogame use is correlated with the first two social classes, probably a status symbol for children belonging to them. However, it has a weak effect on the probability of using a computer for videogames on an average day.

Furthermore, we would like to point out two significant effects on homework on Saturdays. The first one concerns elementary school children: pupils with middle class and self-employed parents devote more time to homework than children with blue collar parents (23' and 15' less respectively, whereas children from the bourgeoisie do not differ significantly). The second effect regards middle school children. Also in this case it concerns children from middle and self-employed classes: both spend almost 20' more on homework, even if this effect is marginally significant ($p = 0.069$). We could argue that children from these social classes tend to anticipate homework on Saturdays in order to be free from school tasks on Sundays. However, we do not have evidence confirming that in the Sunday diaries, where actually children from different social classes do not differ on homework.

Table 4.8 - Logistic regression, “attending sports facilities” on an average day

SPORTS FACILITIES	Odds ratio	Robust standard error	Sign.	95% confidence interval	
North	1.12	0.23	0.594	0.74	1.68
Centre	0.76	0.17	0.226	0.49	1.18
Metropolitan district	1.18	0.34	0.556	0.68	2.07
Munic. of metropolitan district	0.67	0.16	0.096	0.42	1.07
Municipality up to 10K inhabitants	0.84	0.14	0.312	0.61	1.17
Male child	1.58	0.23	0.002	1.19	2.10
Middle school	1.33	0.18	0.042	1.01	1.74
With siblings	1.36	0.30	0.164	0.88	2.09
Mother's atypical full time hours	1.66	0.36	0.018	1.09	2.53
Mother's typical full time hours	1.39	0.33	0.172	0.87	2.22
Mother's atypical part-time hours	1.45	0.41	0.184	0.84	2.53
Mother's typical part-time hours	1.75	0.42	0.021	1.09	2.81
Father's typical full time hours	0.78	0.13	0.137	0.56	1.08
Father not employed	0.94	0.34	0.865	0.46	1.90
Bourgeoisie	2.10	0.59	0.008	1.21	3.64
Middle class	1.92	0.39	0.001	1.29	2.87
Self-employed	1.68	0.37	0.018	1.09	2.59
Mother's university education	0.98	0.35	0.950	0.48	1.98
Mother's high school education	0.82	0.17	0.333	0.55	1.23
Father's university education	0.63	0.22	0.191	0.32	1.26
Father's high school education	1.22	0.26	0.362	0.80	1.86
January-March	1.52	0.36	0.082	0.95	2.43
April-June	1.60	0.38	0.045	1.01	2.54
October-December	1.57	0.38	0.066	0.97	2.53
Saturday	2.57	0.54	0.000	1.71	3.87
Weekday	3.77	0.74	0,000	2.56	5.55

Pseudo R² = 0,07
N = 3510

4.2.6 - “Social” age and gender: two crucial factors

At the end of this survey on main factors affecting children's time use, we can lastly analyse the only variables describing individual, rather than family characteristics. Obviously they are not the only ones, but they are the only ones available. According to our analyses, age and gender are the strongest determinants of children's time use, net of the influence of the other variables that we have just commented upon. This can also be shown by looking at a simple time-budget (Table 4.9) that compares generic means on a weekday, by school type and sex.

In the regression models we did not put age in years because, from a sociological point of view, it is meaningless to estimate the marginal effect of one year. What makes the difference are the age-related status and the age-based social roles attributed to children. Exactly the same is true for adults: it is not important to know the precise age of an individual to infer his/her living conditions or social status, but it is crucial to know his/her stage in the life course.

Table 4.9 - Time-budget on weekday by school type and gender (average time in hours and minutes)

	Elementary school			Middle school		
	Male	Female	Total	Male	Female	Total
Sleep, personal hygiene	10:45	10:55	10:50	10:21	10:20	10:20
Eating	1:51	1:52	1:52	1:48	1:45	1:47
School	4:03	3:57	4:00	4:01	3:56	3:59
Homework, other courses and lessons	0:58	1:05	1:01	1:21	1:44	1:32
Housework	0:06	0:12	0:09	0:13	0:25	0:19
Shopping	0:09	10:00	0:09	0:05	0:09	0:07
Volunteering and religious participation	0:06	0:05	0:05	0:05	0:04	0:04
Social life and culture	0:31	0:30	0:30	0:35	0:42	0:38
Sport and physical activities	0:35	0:28	0:31	0:42	0:40	0:41
Games, pastimes, hobbies	1:54	1:49	1:52	1:09	0:38	0:54
Computer use and videogames	0:23	0:09	0:16	0:35	0:09	0:22
Reading	0:05	0:08	0:06	0:07	0:12	0:09
TV watching and radio	1:37	1:46	1:41	1:54	2:04	1:59
Travels	0:57	0:52	0:54	1:01	1:09	1:05
Unspecified time, keeping diary	0:01	0:02	0:02	0:03	0:02	0:03
Total	24:00	24:00	24:00	24:00	24:00	24:00

For this reason we decided that the type of school attended could be a good indication of a child's status. In fact, when they go the middle school they are generally perceived as being "less children" than when they attend elementary school.¹³ It is obvious that school type is highly correlated with age (except for pupils who failed to pass the school year or started school one year earlier), but we were interested in status related time-use differences. Moreover, such differences do not become

¹³ Children generally consider aging as status element: being 8 years old means being "grown up" with respect to a 5-6 year old child who has also less physical and cognitive skills. Access to middle school represents an additional reinforcement of age-based status.

necessarily evident in a linear and progressive way with age; they could be revealed only after a status attainment at the end of a "career" in a previous status.

As far as gender is concerned, it is common practice in time use research to look at differences/inequalities between sexes. In the case of children they are interesting because they anticipate differences that will be structured in adult life, partly as a consequence of differing paths of childhood socialization.

Children's physiological activities like sleep are partly socially regulated (let us think of the "rules" on bedtime) hence it is quite obvious that we will observe differences between little ones and grown ups. Indeed, we found that middle school children, on all types of day, sleep less than elementary school children: on weekdays and on Saturdays three quarters of an hour less, on Sundays about half an hour less (24'; "net" effect). There are, of course, other differences associated with the passage from elementary to middle school. The first and most evident finding is the decrease in time spent doing games and pastimes, about one hour less (57'). As already noted elsewhere (Belloni, 2005), a straightforward interpretation of this finding is not easy. Actually it should be considered that children, growing up, give a different definition to their activities. If the perceived sense given to relations with peers changes from a playful meaning to a social one ("being together"), it would be plausible that the decrease in time spent playing simply represents a change in the definition of daily activities which, as a result, fall into other categories of the Istat coding scheme. In any event, middle school children do not lose their preference for play activities like videogames (even though generally alone). In fact, they have a slightly higher propensity than elementary school children for kind of entertainment. They also read more, an activity that, as already mentioned, is not significantly influenced by mother's education and, as we will see, is associated with gender (being female).

Being a middle school child also means greater opportunities for out-of-home activities. We found an increase in the probability of spending time at sports or entertainment facilities (cinema, funfair, museum etc.). We also noticed, within a general increase in mobility (+7'), a decrease of time spent travelling by car (-5') and an increase in walking (+8'), an indication that, at this age, children begin to move autonomously. Along the same lines, we found a greater tendency to use urban spaces (streets, roads, squares) as places for doing activities.

Becoming grown up also means making greater contribution to housework, even though there is little difference between elementary and middle school children in terms of minutes spent doing housework (7' in the tobit model) which should be related to the little amount of time devoted to housework in both types of school. Finally, we found that middle school children watch more TV (about a quarter of an hour) and most of all they are more at risk of sitting alone in front of the TV after 9 pm (odds ratio 3.2).

Gender differences follow a trend that partly reflects the same existing differences between adult men and women, partly highlights new trends, mostly referred to youth. For example, time spent on homework does not involve gender differences among elementary school children; differences come out at middle school, when we see that male children devote about 20' less than females to this activity. Also reading, as already noted above, is practised less frequently by males; therefore we can infer that today, the activities most related to educational attainment are likely to be undertaken more frequently or for longer by females, from childhood. This could explain the reversal of the trend in higher education where women outperform men. We do not have data on the "return" generated by the higher involvement in these activities by females, but there is good reason to believe that it has a positive effect.

On the other hand, being male or female leads to differences that reflect the traditional division of roles between men and women. Male children are less likely to be involved in housework and, even when they are, this happens for shorter times (7' in the tobit model). On the contrary, they are more involved in sports activities, even at sports facilities, and they have more chance of playing out of home. Males most evidently have an exclusive relationship with technology, as witnessed by their tendency to play videogames, which is as much as four times higher than females' (odds ratio 3.8). Also the duration is on average longer by about 20' (18' estimated by the tobit model).

Table 4.10 - Gender differences in selected activities on an average day
(average time in hours and minutes, participation rate in percentage)

	Housework and care activities		Videogames		Reading	
	Avg.	%	Avg.	%	Avg.	%
Men	0:10	29.5	0:31	38.4	0:08	15.6
Female	0:21	43.2	0:10	14.9	0:11	21.2
Total	0:15	36.2	0:21	27.0	0:09	18.3

Table 4.11 - Tobit regression: time spent on videogames and computer use on an average day, conditional marginal effects

VIDEOGAMES, COMPUTER USE	Marginal conditional effect	Probability uncensored	Sign.
North	-0.3	0.00	0.879
Centre	1.8	0.02	0.276
Metropolitan district	1.9	0.03	0.305
Munic. of metropolitan district	-0.6	-0.01	0.738
Municipality up to 10K inhabitants	-2.6	-0.03	0.059
Male child	18.8	0.25	0.000
Middle school	5.8	0.08	0.000
With siblings	-1.1	-0.02	0.481
Mother's atypical full time hours	1.8	0.02	0.262
Mother's typical full time hours	4.8	0.06	0.008
Mother's atypical part-time hours	-1.9	-0.03	0.410
Mother's typical part-time hours	-0.5	-0.01	0.825
Father's typical full time hours	2.0	0.03	0.111
Father not employed	-0.8	-0.01	0.752
Bourgeoisie	4.6	0.06	0.049
Middle class	6.1	0.08	0.000
Self-employed	3.6	0.05	0.023
Mother's university education	4.9	0.06	0.060
Mother's high school education	2.1	0.03	0.171
Father's university education	-8.6	-0.11	0.001
Father's high school education	-1.1	-0.01	0.481
January-March	-5.1	-0.07	0.002
April-June	-1.3	-0.02	0.419
October-December	-1.5	-0.02	0.352
Saturday	-5.6	-0.07	0.008
Weekday	9.7	0.13	0.000

Pseudo R² = 0,03

N = 3510 (982 oss. > 0; 2528 oss. = 0)

We did not find gender differences in religious practice nor in attending cult places (but bear in mind the ambiguity of the place classification that does not discriminate between oratory and church).

In conclusion, we believe that children's daily lives are mainly differentiated by the "social" age attributed to them and by their sex. Family characteristics and its organization (parents' work hours, social class and education) have a comparatively weaker and less "pervasive" effect, at least within the limit of the activities' coding scheme. Our findings support the proposals of childhood sociologists to study children out of the traditional categories designated for adults; above all they propose to examine childhood on the whole with respect to other generational categories (adults, elderly). However, in our opinion this should not lead us to neglect differences that we can observe internally: there are many childhoods across history, but also within the same society. In fact we found (sometimes marked) diversities across territorial factors as well. We believe the latter, in particular, to be substantial and represent the children's contribution to the rather heterogeneous social picture of Italy.

4.3 - Utility of time use surveys in studying childhood

4.3.1 - The analytical potential

In the previous paragraphs we showed some examples of time-use analyses on a children-inclusive population. In these, the use of multivariate and inferential data processing in addition to the more usual univariate and descriptive form is able to improve the study on the everyday life of children, a subject we know very little about, apart from transposing characteristics recorded in adult populations to these groups, albeit with some adaptation.

Even for these non-adult populations the methodological and, more still, disciplinary considerations that are emerging in time-use studies are valid. In this field, there is now a marked increase in sociological and economical applications; with many examples based on sophisticated statistical data processing and not only simple descriptions of results, but rather answers to various specific cognitive questions present in the disciplinary literature and debate. We can show at least two developing perspectives in this type of data analysis here.

The first one is suggested by Gershuny (2000) in his analysis of social change, described by time-use data. In his approach, how people and groups allocate their everyday time to different activities represents the mechanism through which social and economic activities combine in the social organizations which characterize the different periods of Western history. On the other hand, it is precisely the social configuration, at meso-or-macro level considered, that explains people's everyday behaviour. These are in fact compelled by conciliating individual and family organizations with working hours, local hours, socially structured activities and so on. Gershuny's approach seems to be full of suggestions and of use in childhood studies too, especially as regards the connections between the different national or local time organization systems of the societies in which children live. As we have already mentioned, in these societies the different timetables, especially school ones, are able to shape the structure of relationships and activities in different ways. Conversely, the constraints represented by the compulsory care of children produce social effects, considered at micro or macro level, reflected in parent's everyday behaviour, the structure of the labour market, and the amount and way women work.

The second perspective that more recent time-use studies are developing regards, as we said, in-depth data processing, exploiting the entire wealth of the data collected. As before, we'll outline here the main areas addressed by researchers. One topic is undoubtedly the mostly integrated use of all diary columns: main activities, secondary activities, where, with whom. This satisfies the need to better contextualize the activities performed by the individuals, inferring their meaning, so that it is possible not only to outline mere activity fields, but to find true behaviour "nuclei" on which to base assumptions and explanations. Specifically, the joint analysis of primary and secondary activities allows a more appropriate rating (what's done and what's in the background) as well as showing a specific trend in post-industrial societies, known as multitasking, where doing many things simultaneously is considered an indicator of an increasingly occupied timetable that results in more stress. As regards childhood, an analysis of this nature can enable us to check if and to what extent the adult patterns of time organization, characterizing Western societies, are passed onto children's behaviour, habits and mental settings. Several multitasking studies, not cited here, appear to refute this kind of time approach, except for TV watching. In any event, TV watching is often

the background of home activities, mainly during meals, and is an example of transferring adult's habits.

As regards the ability to contextualise and the utility of the information from the other diary columns, at present there has been little development of analyses in this direction. We are firmly convinced, on the contrary, of their importance. For both children's and adult's activities it is often the places they are performed, and the people with whom they are performed that enables us to understand what we are actually dealing with. Moreover, the places and people connected with activities are good indicators of autonomy levels or, at least, of permitted movements in the city. In our previous analyses, we provided some examples of this. On the contrary, we were unable to process joint data relating to "people" (with whom), due to the fixed format, inadequate both for contextualizing activities and explaining intergenerational and peer relationships, which are so important to analysing children's quality of life.

Finally, another useful field for studying children as social actors regards the general problem of the structuring of time. We do believe that the traditional measuring of the duration of activities isn't sufficient to study behaviour and choices in daily life, and that we need more sophisticated analyses to test specific research hypotheses.

We will only illustrate some particularly interesting fields of analysis here. The first one regards the daily structure of time. A characteristic of radical modernity (Giddens, 1990) is fragmented time, that is the continuous and rapid succession of acts so that the different contexts of action change quickly too. This generates the question of whether we find the same time structuring - calculated by length and number of activities - among children and adults. If yes, to what extent is this behaviour connected with that of an adult in general, or with class models? Although we found that children are less likely to fragment time, and consequently to accelerate rhythms, nevertheless we found them likely to fill up their time. Indicators of this are the widespread popularity of extra-curricular courses (of all kinds, from foreign languages to artistic education, to sports, and so on), correlated with the parent's social class. This behaviour says something interesting about the childhood condition again. It indicates a trend where "long times" are increasingly decreasing, skills are being acquired increasingly early ("anticipation"), and, generally, social and cultural family capital is very

important in transmitting behavioural models, just as knowledge capital and networks of relationships.

Another topic of time structuring refers to the dynamic scale, that we can deduce through when in the day the activities take place and in what order. Large classes of activities can be illustrated in a satisfactory way using the “daygraph” technique (not illustrated herein), while seeking to identify sequences of activities have achieved, for now, more controversial results.¹⁴ Nevertheless, a question can be asked about “routinization”, namely whether children pursue daily routines as adults do. If yes, which of them are chosen in autonomous way? We can say, overall, that a child’s day profile fully reflects a general picture of local (of the city) time flows and family habits (examples are getting up, moving, eating, TV watching at night, in parallel with adults’), even if it is more tuned-in to that of the main care giver (mother). Nevertheless, we can’t provide any results, as yet, about specific routines and micro-sequences.

4.3.2 - The time-use tool: development perspectives

We have already illustrated the usefulness of in-depth data processing with respect to the time use surveys, also as regards the Childhood Sociology approach. However, there are other prior doubts about the adequacy of this tool to record children’s behaviour.

A first issue refers to the ability of a child to fill in a relatively complex diary, valid only if complete. All of the surveys show that the diaries perfectly match the requested information. Even so, if the survey aims to record information methodologically equivalent to the adult’s, children need to have the adequate skills, namely writing and quantifying time. This is the reason we can only really speak of children’s diaries from the age of seven, those filled in by adults reflect the latter’s points of view.

In any event, the main methodological point refers to the supplementary information, such as the questionnaire, and coding narrative into processing data. We have already seen that the diary is compatible with children’s skills, so we could only suggest resorting to an appropriate format for younger children’s writing (a larger space, for example). However, the essential requirement is that in all the recording

¹⁴ An application of the *Optimal Matching Analysis* (OMA) in time-use survey was done by Lesnard (2006).

fields the strips must be narrative, in order to have the complete information. This classical format wasn't, on the contrary, respected in this survey, in which they pre-coded the column of people involved (with whom). We showed before how dangerous and generally sensitive this choice was, as the adopted categories should be strictly connected with the research hypothesis and the purposes. In studying children, relationships (with friends and siblings, or extended family) are crucial and, in the diary, children tend not to disregard the people related to their activities.

The unexpected difficulty we experienced in this survey refers to a larger problem, namely to the theoretical structure of the code-book in surveys on children. As we know, one of the main advantages of these kinds of surveys is that the individual can give the information in his own words, without adopting the proposals of the researcher, and the actual value of the research code book is the analytical and exhaustive nature of the codification categories. With regard to studies of children, a generic code-book is often difficult to adopt. In fact there are two kinds of difficulties: the eligible categories are often insufficient (specific categories for children would considerably increase our knowledge) and the approach is only focused on the daily lives of adults (children are only contemplated in connection with adults). If we wanted to extend the time-use surveys to children, bringing down the age would not be sufficient, we need at least to differently define the code-book, designed primarily for the adults.

Similar problems emerged with regard to the other tools of the survey, the individual and the family questionnaire. Again in this case the approach is adult and production oriented, lacking in the information needed to study children. From this perspective, to make a contribution to the development of childhood studies through the better use of time use surveys, we suggest, by way of example, and by no means intended as exhaustive, some fields which could be very useful for studies of children.

Services - Some background information is essential with relation to the opportunities children have in their environment, as we illustrated in our analysis. A good indicator of behaviour could therefore be the public or private presence of educational and recreational services, as well as sports facilities.

Autonomy - As the progressive reduction of children's autonomy in Western societies is considered a central problem in Childhood Studies, the questionnaire could collect some useful indicators on this. These are the dangerous nature - above all in the eyes of parents - of the outdoors, if and how children manage their economical resources (gifts, pocket money and so on) by themselves, their decisions about extra-curricular courses (educational or recreational) attended or friendships cultivated.

Anticipation and education - Two possible explanations for the anticipated education of children through extra-curricular courses are: organizational needs and the opinion that skills acquired early can facilitate inclusion in desirable social and professional positions. If families had the possibility to explain their motivations for the extra-curricular courses, we could relate the chosen organizations and the pursued objectives.

Inter and intra-generational relationships - The structure of the diary, even if the column of people is well defined, doesn't allow us to collect information about the networks, essential for the analyses of relationships with relatives, friends and peer groups. Childhood Sociology in fact suggests that children are increasingly isolated in Western societies. A question included on this could be fundamental.

Gendered roles - Our behaviour analysis highlighted early gender differentiation as regards specific activities and skills (see IT skills in particular). This could make an important contribution in terms of recording the parents' reasons through the questionnaire.

Healthiness - One popular field of childhood studies is that of early obesity as a prerequisite to future health problems. The large amount of behavioural data collected through these surveys, in relation to weight and height, could help medical and preventive analyses.

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5. Division and sharing in daily life of families with a young child

The processes of modernization affecting our society have introduced important changes in the family organizations and relationships. In particular, the growth in women's participation in workforce has introduced important changes in the relationships between paid work and family roles, and these changes contributed to profoundly unbalance the material and psychological equilibria among the members of the family, and even the definition of their roles. In this perspective, an analysis of daily life of families is of great theoretical interest as it lets emerge the complex relations among modernization processes in our society.

In this study we examine data from the Istat Time Use Survey (Years 2002-2003), referring to a subgroup of Italian households, namely those that includes a young child. The daily life of these families is of particular interest as the presence of a young child *per se* demands specific care activities by the adult members and necessarily becomes a central element in the domestic organization.

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Thus, the commitment to caring for a child represents a significant constraint on the parents' individual and mutual behaviors and may provide an opportunity for new forms of organization of family daily life. The ways in which mother and father nowadays reorganize their daily life around the young child and re-define their reciprocal roles clearly reflect macro- and micro-social, cultural and psychological elements, that are all marked by important transformation processes.

The structure of the Use of Time Survey provides an exceptional opportunity to research, as it describes the behaviors of the members of each household and, thus, allows to identify as unit of analysis the family daily life. In the case of households that include young children it is therefore possible to accompany the analysis of the amount of time dedicated to family life respectively by the mothers and the fathers with the analysis of the interaction between the family commitments of each parent in each household. In other words, the analysis of the *subdivision* of the family commitment between the two parents can be coupled with that of their *sharing*. These analyses open up new perspectives on the possible changes in the assignment of value to the time dedicated to family by each parent (Saraceno, 1988), as well as on the quality of daily life of the families.

Analysis of the daily organization of families with young children is also a topic of priority interest in the planning of new welfare policies in Italy, as it is in practically all European countries (Oecd, 2001; Oecd, 2006). This paper examines the subgroup of households with children under the age of six -the age established for compulsory schooling in Italy -, when the children's daily schedule is not dependent on the school schedules, but is the result of the organizational capacity of the family to cope with the non total availability of preschools for children aged between three and six and the scarcity of child care services for younger children. For this reason, the analysis of the relationship between the daily organization of households with young children and social schedules allows to identify diversified socialization trajectories (Musatti, 1992) leading to different processes of social integration. This analysis can provide suggestions for planning policies aimed at guaranteeing equal educational opportunities, the development of equal socialization itineraries for all children, and support for parents in the care and education of their children.

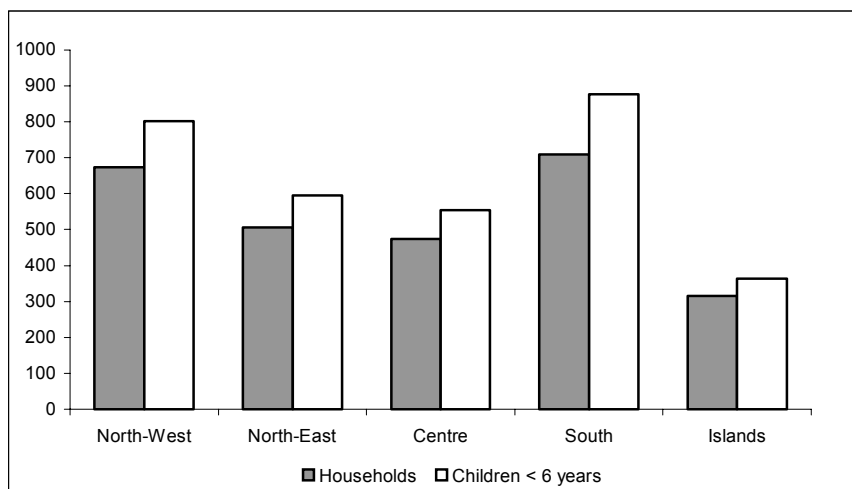
In the following pages we shall present distinct pathways of analyses of the data referring to households with young children in Italy:

- the individual characteristics of the parents of children under the age of six, with special reference to the aspects regarding their participation in workforce; - the differences between mothers and fathers in the use of time related to family life, with a special focus on the relationship with young children; - the organization of the daily life of couples with young children, as emerges from the relationship between the mother's and the father's behaviors.

5.1 - Households with young children in Italy

From the whole sample of the the survey we selected 2,571 households, composed of couples or single parents with at least one child aged less than six years, which are representative of 2,677,267 households in which 3,309,896 young children live. Figure 5.1 shows the geographic distribution of the households and children aged less than six years.

Figure 5.1 - Children under the age of six and their households by geographical areas - Years 2002-2003 (in 1,000)



As shown in figure 5.2, both parents are present in 94.1 per cent of households; mothers are more frequent among single parents. Parents live mainly alone with their children; cohabitations with other individuals or couples account for only 7.5 per cent.

Figure 5.2 - Composition of households with children aged less than 6 - Years 2002-2003 (percentage)

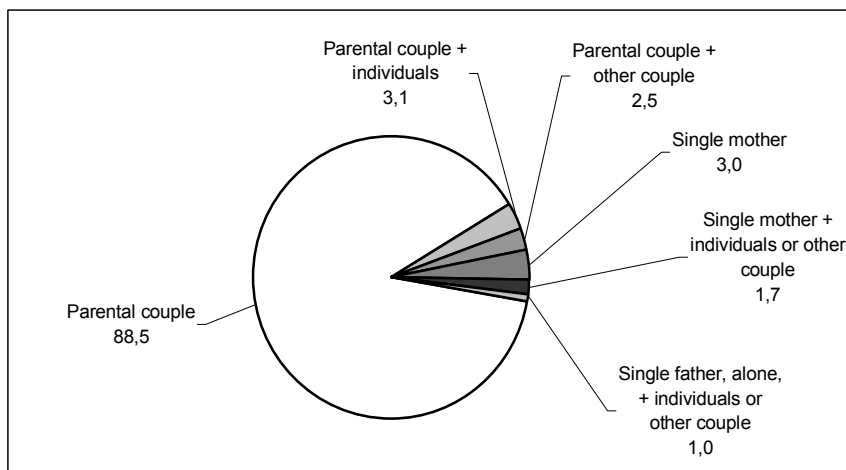


Figure 5.3 shows that the households are relatively small, with only one child in 46.1 per cent of cases (more frequent in single parent households) and in 41.4 per cent two children: in these cases there are less frequently (13.2 per cent) two young children. Households with three children account for 10.4 per cent and those with a larger number of children are still rarer (2.1 per cent). In the figure “young” children are defined as aged less than 6 and “older” children as over the age of six.

Analysis of the distribution of the number of children per household by geographic area, illustrated in Figure 5.4, confirms the finding of Barbagli, Castiglioni and Dalla Zuanna (2003), namely that only children are more numerous in Central and Northern Italy and that it is above all the greater presence of third and fourth-born children that characterizes the other areas.

Figure 5.3 - Households with children under the age of 6 by number of children and children's age - Years 2002-2003 (percentage)

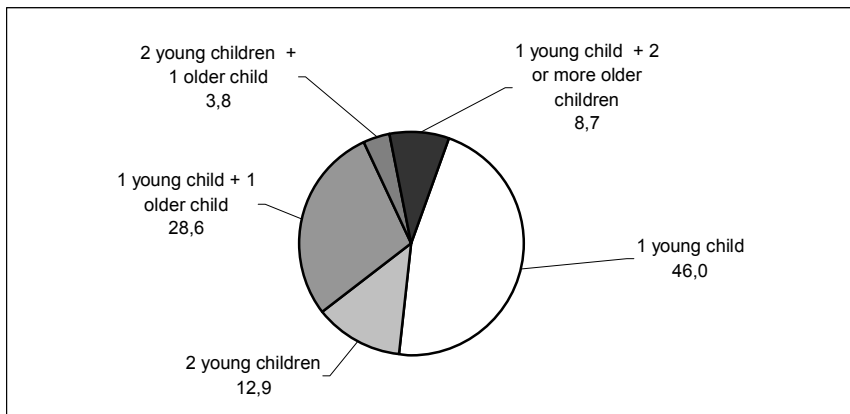
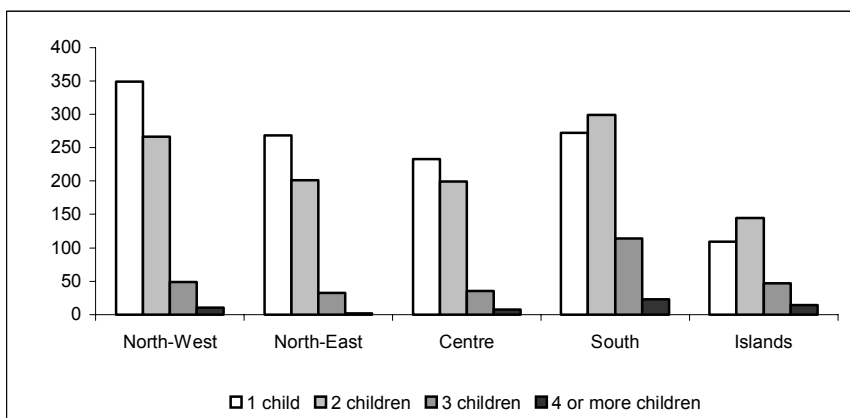


Figure 5.4 - Households with children under the age of 6 by number of children and geographical areas - Years 2002-2003 (in 1,000)



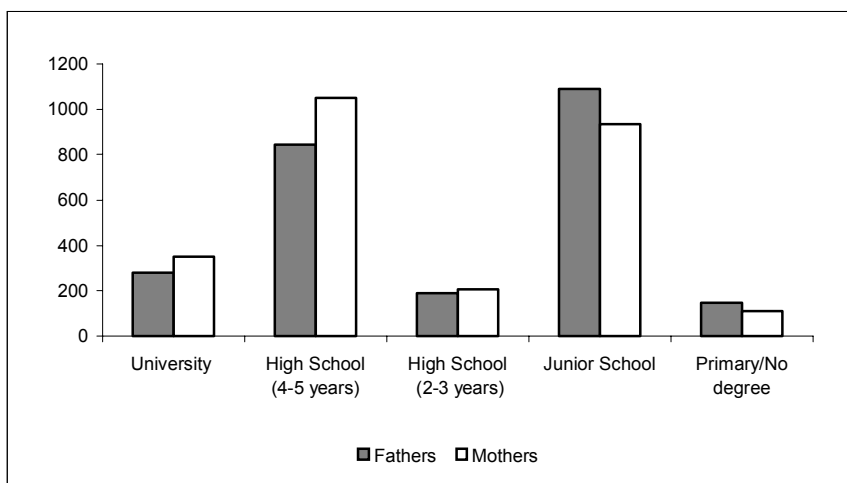
5.1.1 - The parents of young children

As mentioned earlier, in our sample, mothers are slightly more numerous than fathers (51 per cent). There are relatively few parents under the age of twenty-five or over forty-five. If we examine the

distributions of parents in the age classes we find that, although mothers are slightly younger than fathers, the largest age classes are those of the thirty-year-olds.

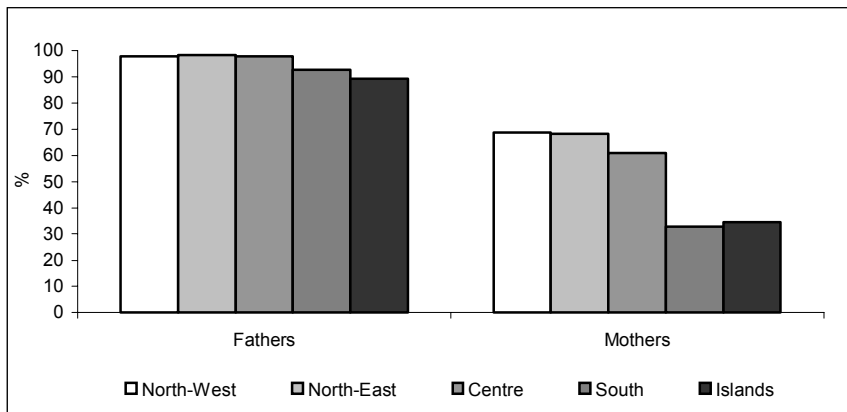
As shown in figure 5.5, confirming a trend found in all the surveys which indicates women's increasing education, the highest educational levels - university degree and high school diploma - are more frequent among the mothers than the fathers.

Figure 5.5 - Parents of children under the age of 6 by education - Years 2002-2003 (in 1,000)



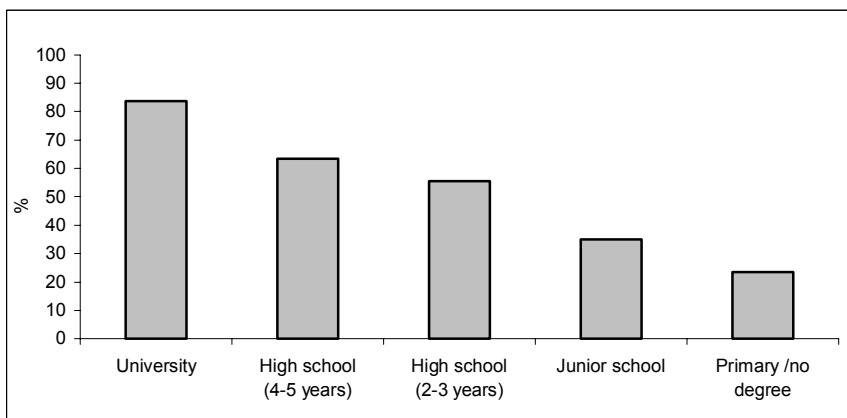
Relevant differences in participation in workforce are found between fathers and mothers. Whereas 95.5 per cent of fathers are employed (91.7 per cent full time), we find that only 53.8 per cent of mothers work and only 31.9 per cent work full time. Mothers' employment is also more strongly affected by the local labor market conditions. In figure 5.6, which shows fathers' and mothers' employment by geographic area, mothers' employment in the South and Islands areas is seen to suffer a greater decrease, probably due also to the smaller availability of childcare services in these areas.

Figure 5.6 - Employed parents of children under the age of 6 by geographical areas and gender - Years 2002-2003 (percentage)



Mothers' participation in the workforce is related to their educational level. As can be seen in figure 5.7, also the present survey data confirm that the mothers' employment rate decreases with decreasing education.

Figure 5.7 - Working mothers of children under the age of 6 by education - Years 2002-2003 (percentage)



A relationship is found also between mother's employment and number of children. Only children are the most frequent among working mothers and three or more children are found most often among non working mothers.

5.1.2 - Comparison with non parents

At which extent does parenthood itself, in particular, parenting a young child with the special care needs that this involves, affect participation in workforce? In order to answer this question, we compared some characteristics of the parents of young children with those of individuals of the same age who are not parents or are parents of older children.

Since over ninety per cent of both fathers and mothers of children under 6 are aged between 25 and 44, we selected from the overall Istat Time Use Survey sample all individuals in the same age group, subdividing them into "non parents" (more exactly: not living with a child), "parents of children under the age of 6" and "parents of older children". We found a higher percentage of non parents among men (over fifty per cent) than among women (less than forty per cent) and in Northern and Central Italy.

In figure 5.8, which shows the percentage distribution of the three categories in age classes, it can be seen that from the age of thirty the majority of women are mothers while fatherhood is more frequent among men only from the age of thirty-five.

The effect of parenthood on employment is inversely proportional to gender. As can be seen in figure 5.9, while fatherhood for men increases the employment rate by about thirteen percentage points, for women motherhood lowers it by nearly as many percentage points. For both, this strong change is due to parenthood itself, regardless of the child's age.

Figure 5.8 - Persons aged 25 to 44 by parenthood, age groups, and gender
Years 2002-2003 (percentage)

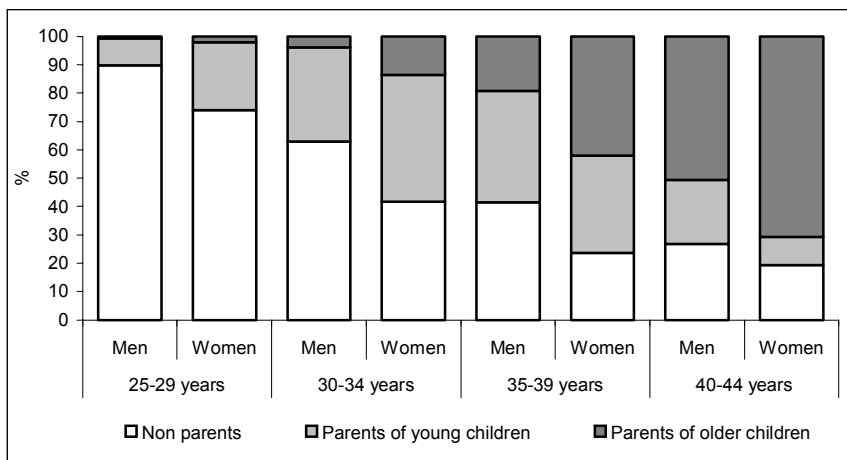
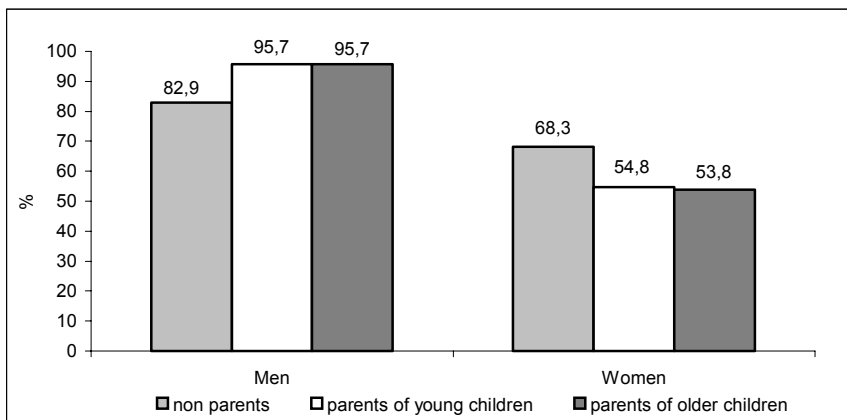


Figure 5.9 - Employed persons aged 25-44 years by parenthood and gender - Years 2002 - 2003 (percentage)

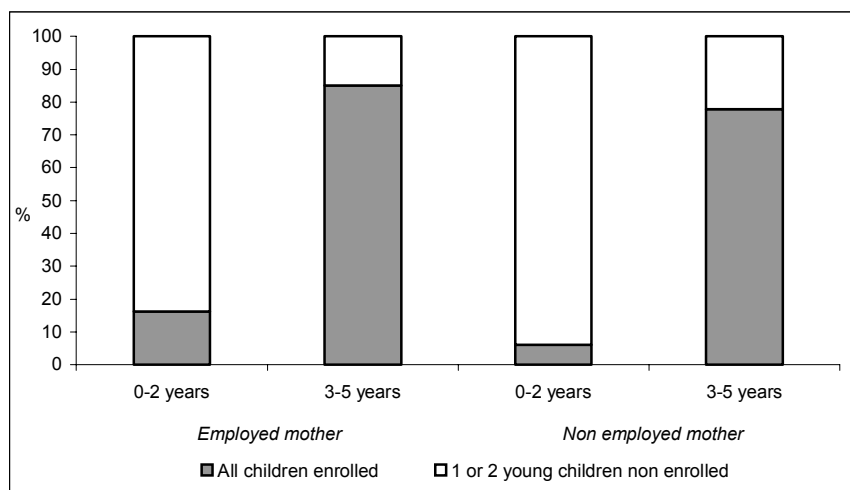


This effect does not seem to vary with varying employment rates in the geographic areas.

5.1.3 - Young children and child care and education services

Before addressing the analysis of the daily organization of the family, it is interesting to examine the social support provided by childcare or education services. As is known, and is confirmed by the data emerging from the present survey, in Italy the availability of educational services for children under the age of three is much more limited than for preschool, which provides for children from the ages of three to five; also the mothers' employment has a different effect on the children's schooling. As shown in figure 5.10, the vast majority of mothers with children aged between three and five enroll them to preschool and mothers' employment shows only 7.8 per cent more children enrolled. The vast majority of mothers with a child under three has to cope with care for their child without the support of a childcare service. For these mothers, employment has a greater effect as the child's enrolment into an educational service increases from 6.1 to 16.2 per cent.

Figure 5.10 - Households by enrolment of children in an educational service, age of youngest child, and mother's employment - Years 2002 - 2003 (percentage)

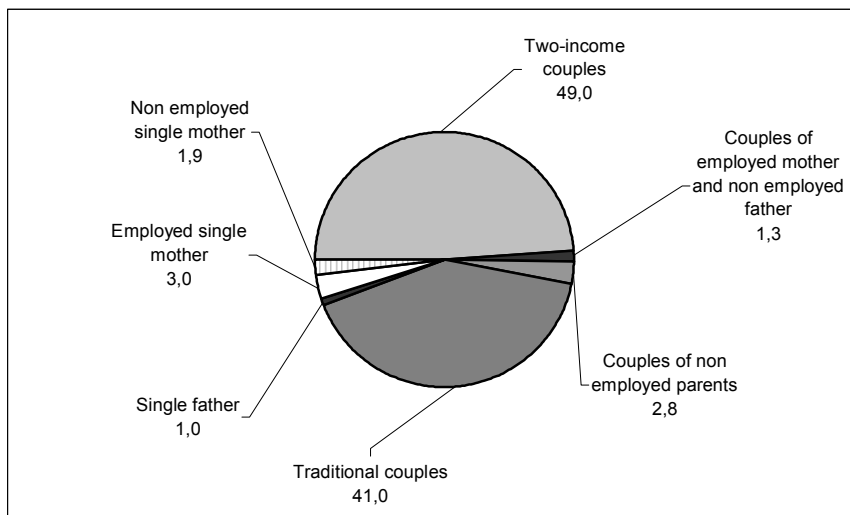


Also the private use of domestic help or a babysitter is not particularly widespread (2.6 per cent) among non working mothers, while 14.6 per cent of working mothers use it.

5.1.4 - Households with young children

By cross-referencing the variables mother's and father's employment and household composition, we obtained a typology for households with children under the age of six, as it is illustrated in figure 5.11. In figure 5.11 we see that the two most frequent types of household, which account for 90 per cent of cases, are couples in which both parents work, and that we have labeled "two income" and those in which only the father works, which we have labeled "traditional".

Figure 5.11 - Households with children under the age of 6 by parents' employment - Years 2002-2003 (percentage)



In the following pages we will examine the contributions made by parents to family life also with reference to these types of household.

5.2 - The use of time in households with young children

We based all the analyses of use of time on the data recorded every ten minutes in the diary written by each individual, together with the data regarding the individual characteristics collected in the individual questionnaire. For these analyses we took into consideration the data collected from the diaries kept by parents in each type of household, excluding in the case of couples the diaries kept by the two parents on different days (accounting for 5.6 per cent of the subsample). The diaries taken into consideration are distributed over the three types of days of the week: 37.4 per cent on a weekday (from Monday to Friday), 31.2 per cent on a Saturday and 31.4 per cent on a Sunday.

5.2.1 - Contribution by fathers and mothers to family life

The time spent by fathers and mothers at home, in the workplace, on transportation or in a shopping place is an important indicator of their contribution to family life. Figure 5.12 shows how during the weekend the length of time spent in such places by both parents decreases.

Figure 5.12 - Average time spent by fathers and mothers in several place, by place, gender and day of the week - Years 2002-2003 (in hours and minutes)

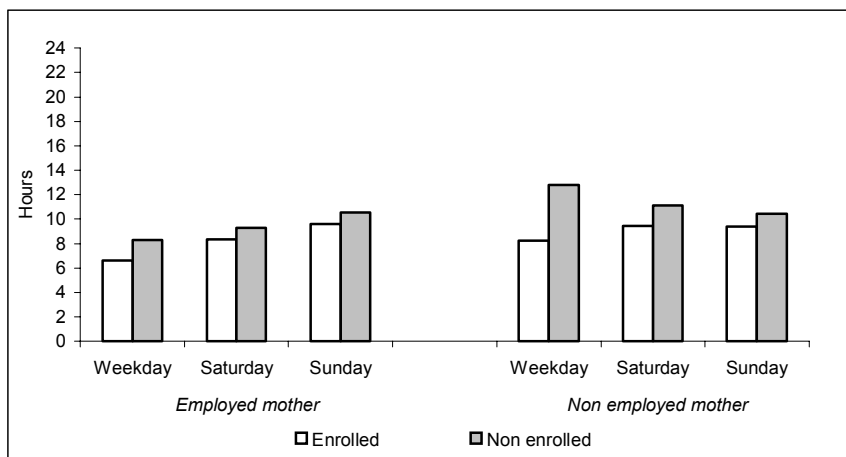


The traditional division of roles between genders within the family is confirmed: the fathers, in the role of breadwinner, spend more time in the workplace and on transportation, while mothers spend more time in the home, also at weekends.

In the case of parents with young children, this relationship between genders seems to be only partly modified by the mother's employment. The mean duration of time spent in work outside the home, by those who actually worked in the day for which the diary was kept, by mothers was about six hours, while fathers' mean duration of work exceeded eight hours.

Conversely, the mean time spent by all mothers with their children (as inferred from the answers to the question in the diary "with a child under the age of ten") is greater (mean duration from 8h50' to more than ten on Sundays) than that of the fathers, who spend up to a maximum of eight hours with their children on Sundays. However, as shown in figure 5.13, the time spent by mothers with the children is affected both by the mother's employment and by the school attendance of the young child.

Figure 5.13 - Average time spent by mothers with children under the age of 6 by children's schooling, mother's employment and day of the week - Years 2002-2003 (in hours and minutes)

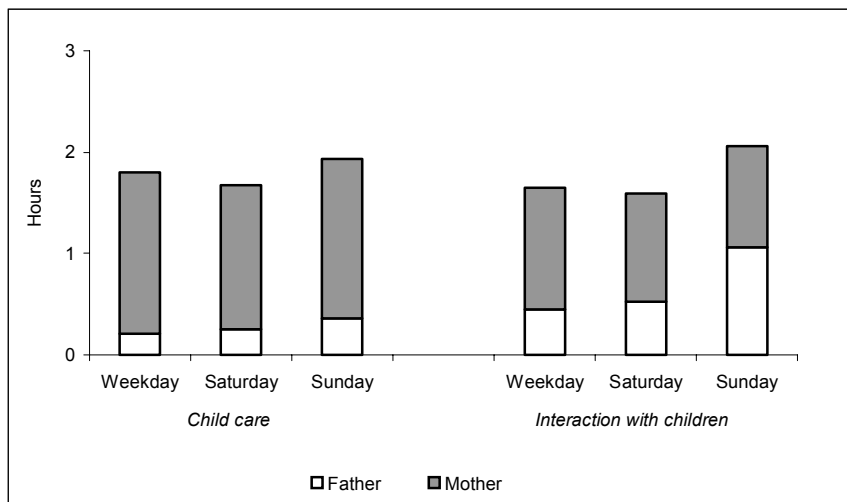


The analysis of the time spent in activities directly related to the children and their relation to other activities related to family life provide more interesting information.

We grouped activities related directly to children into two distinct categories: “childcare”, which includes activities of both actual physical care and simply looking after children, and “interaction with the children”, which includes playing, communicating, reading and telling stories to the children. We point out that these activities are not necessarily related to the youngest child in the household. Since the activities of both categories were recorded by the parents as “contemporary activities” at a higher percentage than other activities, for these two categories the use of time was cumulatively computed as both a principal and a contemporary activity.

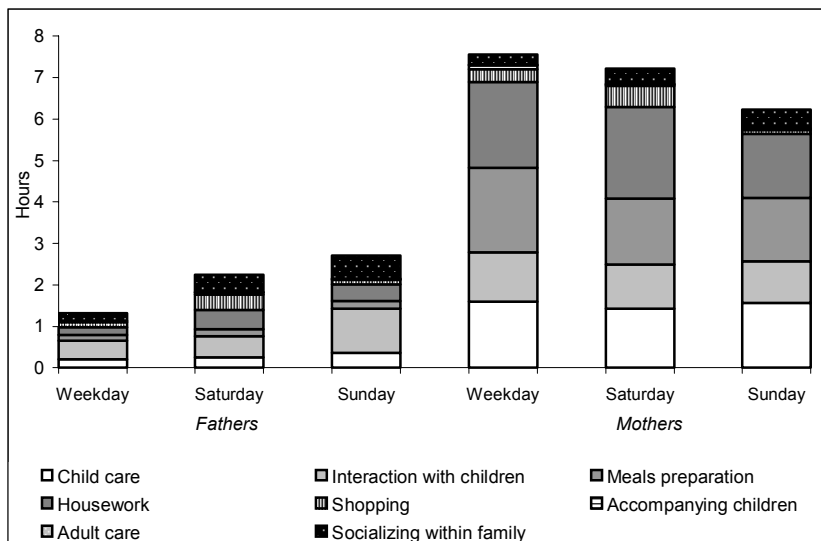
These activities directly related to the children do not occupy much space within the parents’ daily life - slightly more in the case of physical care than of interactive activities and in any case for a duration of slightly more than two hours.

Figure 5.14 - Average time spent in child-related activities by parents by gender, type of activity and day of the week - Years 2002-2003 (in hours and minutes)



The mothers' contribution is much greater than the fathers', in particular as far as physical care is concerned, and is exceeded by the fathers' contribution only in the case of interactive activities on Sundays. It is also interesting to compare the time spent on child-related activities (the preceding ones plus "accompanying the children") with time spent in other activities concerning family life, such as "housework", "preparing meals" and "social activities with relatives" or with "friends", as well as caring for "family adults".

Figure 5.15 - Average time spent by parents in care and social activities within the family by type of activity, gender, and day of the week - Years 2002-2003 (in hours and minutes)



As shown in figure 5.15, the durations of the mothers' commitment in family life on weekdays and Saturdays exceed eight hours and also on Sundays amount to more than double those of the fathers. It is again interesting to note that the largest contribution made by fathers consists of activities of a relational type, as indicated by the two categories "interacting with the children" and "socializing with family members".

The data presented so far have indicated substantial gender differences in the contributions to family life made by parents. It has

also been seen how the mother's employment only partially modifies these data.

In the following, these aspects will be further examined to see how the different contributions to the daily life of families by fathers and mothers interact, focusing exclusively on the two most common types of couple: *two-income* couples, in which both parents work, and the *traditional* couple in which only the father works. The subsample thus obtained is composed of 54.3 per cent of two-income couples and 45.7 per cent of traditional couples. The two parents in these couples filled in their diaries on the same day: 37.7 per cent on weekdays, 31.0 on Saturdays and 31.2 per cent on Sundays.

The analyses carried out on these households were designed to seek answers to three main questions:

How does the time dedicated to family life vary in relation to the individual characteristics of the father and the mother? And on the different days of the week?

How are the family-related activities included in the daily routine of the father and the mother in the two couple types and on the different days of the week?

What is the temporal relationship during the course of the day between the family-related activities performed by the father and the mother? Do their different contributions correspond solely to a division of roles between genders or is it possible to discern aspects of real time sharing between the two members of the parenting couple? At what times and in relation to what activities?

5.3 - Variability of commitment to the family life

In the following attention will be focused on the four principal care activities: two related to the children (physical care and interaction) and two to the general running of the household (preparing meals and housework). A series of analyses of variance were conducted in order to assess the variability in the mean duration of time dedicated to these activities:

- by parents, according to gender, type of couple and day of the week; and separately for each day of the week;

- separately for father and mother according to the type of couple, the day of the week, education and age; and separately for each day of the week.

For these analyses sample weighting was modified so that their sum would coincide with the size of the sample. This modification was required in order to avoid the results of the statistical tests always being banally significant, as the sum of the original sample weighting is equal to the total size of the population. It should also be noted that the significance levels shown in tables 5.1 and 5.2 do not take into account the peculiar structure of the Istat sample (multi-stage with stratification); as they are nevertheless generally much lower than the required threshold ($p=0.05$), in the majority of cases they can be considered to ascertain the significance of the tests reported.

5.3.1 - Variability in the couple's use of time

Table 5.1 shows the results of the principal analyses carried out on the time spent by both partners in the couple.

Table 5.1 - Variability in the use of time in care activities- Years 2002-2003

	Day	Sex	Type of couple
Child care	F (2,4362) = 7.969 p<0.0001	F (1, 4364) = 1190.360 p<0.0001	F (1,4364) = 1.456, NS
Interaction with children	F (2,4362) = 0.846, NS	F (1,4364) = 48.333 p<0.0001	F (1,4364) = 10.303 p< 0.001
Preparation of meals	F (2,4362) = 0.120, NS	F(1,4364) = 3590.470 p<0.0001	F (1,4364) = 76.263 p< 0.0001
Housework	F (2,4362) = 21.460 p<0.0001	F(1,4364) = 1518.052 p< 0.0001	F (1,4364) = 26.244 p< 0.0001

Significant differences were found among the various days of the week regarding the time spent by parents in caring for their children, principally on Sundays, and in housework, mostly on Saturdays.

A significant gender difference was always found in all four activities, with greater commitment always by the mothers. This is true also when the data are analyzed separately for each day of the week, with the important exception that no significant difference was found in the time dedicated by fathers and mothers to interacting with their children on Sundays.

Although significant differences in all activities, except caring for the children, were found by couple type, analysis of the mean values show that, while the time dedicated to housework is greater in traditional couples, it is the two-income couples that dedicate more time to interacting with their children.

However, when the same analyses are performed on the data considered separately for each day of the week, it is found that on week days the mother's employment is obviously relevant as regards time spent in child care, which is obviously more long in traditional couples. The mother's working status does not however differentiate the time spent interacting with the children where the greater material availability of time in traditional couples seems to be offset by a more specific educational choice of two-income couples. On Sundays, couple type no longer appears to significantly differentiate the length of time spent in housework.

5.3.2 - Variability of the use of time by fathers and mothers

Analyses carried out separately on the time dedicated respectively by fathers and mothers display significant differences for all activities depending on the day of the week considered. Table 5.2 shows the results of the principal analyses carried out in which fathers and mothers are considered separately.

Differences are found also in the behavior of both fathers and mothers depending on the type of couple they belong to. The only exception is the duration of the interactions between mothers and children which is again found not to be significantly different in the two types of couple. In other words, the mother's working status has an effect on all her partner's care activities, on all the care activities of the mothers themselves who, if they *do not work*, spend more time looking after their children, preparing meals and running the household, but it does not affect the duration of the interactions of the mothers themselves with their children.

Table 5.2 - Variability in the use of time spent in care activities by fathers and mothers - Years 2002-2003

	Type of couple	Education (a)	Age of youngest child
FATHERS			
Child care	F (1,2181) =16.172 p<0.0001	F (2,2180) =6.539 p< 0.001	F (5,2176) = 27.903 p< 0.0001
Interaction with children	F (1,2181) =10.653 p< 0.001	F (2,2180) =7.903 p< 0.0001	F (5,2176) = =5.798 p<0.0001
Preparation of meals	F (1,2181) = 47.004 p<0.0001	F (2,2180) =7.115 p<0.001	
Housework	F (1,2181) =15.682 p<0.0001	F (2,2180) =2.605, NS	
MOTHERS			
Child care	F (1,2181) = 13.975 p< 0.0001	F (2,2180) =3.775 p< 0.023	F (5,2178) = 170.497 p<0.023
Interaction with children	F (1,2181) = 2.137, NS	F (2,2180) = 8.095 p<0.0001	F (5,2178) = 2.299, NS
Preparation of meals	F (1,2181) = 276.943 p<0.000	F (2,2180) = 44.909 p<0.001	
Housework	F (1,2181) = 134.858 p<0.0001	F (2,2180) = 23.850 p<0.0001	

(a) The educational degrees were grouped into three categories: university degrees, high school degrees and lower degrees.

Father's education affects the time spent by fathers in activities with their children, both child care and interaction (in both cases they increase with increasing education), and in preparing meals, but not on the time spent in housework. For mothers significant differences are found in all four activities, but in different directions, as the time spent on child-related activities is less in mothers with less schooling, while that dedicated to housework increases.

Exclusively for child-related activities we examined their variability with the youngest child's age. For mothers only time spent in childcare activities was found to vary significantly with the age of the youngest child: it decreased linearly between the first and the sixth year of the child's life, presumably also as a function of the children's increasing schooling. For fathers there are significant variations in time spent in

both child-related activities. However, while for child care a gradual decrease was found with increasing child's age, for interactions a decrease is observed after the age of three.

5.4 - Care activities in the daily life of fathers and mothers

In order to examine how family-related activities are inscribed into the daily life of the parents of young children, we considered the principal activities recorded every ten minutes in the diaries, clustering the activities into seven macro-categories: three referring to the person (sleeping, eating, personal care), two diversely referring to the family (paid work and unpaid work (i. e. care activities related to the house and to the children), one grouping all the various non work activities carried on outside the home (sporting, social and cultural activities, but also traveling) and one specifically reserved to watching Tv (owing to its unquestionable importance in the daily life and its ambivalent status between solitary consumption and potentially socialized and socializing activity within the family).

We examined the percentage distributions of the time spent in these activities between 7:00 am and 23:00 pm (as this period corresponds to the waking hours of the majority of individuals considered), separately for the fathers and mothers of two-income couples and of traditional couples on the three different days of the week.

As shown in figures 5.16 and 5.17, during a week day the care activities figure massively in the day of the mothers in both types of family, although important differences emerge in the period between 8:00 am (time within which awakening occurs for everyone) and the late afternoon (17:30 – 18:00): in the case of mothers in traditional couples, the time dedicated to care activities overlaps, with few exceptions, with the time dedicated to work by the other mothers. For traditional couple mothers Tv watching is distributed over the entire span of the day, while for working mothers, it is concentrated more in the evening hours.

Figure 5.16 - Activities of mothers in two-income couples on weekdays from 7:00 to 23:00 - Years 2002-2003 (cumulated frequencies)

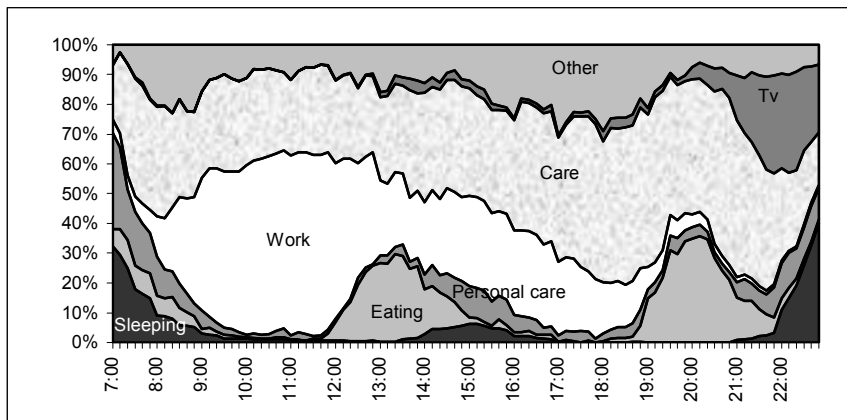
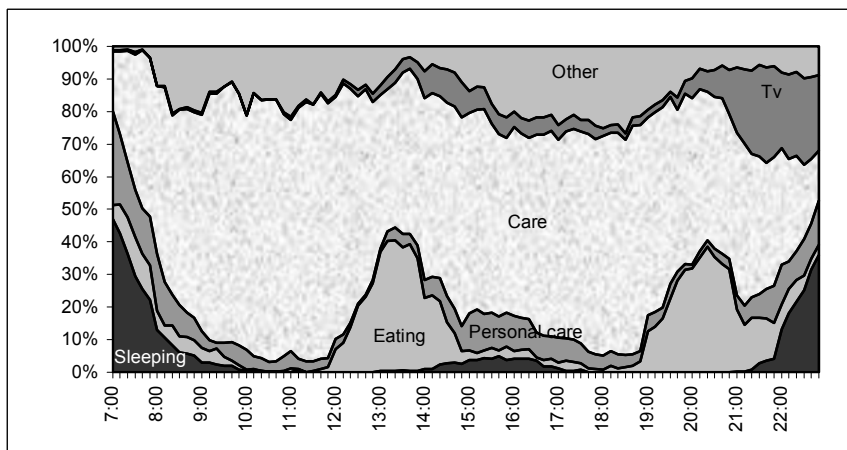


Figure 5.17 - Activities of mothers in traditional couples on weekdays from 7:00 to 23:00 - Years 2002-2003 (cumulated frequencies)



The days of the fathers in the two types of couple are even more similar, as shown in figures 5.18 and 5.19. These days are spent mainly on work and care activities become relatively relevant only after 18:00. Nevertheless, the fathers in two-income couples seem to be more actively involved in these activities.

Figure 5.18 - Activities of fathers in two-income couples on weekdays from 7:00 to 23:00 - Years 2002-2003 (cumulated frequencies)

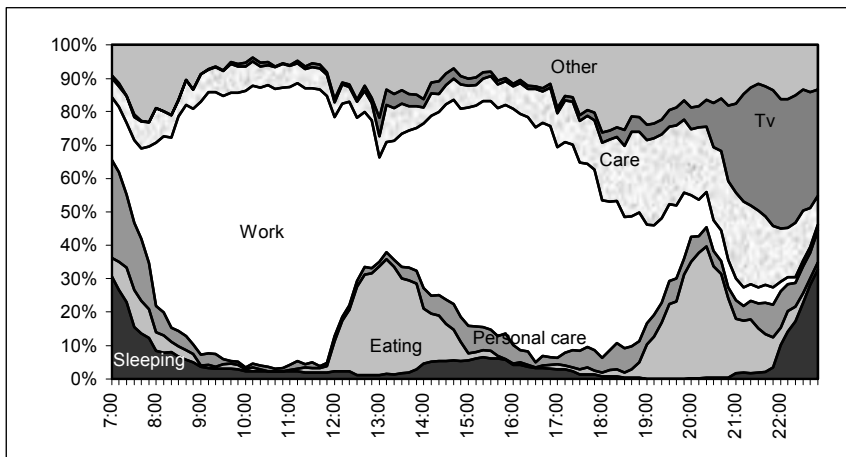


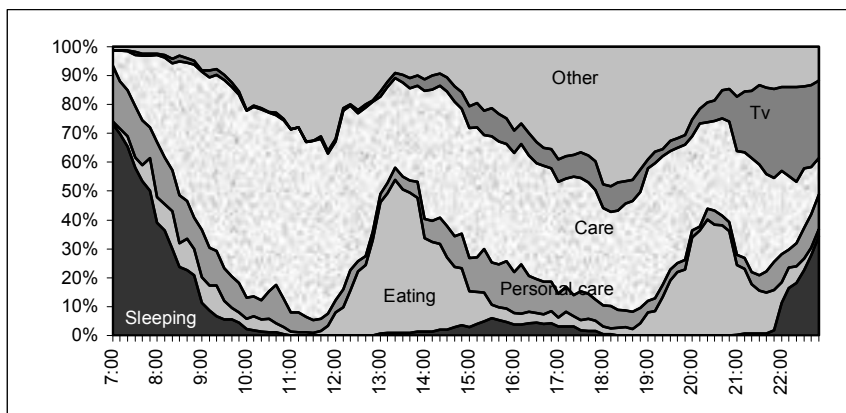
Figure 5.19 - Activities of fathers in traditional couples on weekdays from 7:00 to 23:00 - Years 2002-2003 (cumulated frequencies)



For both parents and both couples the weekdays are nevertheless squeezed between paid work and care activities; watching Tv is the only activity that escapes the squeeze.

The Sundays of mothers and fathers are respectively very similar in the two couple types. For mothers, the day is extensively spent on care activities. Figure 5.20 shows the day of mothers in traditional couples. The day of mothers in two-income couples is quite similar with the only difference that a relatively larger number of mothers take an afternoon nap.

Figure 5.20 - The activities of the mothers in traditional couples on Sundays from 7:00 to 23:00 - Years 2002-2003 (cumulated frequencies)



Also the Sundays of the fathers, illustrated in figures 5.21 and 5.22 are very similar. They are all marked by late sleeping, more time dedicated to meals and personal care, and Tv watching spreads over the entire day (to a greater extent by fathers in traditional couples).

Figure 5.21 - Activities of fathers in traditional couples on Sundays between 7:00 to 23:00 - Years 2002-2003 (cumulated frequencies)

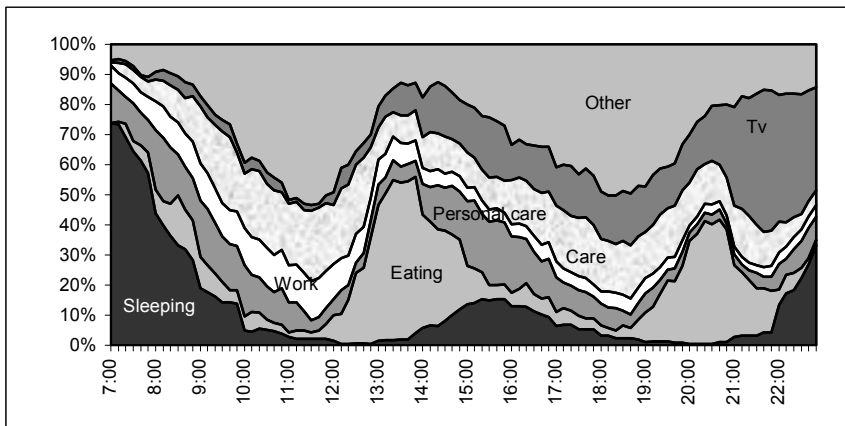
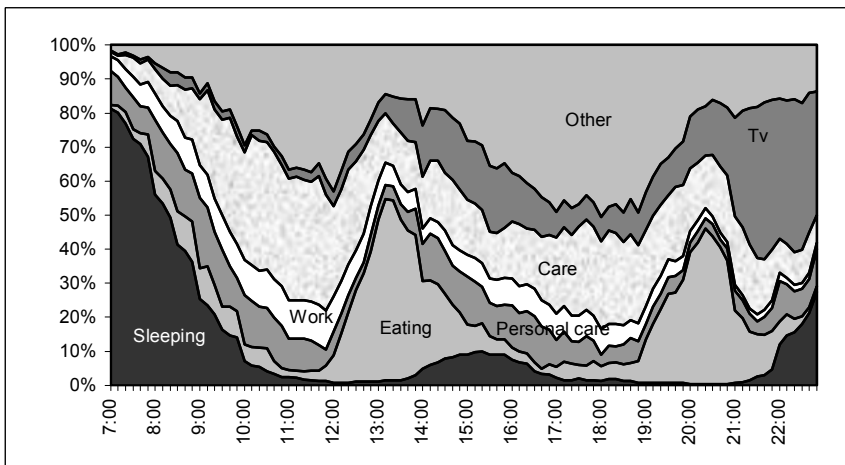


Figure 5.22 - Activities of fathers of two-income couples on Sundays between 7:00 and 23.00 (cumulated frequencies)



Nevertheless, figure 5.22 shows that a larger number of fathers in two-income couples spend time on care activities both in the morning and the afternoon, while the afternoon nap of traditional couple fathers lasts longer than that of the fathers in two-income couples and that of their own partners. In both types of couples, activities other than work and care are much more frequent.

Saturdays follow a routine that is intermediate between weekdays and Sundays for both mothers and fathers. Some of those employed work on this day (more likely fathers than mothers). For mothers the same massive distributions of care activities are observed and for fathers the time not occupied by work is marked by a greater commitment to care activities and more extensive Tv watching.

5.5 - Sharing care between father and mother

It has been seen how the social division of roles between mother and father, which involves gender differences in the equilibrium between participation in the workforce and presence in the home, is found also in the subdivision of care activities between the parents when the children are young.

The structure of data in the Time Use Survey provides information referring to the characteristics (in the individual questionnaire) and to the behavior (in the daily diary) of individuals, together with information on the household they belong to. This has allowed us to back up the analysis of the amount of time spent by fathers and mothers in the various activities and in the organization of their daily schedule with a complementary analysis referring to the relationship between the use of time by the two parents within the same household. Having thus been able to reconstruct the relationship between the behaviors of the two partners in each household with concern to their nature and timing, it became possible to deal with new questions regarding the daily life of families with young children, i.e. questions not referring to the *subdivision* but to the *sharing of care activities* between the parents.

How much of the time spent in the family is really shared by the two parents? For how long are the two partners in each parental couple involved in care activities, and in which activities in particular?

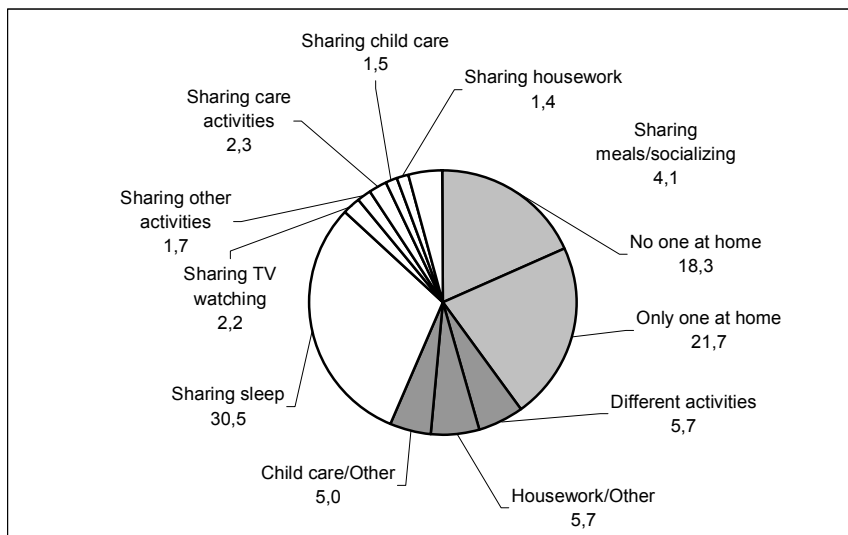
To answer these questions we identified the activities of each partner for each couple during the same 10' period, and analyzed the

similarities and the differences between them. Since much of the daily life concerning a young child, and most of the activities relating to family life take place inside the home and it is in the home that the daily schedules of the two parents interact most strongly, we focused solely on the activities carried out simultaneously by each partner of the parent couple during their co-presence at home.

5.5.1 - Time shared by the two parents at home

Figure 5.23 shows the amount of time simultaneously dedicated to activities related to family life by the two parents in each household.

Figure 5.23 - Activities carried on simultaneously at home by the two parents in the couple - Years 2002-2003 (percentage)



The partners are simultaneously present in the home for about 60 per cent of the 24 hours (with the difference that in the case of traditional couples the home is occupied by one of the partners alone for a greater length of time, while in the case of two-income couples there is a greater length of time in which no one is present in the house). Much of the co-presence and waking time is spent by the two partners in different activities, in which one may be involved in care activities and

the other in other activities. The parents spend only 12.2 per cent of the day performing the same activity which only partially consists of care activity. Attention is focused simultaneously on the children by parents only just over 20 minutes per day on average. It is confirmed that mealtimes are the occasion on which the partners are together longest (nearly one hour on average).

The analyses presented previously show that the family daily life is heavily marked by the parents' work schedule. Therefore, it is interesting to ask further questions regarding the organization of the days shared by the two parents. At what times of the day and on what days is sharing greatest? And do different sharing models regarding care activities emerge in the different households?

5.5.2 - *Days shared by the parents*

In order to answer these questions the following analyses were performed:

- 1) An analysis of multiple correspondences (Cormu procedure of the SPAD.N package) in which we subjected to analysis, i.e. considered as active, the variables ($N = 96$) defining "the sharing among parents for each 10' in the period from 7:00 to 23:00", further aggregating the categories involving the sharing of non care activities, such as sleeping, watching Tv and others. The following variables were considered supplementary: household characteristics (type of couple, number of children, age of youngest child), mother's and father's characteristics (age, education, employment), characteristics of diary writing (type of day, month, and whether it referred to a particular day), all the mothers' and fathers' activities for each 10' in the period between 7:00 and 23:00, their being together with the young child for each 10'.

The durations of the types of sharing for each couple were also considered illustrative variables. The multidimensional space resulting from the analysis is a spheroid, the first 20 factors of which explain a total of 30.05 per cent of the total inertia.

- 2) On the basis of the first 20 factors scores in the multiple correspondence analyses, a hierarchic cluster analysis was then carried out (Recip and Parti procedures of the SPAD.N package). From the analysis of the numerical results and of the histogram of the distance index values selected for the

aggregation of the classes, after 10 iterations an 8 class partition was identified (between-class inertia/total inertia = 0.47852), each class clustering a substantial number of couples.

Each of the eight classes is representative of a typical day characterized by different sharing modes among the partners. Moreover, on the basis of the illustrative variables (characteristics of the households and individuals, and of the diary writing characteristics), that were found to be significantly associated with each class, a profile was identified for couples belonging to each of these classes, as summarized in table 5.3.

Table 5.3 - Principal modalities of illustrative variables significantly associated with the classes - Years 2002-2003

	N. of families (%)	Day	Month	Type of couple	Father's education	Mother's education	Number of children	Geographic area	Region
Class 1	23,67	Weekday	May	Traditional	Junior school	Junior school	3	South Islands	Campania
Class 2	10,54	Weekday	April June						Puglia
Class 3	16,09	Weekday	February December	Two - income		High school		Centre	
Class 4	10,44	Saturday Sunday	August	Traditional				South	Campania Puglia
Class 5	9,29	Sunday		Two - income			1		
Class 6	13,95	Saturday	March	Traditional					Veneto
Class 7	11,27	Sunday			Primary school			North-West	Emilia-R.
Class 8	4,8	Sunday							

The first three classes are representative of the majority of weekdays (respectively 40.5, 13.5 and 30.2 per cent of Mondays-Fridays). Let us focus on classes 1 and 3 which illustrate two typical weekdays, respectively for traditional couples and for two-income couples. Both days are marked by the lack of co-presence of parents in the home even in the afternoon hours.

In Class 1 only the father is absent (the majority of mothers in this class do not work), while the mother is continuously found to be busy in child care and housework.

In Class 3, in which 92.91 per cent of mothers work, both parents are absent until 18:00 pm, after which the mother returns home, while the fathers often come home later.

Comparison between the time shared by the two parents when they are both at home is more interesting.

The two figures 5.24 and 5.25 illustrates the sharing modalities found to be significantly associated with each class for the period from 17:30 pm to 23:00 pm.

A comparative overview of these two figures shows that, in the evening, when the two parents are both at home:

- in traditional couples a traditional division of roles persists, in which the mother is engaged in childcare or household chores while her partner is engaged in other activities;
- in two-income couples, together with the same model, more extensive areas of sharing in childcare activities and of non care activities emerge.

Class 2, which also clusters a large number of couples, presents a particular negative sharing pattern between the partners for weekdays. It is characterized by the lack of co-presence of the two parents, who are engaged outside the home in anomalous working hours: very early in the morning and very late in the evening for him, and for many hours during the afternoon for her.

The other classes are all representative of weekend days.

Figure 5.24 - Sharing between parents from 17:30 to 23:00 in traditional couples on weekdays - Years 2002-2003 (Class 1)

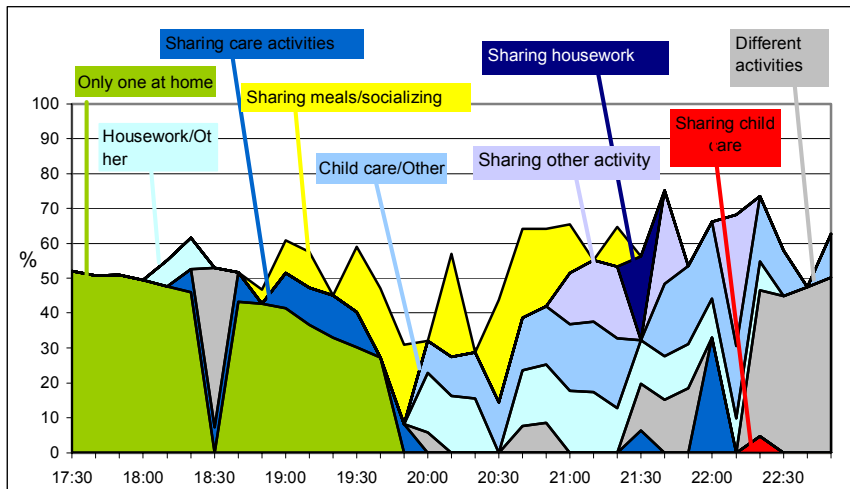
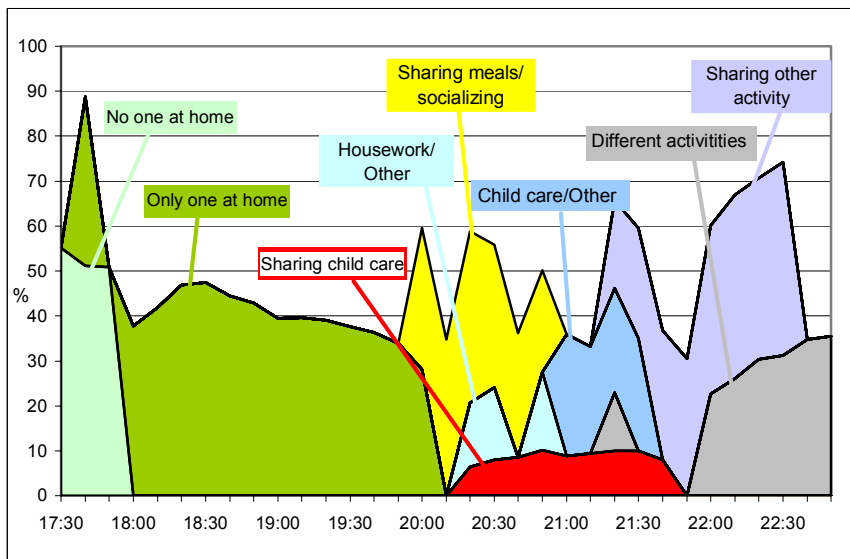


Figure 5.25 - Sharing between parents from 17:30 to 23:00 in two-income couples on weekdays - Years 2002-2003 (Class 3)



Class 4, in which the traditional couples are over-represented, describes a Saturday or Sunday (or may be a non-working day in August), in which after a late waking up, she is engaged in care activities both in the morning and in the afternoon, while he is more often engaged in sports or social activities outside the home. The couples may share care activities briefly in the early afternoon and later, starting from 19:00 pm, they both go out with the child.

Class 5 describe a Sunday which is very common among two-income couples with an only child. It should be pointed out, however, that for many this is a special day. It is characterized by a morning at home in which both separately look after the house or the children, and which ends at around 12:00 pm, when both go out to engage in religious and social activities which may last until evening.

Of greater interest is Class 6, which is representative of a traditional couple's Saturday. After a morning spent alone by her, during the afternoon, some couples (between 5 and 10 per cent,) share care activities, also specifically child care, for a prolonged period.

Figures 5.26 and 5.27 show the profiles of two Sundays (Class 7 and Class 8), which differ in the different behaviors of the partners. They are not related to individual or household characteristics. On these days considerable time is dedicated to care activities, although with substantial differences. On the class 7 Sundays, illustrated in figure 5.26, the whole morning and also the afternoon are characterized by comparatively lengthy periods of child and other care activities (involving even more than 10 per cent of parents in this class). It is interesting to note that when the house and child care activities are performed by only one of the parents, in several cases it is by the fathers. More than half the fathers in this class (up to over three quarters) are continuously with the child throughout the day and interact with her during the day for a longer time than the average.

On Sundays in class 8, on the other hand, much more time is dedicated to housework involving both mothers and fathers. It is above all on these activities that the sharing is concentrated.

Figure 5.26 - Sharing between parents on Sundays - Years 2002-2003 (Class 7)

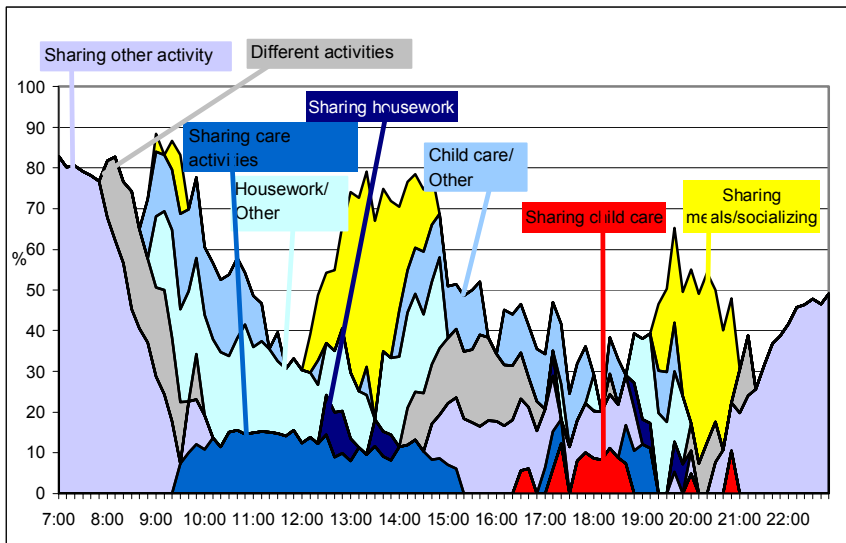
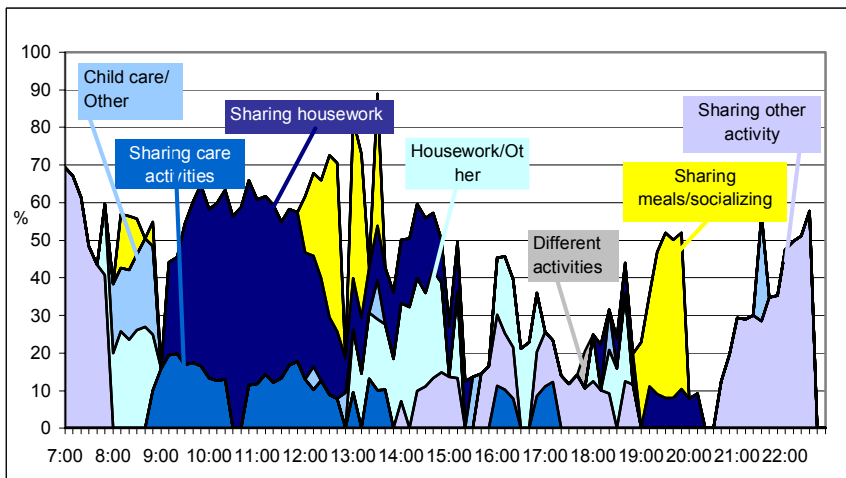


Figure 5.27 - Sharing between parents on Sundays - Years 2002-2003 (Class 8)



5.6 - Conclusions

Alarm over birth decrease and the lack of consistent and integrated national policies for children and families often lead to neglect the analysis of the living conditions of young children and their families. The analyses we have presented show, on the contrary, that in the organization of the daily life of families with young children complex processes of social and cultural transformation are involved which are deserving of greater attention from researchers and social policy planners.

In Italy, households with at least one child under the age of six are quite numerous: in the present survey they account for 12.2 per cent of the sample. They consist of comparatively small households, practically all composed of the parental couple and one or two children. Only a few are single parent families and only a small percentage of them cohabit with other relatives. Even if we know from other surveys that these households are often part of family networks involving many interactions and material exchanges (Musatti and D'Amico, 1996; Romano and Cappadozzi, 2002), their daily life is played out in a narrow organizational unit and in a universe defined by the parent-children relationship (Musatti and Picchio, 2005). The analyses presented were aimed at identifying how the daily activities of the mothers and fathers builds up this universe.

The structure of the Istat Use of Time Survey enabled us to analyze the relationship between three dimensions of daily life, dimensions that interact in the organization of families with young children.

First, we showed how the social condition of men and women is still very different: the employment rate of men and women of the same age is different; also the effect of education in the employment of men and women is different, even though for some years now women have exceeded men in schooling and in the attainment of higher qualifications. But, above all, the relation between parenthood and employment is different: while fatherhood is associated with greater employment rate, motherhood severely penalizes the woman's participation in the workforce in terms of both employment rate and working conditions. And the different conditions of the local labor market further widen the gender gap in work participation: while in Southern Italy and in the Islands, the fathers work less than in the Northern and Central areas, in going from North to South the gap

between working and non working mothers is further widened. Already many years ago (Musatti, 1992) we showed how this negative interaction between participation in work outside the home and motherhood sinks its roots into the social conditions determining both female employment and daily life with a young child. The prevailing cultural model of motherhood in which the mother is still firmly anchored to fulltime care activities inside the home (Neyrand, 2001) is at work only later to modulate the relationship that the mother, whether she works or not, establishes between activities outside the home and care activities, between the latter and social contacts, always seeking for a balance between self-realization as an individual, as a mother and as a working woman or housewife (Rullo and Musatti, 2005). In this balance, for mothers with children under the age of three, the support provided by child care and education services still makes only a very small contribution.

The analyses presented herein on the use of time by mothers during weekdays clearly reveal a very close relationship between working activities and care activities. In the first place, in the organization of the day, the time not occupied by the former is immediately and completely available to the latter; this confirms, also for this subsample of women, what in a European comparison is a characteristic of the use of time by all Italian women, who are more strongly engaged in both paid work and care activities than women in other countries (Sabbadini, 2005). This close relationship also suggests the persistence of a cultural model of parenting in which work outside the home is not a basic component of the maternal role but contributes to further expanding it (Piccone Stella and Saraceno, 1996); a new task is assumed but the relation among the various tasks is not re-balanced. It should be noted that this model results into a disadvantage also for the fathers only the mothers, as it assigns them only the role of breadwinner and leaves them with few alternatives regarding their use of time on weekdays.

Moreover, for both parents the amount of time dedicated to direct participation in family daily life appears clearly to be residual vis-à-vis the time devoted to work. This confirms that in order to enhance the quality of daily life of families it would be necessary to modify the powerful social schedules of work organization.

Verification of the statistical incidence of the characteristics of couples and of individuals on the duration of child-related activities shows that, while the mothers' employment has no effect on the amount

of time they dedicate to interactions with their children, it does induce different behaviors by their partners. Confirming the results of other surveys in which the partners of working mothers were found to be more involved in the care of young children (Musatti and Pasquali 2001; Sabbadini 1999), also the present survey shows that the fathers of two-income couples dedicate significantly more time to both childcare and interaction with their children. It was also found that the amount of time spent above all in interacting with the children both by fathers and mothers increases with increasing educational level.

It is interesting to examine the use of time on Sundays, on which the relative weight of work activities is marginal also for fathers. While for mothers the pervasiveness of care activities is confirmed, on this day of the week diversified behaviors among fathers emerge: it is the fathers in two-income couples that dedicate more time to care activities and, significantly, precisely to interaction with their children.

Analysis of the *sharing* of time among parents within the home is particularly significant for identifying how the daily behaviors of mothers and fathers interact in establishing the daily life of the family and to determine whether, within the couples, parenting roles are actually being re-defined.

Analysis of the relationship between the activities performed by the two parents in each couple has shown that the subdivision of care activities persists even when both are present at home: it happens that only one of them is engaged in looking after the house or the children more often than both are simultaneously performing either of the tasks. It must be pointed out however that these sharing activities cover a comparatively long average time, also when compared with that devoted to meals, which is still the most significant occasion for the family to meet (Pontecorvo, Fasulo, and Sterponi, 2001).

Our analyses have revealed that the sharing models differ according to different dimensions, above all that of the mother's employment, as on weekdays we find the two-income couples are more engaged together in activities related directly to the children. Analysis of the various forms of organization of the family on Sundays, when the time dedicated to work does not differentiate the couples, nevertheless suggests that the material availability of time interacts with cultural and psychological elements in determining the modality of the parents' commitment within the family, related more to housework or to child-related activities.

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6. Analysis of diaries through methods of textual statistics and tools of text mining

6.1 - Aims and objectives of the analysis

The 2002-2003 Istat survey on the use of time (henceforth, *Tus*, acronym of *Time Use Survey*) contemplates the writing out of a free-text diary describing a day's activities with intervals of at least 10 minutes. For the first time in the history of the survey, Istat decided to acquire the entire text of each one of the individual diaries, thus having at their disposal a very relevant data archive - not only in terms of size (more than 50,000 diaries, corresponding to 16,500 pages, one and a half million descriptions of single activities) but, more importantly, also of contents. This opened the way for a number of developments. This study constitutes a first experimentation, and anticipates some perspectives of analysis.

Today, the applications of textual statistics that deal with information expressed in natural language (textual data) in the same way as with classical statistical data (quantitative and/or codified data) are quickly growing in number.

This chapter was written by Sergio Bolasco, Elisabetta D'Avino (paragraphs 6.5, 6.6.1) and Pasquale Pavone (paragraph 6.7.2), "Sapienza" University of Rome.

They include *surveys* based on questionnaires with open questions and free answers; pieces of research based on non-directive interviews; and *focus groups* or surveys based on documents. In all these cases, the information gathered is entirely non-structured, because they are produced in natural language.

The potential of a direct analysis of textual data is essentially related to the ‘higher resolution’ of the measure. An analysis based on concepts is more flexible and more accurate than one based on keywords or coding. Most of the limitations due to the ambiguity of natural language are overcome at the beginning of the treatment, through the use of the appropriate instruments for this kind of data.¹ In particular, textual statistics - above all in *text mining*² applications such as that presented here - is characterised by a high level of multi-disciplinary integration that involves statistics, computer science and linguistics.

The present work purports to highlight certain characteristics of the daily activities described in the *Tus* individual diaries, as these characteristics can emerge from a lexical analysis; and to subsequently measure quantitatively, on the basis of textual analysis, specific phenomena with respect to particular portions of the ‘population’. The analysis consists of the extraction of information from unstructured material (the text of the diaries); the annotation of it in structured form (as presence/absence or frequency) in a matrix of individual data; and then the connection of this information to the other variables that characterise the individuals. In particular, an in-depth study is performed of the *localisation* of the activities, the *simultaneity* of different activities and the intensity of social *interaction*. Analyses of this kind can be carried out by taking into consideration as the basic unit of study either the single activities (episodes) or the individuals (in which case the entire diary of a day is regarded as a single record). In what follows, only the latter case is considered.

¹ There are many programmes for the treatment of natural language and the automatic analysis of texts. The differences between them regard the type of analysis to be undertaken. In the present study, in the light of our aims (having to do with statistical analysis), we used TaLTaC2 (acronym for Trattamento automatico Lessicale e Testuale per l’analisi del Contenuto di un Corpus – Automatic Lexical and Textual Processing for the Analysis of the Content of a Corpus). TaLTaC2 was developed on the basis of research done at the “La Sapienza” University of Rome (Bolasco et al. 2002; www.taltac.it).

² Sullivan (2001); Zanasi (2005); Dulli et al. (2005); Bolasco et al. (2005).

The most of references to textual data of *Tus* are in Italian because of the equivalent English do not correspond to the same linguistic structure.

6.2 - Lexicometric measures on the corpus of diaries

In the archive of 50,197 diaries collected by Istat³, a set of identical (in terms of activity and surrounding conditions) consecutive 10-minutes intervals is considered as a unitary *episode* for each individual. The day of an individual turns out to be composed, on average, of 29.5 episodes. The archive, therefore, consists of around one and a half million episodes.

The analysis of the archive conceived of as a whole (the corpus of the diaries) identifies many peculiarities of the language that was used. Given the characteristics of the study, the entire text is huge (N=9 million total occurrences⁴), and yet the vocabulary is small (V=35,295 different words). This determines a very low index of lexical richness⁵ ($V/N \cdot 100 = 0,46$ percent). The *hapax*⁶ percentage, on the other hand, is still high (43,7 percent).⁷ Considering the terms with a frequency of at least 20 occurrences, the vocabulary is composed of 4,650 different words. Such vocabulary already guarantees that 99 percent of the total occurrences is accounted for. This goes to show that the relevant language, even though it possess many more ‘shades’ than codified by

³ Every person describes the day’s activities on the basis of 10-minutes intervals in a very concise way. The fragmented text is articulated in: main activity (AP), secondary activity (AS) and location in which the activity took place (L). Each episode thus corresponds to a ‘sentence’ of the form <AP & AS W L>. The resulting language is a language with a high level of repetition, and that almost completely lacks syntax. Examples of this are the following: *vado in piscina & parlo con i miei genitori W in macchina | faccende domestiche & vedo tv W casa | ho pranzato & ho visto la televisione W a casa di nonna | pulizia piatti - pentolame & guardo la tv W casa | inizio a mangiare & W a scuola.*

⁴ In what follows (unless specified otherwise) the term “word” will indicate a form or flexion of a lemma as it is found in the text of the diaries; *madre* and *madri* are therefore two different words. “Occurrences” indicates the number of times (frequency) a word appears in the text.

⁵ This is due to the repetitiveness of the formulas describing the daily activities (*mi sveglio, preparo, esco, mangio, sto a casa, parlo con* and so on).

⁶ A *hapax* is a form that appears only once in the text.

⁷ After a first screening on the grammatical categories, 29% of the written forms are not recognized as words. This is due to the fact that in diaries abbreviations, initials and cuts are employed; but also to the incidence of orthographic errors and/or typos in the transcription of the information, which keeps the *hapax* percentage high. If all this were corrected, the extension of the vocabulary would decrease of at least 25%.

Istat for the categorization of the activities, is very restricted and ‘controllable’.⁸ If one only considered the 1,353 words with frequency higher than the average (218 occurrences), then one would still account for 96 percent of the entire text.⁹ By operating further restrictions, however, the terms included would give rise to too many ambiguities (for instance, the word *centro* can indicate a *centro sportivo*, a *centro sociale*, the *centro della città* and so on). The individuation of a very small nucleus of “key” words, therefore, does not automatically ensure validity of the informative content of the text. On the other hand, as shown in section 6.4, disambiguation can be obtained through the gradual recognition of fixed expressions, locutions and other composite forms.

6.3 - Lexical analysis

In order to individuate the *peculiar* language (that is, the minimal set of terms capable of characterising the daily activities described in the diaries), a comparison was made between the vocabulary of the 50,197 diaries and the lexicon of frequency of the ‘standard’ Italian language.¹⁰ This was done by calculating a normalized relative deviation (NRD) between the frequency of the words in the diaries and that assumed in the lexicon as a point of reference.¹¹ Subsequently, the terms with a high positive NRD (about 450 words, with a NRD higher than 9) were linked to their roots (for instance, the form <*parl**> groups together various forms of the Italian verb meaning “to talk”: *parlo*, *parlato*, *parliamo* and so on). Performing a *query* on the vocabulary of the corpus, 3,200 flexions of these lexemes have been found (representing more than 50 percent of the total occurrences). This allowed for the gathering of the maximum possible number of relevant vocabulary entries into lemmas. Notice that the transformation into lexemes (*parl**, *guard**, *chiacch** ...) allows one to also recover the words that were written incorrectly (*chiacchierare*, *chiaccherare*, *chiaccheramo* eccetera) but were at any rate useful for the purposes of the analysis.

⁸ It is barely worth pointing out that the extreme expressive variety of language overcomes by far the rich definition of assisted codification contemplated by the Istat codes.

⁹ However, it must be said that 30% of the text accounted for consists of so-called “empty” (in terms of content) words. These have a purely grammatical content (*di*, *e*, *con* and so on).

¹⁰ By standard Italian we mean a mixture of written and spoken language that is representative of contemporary Italian (Berruto G., 2005).

¹¹ See Bolasco (1999), pp. 223-225.

Table 6.1 - Forms, locutions or lemmas according parts of speech - Years 2002-2003

Verbs			Adverbs			Nouns			Adjectives			
Lemma	Flexions	Occurrences	Locution	Occurrences	Form	Occurrences	Lemma	Flexions	Occurrences	Lemma	Flexions	Occurrences
andare	30	176.382	a casa	680.304	tv	139.096	pomeridiano	4	713			
guardare	23	159.992	a piedi	72.427	radio	47.995	comunale	3	438			
parlare	15	133.585	in casa	55.415	televisione	39.606	televivo	4	325			
fare	40	117.461	in macchina	43.787	amici	39.080	ricreativo	3	248			
preparare	38	89.882	a letto	38.122	marito	26.744	agricolo	5	246			
ascoltare	16	77.800	in auto	34.097	figlia	26.073	lavorativo	4	245			
uscire	21	70.838	in cucina	18.783	moglie	25.682	aziendale	3	217			
stare	12	54.249	al bar	15.356	figlio	24.515	materno	4	178			
tornare	18	44.918	a scuola	15.090	cucina	24.233	serale	2	166			
giocare	18	35.123	in bagno	14.693	macchina	20.959	regionale	2	143			
prendere	26	28.306	al lavoro	11.236	piatti	20.662	parrocchiale	2	141			
vestire	20	25.663	per strada	10.090	caffè	20.133	musicale	2	141			
chiacchierare	9	20.826	in camera	8.735	auto	18.889	paterno	3	134			
arrivare	15	21.739	sul divano	7.386	spesa	18.468	estivo	4	116			
mettere	25	19.522	in chiesa	6.880	mamma	16.539	turistico	3	108			
riposare	18	19.432	al mare	5.515	musica	15.178						
rientrare	14	19.463	in ufficio	5.483	madre	13.016						
vedere	22	19.308	in giardino	5.379	doccia	12.900						
leggere	13	15.847	in automobile	5.070	tavola	12.716						
ritornare	14	16.646	al supermercato	5.064	familiari	11.333						

The classification of words by grammatical type obtained by making this selection provides a first overall view of the significant language. For reasons of space, only the 20 most frequent forms/locutions/lemmas for each grammatical category are indicated in table 6.1.

Among the verbs in the table, items such as *dormire*, *alzarsi*, *lavarsi*, *mangiare* have been ignored, as they are to be considered as constants, or as denoting ‘necessary’ actions. Consequently, they characterize the diaries only in a negligible way. To be noticed, instead, the different weights of verbs indicating motion (*andare*, *uscire*, *tornare*, *arrivare*, *rientrare*, *ritornare*), “static” verbs (such as *guardare*, *stare*, *riposare*, *vedere*, *leggere*), action verbs (*fare*, *preparare*, *giocare*, *prendere*, *vestire*, *mettere*) and verbs having to do with “communication” (*parlare*, *chiacchierare*, *ascoltare*). Within the set of adverbs, only terms expressing location appear among the 20 most frequent ones (the first non-ambiguous adverb constituted by one word only is *sempre*, which has 816 occurrences). Later on, we will illustrate the procedure that allows one to individuate such locutions. Among the nouns, *tv* and *televisione* stand out as “actors” and “objects” of the activities. Lastly, it must be pointed out that adjectives turn out to have low incidence, as the daily activities are seldom qualified due to the concise form in which they are described.

An in-depth study of the peculiar language allows one to group verbs by themes, in analogy with Istat’s traditional classes of activities. In table 6.2, fragments of the classes “Home and Family Care”, “Personal Care” and “Mass media and Communication” are illustrated. The other classes that have been identified are:

- “Study/work”: *lavorare*, *studiare*;
- “Social life, entertainment, open air activity”: *chiacchierare*, *chiamare*, *conversare*, *dialogare*, *discorrere*, *discutere*, *disegnare*, *giocare*, *litigare*, *mandare sms*, *parlare*, *raccontare*, *rispondere*, *salutare*, *scherzare*, *scrivere*, *stare al telefono*, *telefonare*;
- “Motion, travel and open air activity”: *andare*, *camminare*, *fare una passeggiata*, *guidare*, *passeggiare*, *tornare*, *viaggiare*.

These classes are useful for an analysis based on concepts (described in section 6.6), especially as regards activities having to do with relations and joint activities.

For brevity's sake, we will not deal with other aspects of the peculiar language. It is easy, however, to find many socio-linguistic features that are typical of the Italian language mirrored in the 3,000 and more words that have been selected; these features could be studied in depth and carefully measured by putting them in relation to the individual characteristics of the speakers, namely, age, sex, level of education and place of residence.

Table 6.2 - Principal action verbs for three classes of activities - Years 2002-2003

Home and Family Care (CF)			Personal Care (CP)	Mass Media and Communication (MC)
accudire	lucidare	riordinare	bere	ascoltare
aiutare	mescolare	riporre	cenare	guardare
annaffiare	ordinare	ripulire	coricare	leggere
apparecchiare	piegare	risistemare	desinare	inviare_e_mail
cucinare	potare	sciacquare	distendersi	mandare_e_mail
cucire	preparare	scopare	fare colazione	mandare_sms
cuocere	pulire	sfaccendare	lavarsi	navigare
curare	raccogliere	sistemare	mangiare	sentire
disfare	rammendare	sparecchiare	mangiucchiare	sfogliare
distendere	rassettare	spazzare	pettinarsi	spedire_e_mail
friggere	riassettare	spazzolare	pranzare	vedere
imbandire	ricamare	spolverare	riposare	
innaffiare	rifare	stendere	stendersi	
lavare	rilavare	stirare	vestirsi	

It is barely worth mentioning that a diachronic study of the various *Tus* surveys made by Istat would be of particular significance for a measurement of changes in the language across time (tied to individual and family behaviours).

6.4 - Textual analysis: study of some concepts and relative information extraction

The textual analysis described here aims to provide quantitative measurements of some concepts defined on the basis of the lexical variety in the text of the daily diaries with respect to specific classes of

individuals (age, geographic apportionment and so on). To this purpose, starting from the relevant terms selected through the peculiar language, appropriate expressions (terms) have been isolated, capable of disambiguating certain specific words. This, as we will see later, was functional to the subsequent parts of the analysis, and to the better identification of the corresponding conceptual entities.

In particular, it was necessary to individuate typologies of *actors* (subjects/objects of the activities), *actions* (verbs/nouns expressing the activity) and *locations* (places where the activity described in each episode took place). In order to do so, independently of the codifications suggested in the Istat classification, these “entities” were progressively put into focus on the basis of the vocabulary of the corpus. *Text mining* tools were then defined to unambiguously capture them. Finally, for each of the three types, operational *concepts* were defined on which to carry out the abovementioned measurements.

In more detail, the process consisted of the following steps:

- Preliminary recognition of some “terms” with a view to identifying ambiguous words (*sala, centro* etc.) to be included in the concept; this was achieved, for example, by lexicalizing a specific sequence of words, such as / *sala giochi / sala riunioni / sala mensa / - / sala d’aspetto / sala da pranzo / sala da letto / - / centro commerciale / centro sociale / centro storico /* and 20 other expressions. The potentially ambiguous terms get disambiguated as long as the occurrences involved in the reconstructed sequences are concerned;¹²
- Construction of queries (on the basis of the peculiar language already selected) to be applied to the vocabulary of the text, and capable of automatically generating dictionaries (or thematic lists) that comprise all the forms - actualised in the corpus under study - that correspond to the chosen concept. In particular, two dictionaries were constructed for individuals belonging to the ‘parental’ class: one of “general” and one of “Particular-Tus” individuals; the latter includes words that are used in the diaries in a sense different from that which is prevalent in common language (for example, in the diaries the word “children” is often intended to mean ‘sons’);

¹² This stage is relevant both for the development of future Istat surveys, and for improving the assisted codification, as it allows to capture “clean” information *a priori*.

- Individuation of all the peculiar locutions capable of univocally defining certain concrete expressions of the concept. For example, in the case of locations, on the basis of the *Tus* diaries it was possible to define thousands of spatio-temporal ‘modalizers’, including role-places (“*a casa dei miei genitori*”), and role-persons (mentioned in the text in order to describe not a relation but rather the spatial location of the activity being carried out (e.g., *dal benzinaio*).¹³ For “places”, a general model was defined in order to individuate the variety of adverbial locutions (see section 6.7);
- With respect to the concept so delimited, all the “terms” existing in the corpus were put in the vocabulary, thus creating a *semantic category* (henceforth, CATSEM) corresponding to the concept.

At this point of the process, it is possible to construct new textual variables to be inserted in the matrix of the data of the individual diaries. Such variables constitute a representation of the concepts, or of relations among them, that is to be correlated with the available *a priori* information (for instance, regarding the classes of individuals). The search of information useful to feed such a matrix in the text is performed by using complex *queries* defined by *regular expressions*. The latter make use of Boolean operators (AND, OR, AND NOT), distances among words appearing in a sequence ([LAG_{xx}]: for instance, “mezzo LAG2 trasporto” can trace both “mezzo di trasporto” and “mezzo pubblico di trasporto”), lexematic reductions (via the ‘*’ and ‘?’ symbols as, for example, in ‘*parl** and *suocer?*’); but also of the two operators CATSEM(concept) and LEMMA(verb).

In order to look for sentences expressing the situation in which one talks to, or communicates with, a relative (“parlare/comunicare con un parente”), one can use a regular expression such as “CATSEM (*parl*) LAG3 *con* LAG3 CATSEM (*parent*)”. Such an expression is capable of individuating all the sequences in the text that (with a maximum distance of three words from the form *con* and the object of communication) connect a verb of the class (*parl*) to an individual of the

¹³ In Italian, sentences such as “I am going to the filling station” are usually expressed via the equivalent of “I am going to the filling station *owner*” (“*benzinaio*” denotes the owner of the filling station).

parental type. (The amplitude of the distance among words in the sequence is individuated experimentally).

Text mining applications were therefore based, in the present case, on the automatic search in the individual diaries of the abovementioned sequences relating entities and/or concepts. This allowed one to measure both the diaries' 'lexical variety' (number of different sequences) and their 'intensity' (frequency of episodes that present that expression during the day).¹⁴

In what follows, the procedures that were employed in order to define some operational concepts on which to perform the mentioned measurements are described for each one of the three types of "entities" (actors, actions, places).

6.5 - "Actor" entities in the daily activities

The individuation of the "actors", that is, of the subjects of the actions¹⁵ described in the daily diaries, led to the development of two *Tus* dictionaries, one of "Relatives" and one of "Others" (non-relatives). Both of these are divided into thematic sub-classes consisting of various kinds of figures.

The first nucleus of the "Relatives" dictionary was obtained by automatically comparing the vocabulary with the list of terms that properly refer to kinship in the Italian language. The list was built by connecting all forms of these terms to the corresponding lexemes in all those cases in which the lexematization was not misleading. Namely, with the exception of cases in which the different forms belonged to different dictionaries. For instance, the lexeme *zi?* captures the forms *zio/zia/zii/zie*, all of which can be categorized as "Relatives". To the contrary, the expression *mamm?* captures *mamme* (plural), which also

¹⁴ Taltac2 allows one to calculate the number of fragments (daily diaries or episodes) in which expressions recur; to isolate these in the text; and to populate the matrix of the individual records with new textual variables indicating the presence/absence (or the frequency) of the concept expressed by the *query*. Textual variables so generated can then be analysed via factorial techniques (such as the analysis of correspondences) together with, or in connection to, other qualitative/quantitative variables coming from the questionnaire and the peculiar language extracted from the diaries.

¹⁵ In the diaries, the explicit recognition of an actor is always relative to the object of the action. The subject is, by construction, only expressed in the first person: *parlo con mamma, litigo con mio fratello, ho raccontato una storia a mia nipote*.

appears in the diaries, for instance, in “the mothers of other children”. In this case, while the form ‘*mamma*’ can be included in the “Relatives” dictionary, the other must belong to “Others”. The shift to the lexematization, as already pointed out, also aims to capture the forms that are orthographically incorrect (*mamm+*) or unpredictable (*mammo*, *mammy*).

The high number of occurrences of certain graphic forms in the vocabulary suggested the following: due to the peculiarities of the language of the daily diaries (that have already been emphasised), certain expressions that are typical of the colloquial language (<*mamma e papà*> instead of “*genitori*” (parents)) and some terms not necessarily expressing kinship in common Italian (*ragazzi*, *bambini*, *cari*) are instead used in the survey exclusively (or prevalently, namely in 99 percent of the cases) in the latter sense. For this reason, they were classified as “*Tus* relatives”. After the study of concords¹⁶ and the lexicalization of certain forms that were potentially ambiguous (e.g., *altri bambini*), the “*Tus* relatives” were included in the “Relatives” dictionary. The latter is composed by 130 different graphic forms, structured into 10 Types: *Genitori* (both parents), *Madre* (mother), *Padre* (father), *Partner*, *Figli* (sons), *Fratelli* (brothers), *Nonni* (grandparents), *Nipoti* (nephews), *Affini* (non-close relatives: uncle and aunt, cousins, brothers-in-law, daughters-in-law, fathers-in-law, small cousins, son’s or daughter’s fathers-in-law, great-uncles) and words that identify parental figures in a generic way (relative, relatives, family, kinsfolk). The lemmas are grouped by Type (group) and occurrences in table 6.3.

The exploration of the concords of certain terms suggested that some of the individuated forms could not be attributed the role of full-blown “actors” in the relationship, but rather a function of “spatial localisation” of the action itself. For instance, to say: “*vado a casa di mia madre*” does not necessarily mean to describe an action of relationship with the actor mentioned. The same holds for many forms that refer to professional figures: in Italian, “*dal giornalaio*” indicates the place where one buys the newspapers rather than the person selling it.

¹⁶ An analysis of concords is a study of all the local contexts of a word in the corpus (so-called co-texts). For instance, the concords of *madre* show the neighbourhood (right and left, with prefixed width, normally 20 words) of all the occurrences of *madre*.

Table 6.3 - Dictionary of lemmas of relatives according types and decreasing occurrences - Years 2002-2003

marito	26685	partner	figlio	56302	figli	nonno	4689	nonni
moglie	25636	partner	bambino	10349	figli	bisnonno	28	nonni
mio compagno	482	partner	bimbo	4526	figli	nipote	5719	nipoti
mio convivente	207	partner	il piccolo	720	figli	nipotino	1892	nipoti
coniuge	167	partner	ragazzo	603	figli	pronipote	19	nipoti
partner	151	partner	il grande	31	figli	familiari	13086	altri parenti
mamma	14144	madre	figliolo	29	figli	famiglia	7001	altri parenti
madre	9501	madre	pupo	9	figli	parente	4817	altri parenti
mammima	6	madre	gemelli	7	figli	cari	68	altri parenti
papà	3429	padre	primogenito	5	figli	parentado	2	altri parenti
padre	3328	padre	secondogenito	2	figli	suocero	2997	affini
babbo	316	padre	figliastro	2	figli	zio	1749	affini
papi	10	padre	figlioleto	3	figli	cugino	1743	affini
genitori	6234	genitori	pargolo	1	figli	cognato	1458	affini
mamma e papà	1219	genitori (a)	sorella	7252	fratelli	nuora	856	affini
madre e padre	239	genitori (a)	fratello	6493	fratelli	cuginetto	257	affini
mamma e babbo	90	genitori (a)	fratellino	472	fratelli	consuocero	18	affini
mamma e padre	35	genitori (a)	sorellina	248	fratelli	prozio	2	affini

(a) In this Type different conjoint expressions retrieved in the text are cumulated (i.e.: the expression "mother and father" include also "the mother and the father" or "with mammy and with ..." etc.).

Because of this, the “Relatives” dictionary captures in the corpus a total of 228,165 citations, including orthographic mistakes, but not citations of locutions indicating places (for these, see section 6.7).

The “Others” dictionary was basically created on the basis of a list of suffixes (table 6.4) that were deemed “characteristic” of roles, jobs and occupations (lemmas in *-ista*, *-aio*, *-iere*, *-ante*, *-ologo*, *-vendolo*, *-ico* etc.¹⁷). The set of terms so selected was then purified of many inappropriate terms, and enriched with exceptions and other figures (*collega*, *contadino*, *commessa* and so on) through a precise analysis of the *Tus* vocabulary and of the concords.

Table 6.4 - Examples of jobs and occupations individuated via morphologic derivation

SUFFIX	Examples		
aio	benzinaio	calzolaio	macellaio
ante	aiutante	commerciante	insegnante
aria/o	segretaria	veterinario	concessionario
ente/i	agente	assistente	clienti
iere/a	panettiere	parrucchiera	cameriere
ico	amico	medico	idraulico
ista	autista	dentista	commercialista
sore/tore	albergatore	professore	venditore
tra	maestra	geometra	pediatra
trice	accompagnatrice	pettinatrice	educatrice
vendol	fruttivendolo	pescivendolo	pollivendolo
ologo	ginecologo	psicologo	cardiologo

At the end of this operation, a dictionary of 397 forms was obtained, for a total of 80,170 occurrences. The dictionary was organized in three thematic lists: “friends/loved ones” (e.g., *amici*, *ragazza*, *fidanzato*, *moroso*), “roles” (about 270 graphic forms such as *collegghi*, *clienti*, *parrucchiere*, *giornalaio*), “other people” such as neighbours (*vicini*, *condomino*, *co-inquilino*) and others (*madri*, *gente*, ...).

Some differences having to do with gender (most of which quite predictable) emerge from a consideration of the occurrences in these dictionaries: the female figures are cited the most by, and/or gravitate prevalently around, the female ‘universe’; that is, occurrences denoting

¹⁷ Which correspond to English suffixes such as *-er*, *-ist*, *-ian* etc.

female individuals have a higher relative incidence in the diaries of women. An example is given later on, in the section on relation activities.

6.6 - Actions as entities: types of activity

In order to individuate “actions”, verbs are the main element to be analysed. In doing so, some of the classes described in section 6.3 can be employed. Here, we illustrate the extraction of information regarding two specific types of activities: “relational” ones (the so-called “with whom”) - with specific emphasis on “*parlare/comunicare con*”; and those having to do with “simultaneity” (&), such as “*mangiare & parlare*”.

6.6.1 - Relational activities

In the analysis of relational activities, certain specific “themes” were individuated on the basis of the study of sequences containing the keyword <con>. By so proceeding, the verbs that characterise such sequences were identified. Then, the analysis was extended to verbs of relation that employ different grammatical constructions: for instance, not only *parlare/comunicare con*, but also *telefonare/raccontare a*. Terms corresponding to the concepts being sought, but belonging to grammatical categories different from the verbal one, were also taken into account: for example, *telefonata* or *telefono*, where the verb supporting the concept is the generic *fare (una)* or *stare (al)*, and is sometimes implicit in the diaries. Among the themes that were individuated, the most frequent regards the action of “*parlare/comunicare*”. A specific work was performed aimed to quantify the presence in the daily diaries of at least one expression comprising verbs having to do with this theme (see table 6.5) - in connection to the different sub-classes of actors that were already defined (for instance: *parlo di politica con mio padre*). Only “direct” communications were considered, thus excluding forms of non-simultaneous communication (*sms, scrivere eccetera*), as the latter do not represent bi-directional communication activities of the face-to-face kind that were intended as relevant in this particular case.

To the verbs listed in table 6.5, others must be added, such as *chattare, parlottare* or popular/regional variations such as *chiacchierare*. The inclusion of this latter form gave the opportunity to discover many

orthographic mistakes: 98 out of 115 actual types were found in this form (the correct flexions of the verb “*chiacchierare/chiaccherare*” present in the corpus are only 17). It must be pointed out that the reduction to the lexeme (*chiacch**) allows to find many incorrect words without the need for subsequent correction; but flexions with three *c*'s or with other errors in the lexeme itself escape the process.

Table 6.5 - Verbs belonging to the semantic category “*parlare/comunicare con/a*”

VERB		Occurrences	VERB		Occurrences
parlare		con 133,747	discutere		con 2,261
chiacchierare		con 22,380	scherzare		con 1,741
salutare		10,816	chiamare		1,238
telefonare		a 10,276	raccontare		a 624
conversare		con 6,555	litigare		con 167
dialogare		con 2,786	discorrere		con 78

Once the entities and the relative concepts were defined, and the thematic dictionaries created, the search on the text was based on the construction of complex *queries*. These were written via regular expressions, so that the textual sequences (expressions) actualising the activities under scrutiny in the corpus could be individuated. In particular, in the case under study the *query* reads as follows:

“CATSEM(parlocon) LAG5 LEMMA(con) LAG3 CATSEM(parenti) LAG8 |” OR
 “CATSEM(parlalt) LAG5 CATSEM(parenti) LAG8 |”

The individuated expressions get isolated in the text and can be extracted in the form of a list with associated occurrences (at this stage, the occurrences are redundant). The results of the *queries*, moreover, produce new textual variables, coupled to each individual diary, indicating the presence/absence (or the frequency) in the diary of the concept expressed by the *query*. These can be put in relation to the a priori information (e.g., the structural variables of the individuals). Table 6.6 contains an example of quantification of the concept “*parlare/comunicare con*” in the diaries relative to a working day, according to the gender and age of the individuals. From the table, it can

be inferred that in a working day women talk to their mothers¹⁸ four times more than with their fathers, while for men this ratio reduces to two. To the contrary, communications with one's partner are equal for men (*moglie*) and women (*marito*). In addition, while women, talk to their sons as much as to their partner, they talk to their sons much more than men (21.9 percent vs. 11.8 percent). Contrary to what might be expected, the situation does not change in a significant way on Saturdays and Sundays (19.3 percent women and 11.7 percent men). Generally speaking, the locutions referring to communication with one's mother are much more frequent than those referring to talking to one's father. Among women, the ratio is 3: 2.6 percent with their father and 11.8 percent with their mother, while among men the figures are 3.9 percent and 8.8 percent. Notice how the intensity gets reversed for "both parents", to whom men (5.1 percent) talk more than women (4.4 percent).

Table 6.6 - Diaries of a working day containing at least one locution of "parlo con" according to the type of interlocutor and the sex of the speaker (absolute values and percentages)

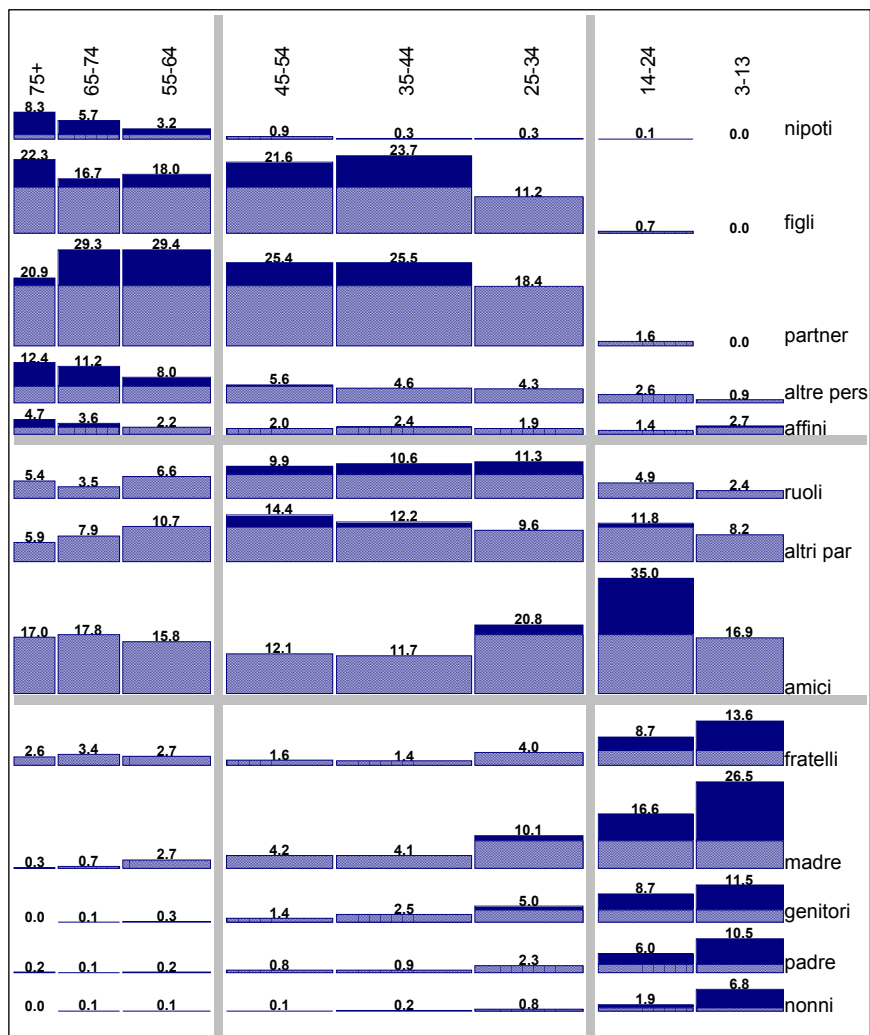
	Men		Women	
	A.v.	%	A.v.	%
Partner	1,979	22.9	1,978	21.7
Padre	333	3.9	241	2.6
Madre	757	8.8	1,078	11.8
Figli	1,018	11.8	1,995	21.9
Fratelli	431	5.0	550	6.0
Nonni	123	1.4	142	1.6
Nipoti	98	1.1	240	2.6
I due genitori	442	5.1	402	4.4
Altri parenti	1,147	13.3	1,112	12.2
Affini	176	2.0	326	3.6
Amici	2,071	24.0	1,760	19.3
Figure-ruolo	921	10.7	662	7.3
Altre persone	468	5.4	677	7.4
Total	8,624	100.0	9,130	100.0

¹⁸ The capital letter indicates the category. Madre, therefore, comprises the forms *mamma*, *madre* and their variants. The same holds for the other types mentioned in the following.

At the level of macro-categories of actors, the difference between working days, Saturdays and Sundays does not seem very relevant: in all three cases, at least one locution relative to communication with a relative is found in around half of the daily diaries; and one locution relative to talking to “others” is found in about one third of the diaries. In the case of relatives, the “similarity” among the types of days seems essentially confirmed for many kinds of figures, except for the class “Other relatives”, which is significantly more present in the diaries during weekends (probably due to the fact that weekends are devoted to relationships with the “enlarged family”), and, albeit less, the class of “Non-close relatives”. To the contrary, for the other figures it is possible to observe a predominance of the communication with role-figures during working days (a predictable thing, considering the weight of the category of the *colleghi* within this sub-class); and, according to expectations, with friends during weekends.

In order to offer an overall view of the “*parlare con*” various interlocutors in relation to the variation in the age of the speaker, a matrix was prepared of the corresponding double distribution. Figure 6.1 reproduces, according to Bertin’s (1981) model of the weighted matrix, the quantification in the diaries of the action of “*parlare/comunicare con*” during the working days (Monday to Friday) - relative to the age of the speakers. In particular, the matrix allows one to give a graphical value to the positive contingencies (corresponding to the black parts of each histogram) and to the consistence of the absolute frequencies (corresponding to the area of each rectangle) at the same time. This elaboration, via a preliminary permutation of the lines of the matrix in function of the associations between categories of interlocutors, also allows one to individuate the main correspondences among categories of interlocutors and age groups (as macro-cells of the matrix that are mutually correlated the most).

Figure 6.1 - Diaries of a working day containing at least one locution of the “*parlo con*” action, by type of interlocutor and age of the speaker (per cent values in the columns)



From the figure above, it is possible to deduce that “*comunicare con*” grandparents, father, mother, brothers and parents - essentially with the entire family - plays a fundamental role for the first age group

(3 to 13 years); “*parlare con*” friends is prevalent for the second age group (14 to 24 years) - up to 35 percent of the class, while it is around 20 percent for the group of 25 to 34 years-olds; the inverse relation holds instead, as age grows, for communication with one’s partner (which grows from 25 to 29 percent) and with one’s sons (which decreases from 23 to 16 percent). The latter tendency changes radically after the age of 75, in coincidence with elderly people recovering a contact with their adult sons (22 percent).

Lastly, notice the constantly increasing tendency, as age, increases of *parlare con* other people and, for the age-groups in-between, of *parlare con* one’s nephews; and the “re-discovery” of talking to friends after 55 years of age. The class of grandparents and that of nephews have low relevance across all the segments, due to the fact that the characterising activity for these two types of kinship is not verbal communication but, rather, play.

From the resulting overall picture, Istat could move on to measure (in future *Tus* surveys) structural behavioural changes relating to communication.

The results of the abovementioned queries, as already pointed out, produce new variables that are inserted in the matrix of the individual diaries. These variables constitute a representation of the concepts or relations among concepts that are to be correlated to the a priori information (e.g., the structural variables of the individuals).

And this allows for an elaboration of pieces of statistics belonging to the Istat’s tradition in the way illustrated in tables 6.7-6.8 (the example, which is purely illustrative, identifies some significant differences in the communication with one’s parents and with one’s friends with respect to age, sex, and also number of components of the relevant nucleus of individuals).

A more detailed analysis of the verbs of the “*comunicare con*” type shows that the grandparents-nephews relationship is regulated by *raccontare*, while that among brothers and non-close relatives in the early years by *litigare*. And that the latter becomes mainly *scherzare* as the age of the younger individual increases, while *dialogare*, *discutere* e *discorrere* are the most frequent terms in the mature age.

6.6.2 - Joint activities

By joint activities we mean here the activities that are carried out at the same time as others such as, for example “*mangiare guardando la tv*”, or - literally from the text - “*ho cominciato a sparecchiare e a lavare I piatti a mano & ascoltavo la tv e parlavo con mio figlio*”. In the diaries, the combined activities are distinguished in the two fields <main activity> & <secondary activity>. ¹⁹ Starting from the verbs pertaining to the several categories illustrated in section 6.3, some couplings were defined between different activities, on the basis of a preliminary analysis of concords. Among the main ones, we point out those relative to “Personal care”, “Study/Work”, “Home and family care”, “Movement, travel and open air activity”, each one coupled with “Social life, entertainment and cultural activities” and “Mass media and communication”.

The search for relations is always operated via *queries* written in the form of regular expressions. These are capable of individuating the information sought in each daily diary. The result of each *query* produces a new categorial variable, the lexical variety (number of different expressions found) and intensity (amount of occurrences found in the diary) of which can be measured. As an example, in order to individuate joint actions between the categories “Home and family care” (CF) and “Mass media and communication” (MC), the following expression was used: “CATSEM(CF) LAG5 CATSEM(MC)”. The diaries that contain at least one joint action between these two categories are 18,077, equal to the 36 percent of the total, for a total of 45,566 episodes. The *query* finds 7,711 different expressions. Among the most used ones, one finds <*lavo i piatti & guardo*> (1,815 occurrences), <*preparo la cena & guardo*> (1,576), <*preparo il pranzo & guardo*> (1,101) and <*lavo & ascolto*> (993). Generally speaking, the actions coupled with the verbs *preparare*, *apparecchiare*, *sparecchiare*, *lavare*, *stirare*, *riordinare* are mainly *guardare* and *ascoltare*. To the contrary, expressions such as *cucinando per la cena & leggo* and *curando i fiori & ascolto* are seldom used. The maximum number of episodes in a diary in which one of these joint activities is carried out is equal to 20, but more than one third of the 18,000 diaries exhibits three or more of these

¹⁹ The searches that have been performed allowed for a consideration of certain cases of simultaneity expressed in only one of these fields. In the diaries, the separator used among primary and secondary activity was the character &.

combined activities for each day. On the basis of the expressions found, a particular situation regarding “watching the television” emerges. In many cases, the expression *ascoltare la televisione* (“listening to the television” instead of “watching ...”: *guardare la televisione*) is found in the diaries. Since the expression “*ascoltare la televisione*” is not present in the codes employed by Istat, it seemed interesting to assess whether its use involved peculiarities. By way of example, a *query* was executed in order to measure the combined activity of *preparare il pranzo* together with *guardare* or *ascoltare* either *tv* or *radio*. The results are summarised in table 6.9.

Table 6.9 - Results of the query on the joint activity of “preparare il pranzo” and “guardare/ascoltare la tv/radio” - Years 2002-2003

Preparare il pranzo e			
	V (a)	N (b)	N(%)
guardare la televisione	78	1,523	56.8
ascoltare la radio	32	691	25.8
ascoltare tv	46	438	16.3
ascoltare e guardare tv	15	26	1.0
ascoltare radio e tv	3	3	0.1
Totale	174	2,681	100.0

(a) V=different expressions

(b) N=total occurrences

The expression *guardare la televisione*, as expected, prevails over the others, and occurs more than twice the times *ascoltare la radio* does. However, *ascoltare la tv* is not secondary with respect to the previous two, and involves 46 types of different expressions. Moreover, it occupies a remarkable 16 percent of the total citations relative to this kind of simultaneous activities. Some writers are even more specific and claim to *ascoltare e guardare la tv* or, more rarely, to *ascoltare e sbirciare*, which gives an even better idea of having glimpses while performing the principal activity, say, of *preparare il pranzo*. It would be worth, in this connection, to verify whether the Istat codification takes these differences into account; and whether the latter are correlated, as it can be hypothesised, with certain individual

characteristics (very often the daily behaviours are influenced by social and cultural factors related to the environment the subject comes from).

6.7 - A model for the construction of a dictionary of locutions indicating place

The entity “place” of the activity described in each episode is of particular interest. Individuating the variety of these places in order to proceed to their non-predefined categorization is not trivial. It can certainly be of profit to identify the expressions used by people to describe places by means of textual analysis. Only an exhaustive study of these varieties allows one to obtain an accurate classification of the localization of the daily activities.

6.7.1 - Construction of the model

For the extraction of the “place” entities, we aimed to define a general model allowing for the individuation of the many relevant adverbial expressions. In this manner, for example, the “indoor” activities could be distinguished from the “outdoor” ones (the latter are, for instance, those connected to motion (*in auto, a piedi*) or to place-figures (*dal barbiere, dal dottore* etc.)). In all cases, the relevant expressions appeared in the form of locutions indicating place, and were used to describe the localization of the activities performed during the day in a different way.

First of all, the typologies of actors considered in section 6.5 - relatives (*genitori, madre, padre, coniuge, figli, fratelli, nonni, zii, cugini*), certain types of figures such as friends and other people (*vicino, inquilino, ...*), and the figures identifying roles (*barbiere, medico, ...*) - were considered in the model in the function of “adjectives”, as they indicate places. For example: *<a casa di mia madre>*, *<in casa di un amico>*, *<sono andato dalla nonna>*.

Subsequently, besides the place-figures, nouns used to express a localization (be it an environment or specific places (*camera, bagno, sala, ufficio, strada, cinema*) or an object (*tavolo, panchina*)) were also identified in the text. For instance, one finds: *in camera, al cinema, ad un tavolo del bar, su una panchina*.

After this, the general model for the identification of a wide range of adverbial locutions of place was defined. This was done starting from

a preliminary study of more than 439,000 segments aimed to individuate the typology of basic information. The model was founded on the use of a hybrid system, constituted by *rules* (REG) and *dictionaries* (DIZ), and was created in two stages. A first, exploratory, phase of training – useful for determining the empirical details of the model –, and a second phase of application of the theoretical model, aimed to examine its actualization in the *Tus* corpus.

The series of operations involved included the application of lists of reference (dictionaries) and of *queries* with elementary logical operators holding among predefined concepts (rules).²⁰ More specifically, the stage of *model construction* has the following structure: i) extraction of the peculiar language [DIZ]; ii) reduction to lexical morphemes (*stemming*) of the previously identified forms [REG]; iii) application of lexical *queries* in order to generate dictionaries of forms which are actualized in the corpus [REG=>DIZ]²¹; iv) annotations of the vocabulary of the corpus for the creation of different semantic categories [DIZ]; v) construction of the graph and formulation of the *queries* [REG].²²

The subsequent stages of *model application* are: i) launch of a final *query*, constituted of a regular expression of 39 sequences with OR, for a total of more than 150 relations between concepts, expressed by 16 semantic dictionaries capable of extracting locutions; ii) analysis of the

²⁰ In a *query*, the operator LAGxx can be used on two *operanda*. In this case, it is intended as “right-hand margin of no more than xx words”, and it is capable of extracting all the *quasi-segments* of a given expression. For example, if one were interested in exhaustiveness as regards the locution “*in modo*”, the *query* “in LAG3 modo” would find all the locutions that can be uttered in Italian from “*in modo*” to “*in un certo qual modo*”, such as “*in tal modo*”, “*in questo modo*”, “*in quel certo modo*” and so on.

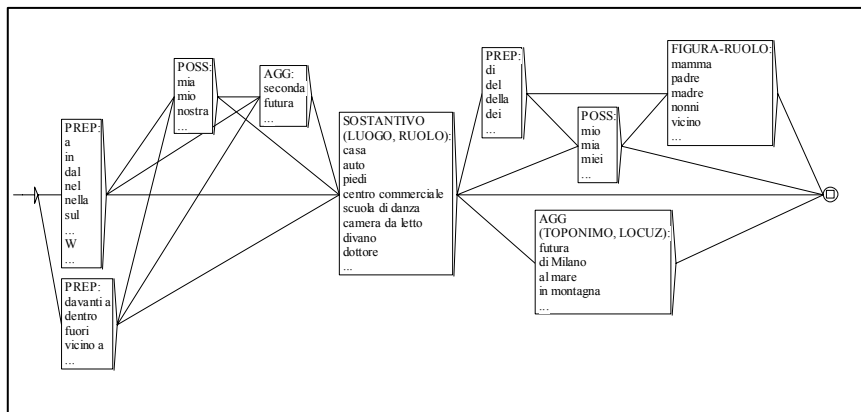
²¹ In general, the dictionary obtained via *stemming* is larger than the initial peculiar language, as it includes all the flexions compatible with the *queries* – especially if the latter are applied to large corpora. Once these lists have been constructed, it is necessary to make a selection of the prepositions supporting the corresponding nouns without ambiguities. For instance, one can accept as a locution of place (that is, consider as an admissible expression), when connected to the noun “*funzione*”, the proposition “*alla*” but not the preposition “*in*”. In this perspective, a distinction has been drawn between nouns strictly indicating place (W) – to which it is possible to associate most prepositions – and nouns indicating persons/figures (or other nouns preceded by specific prepositions for purposes of constitution of locutions of place).

²² In particular, a typical *query* looks like the following: “CATSEM(*prep_W*) CATSEM(*sost_W*)” OR “CATSEM(*prep_W*) CATSEM(*poss*) CATSEM(*sost_W*)” OR “CATSEM(*prep_W*) CATSEM(*agg*) CATSEM(*sost_W*)” OR “CATSEM(*prep_W*) CATSEM(*poss*) CATSEM(*agg*) CATSEM(*sost_W*)” OR “CATSEM(*prep_W*) CATSEM(*sost_W*) CATSEM(*poss*)”.

variety of the 6,390 expressions found²³; iii) calculation of the occurrences of each locution, for a total of 1,731,630 gross (redundant) occurrences, equal to the 22 percent of the entire corpus.²⁴

The model corresponds to the graph in figure 6.2, which reconstructs a prepositional form of the [PREP-(POSS)-(AGG)-N-(AGG)] kind - where adjectives are indicated between brackets because their presence is not necessary. For instance, with respect to the basic locution “*a casa*”, the model reacts to actualizations such as: “*a casa mia*” and “*davanti_a casa*”. When necessary, the model can be applied in an iterative manner (Table 6.10).

Figure 6.2 - Graph of the model of locutions of place - Years 2002-2003



²³ As in every automatic recognition process, the model produces some false *positives* (*verso l'acqua*, *in macchina mio*, *a casa della piscina* etc.) that can be removed via a priori lexicalizations of the ambiguous words (such as “*verso*”) together with nouns of the object type (*dall'acqua*, *in acqua*, *nell'acqua*, *sull'acqua*); and some false *negatives* due to gaps in the *queries* (for example, in the list of nouns, those that refer to cities, and the proper nouns to be recovered via an *ad hoc query* capable of individuating words beginning by a vowel are both missing).

²⁴ By ‘gross’ we mean here the occurrences considered in their totality, without subtracting those due to a sub-locution. For example, *a casa* includes the occurrences of *a casa mia* or of *a casa di mia figlia*. A lexicalization process provides instead the net count of each expression. It must also be said that, for purposes of correct evaluation of the weight of the locutions, it must be borne in mind that the latter have to be related to the total number of episodes, and not to the number of diaries, because sometimes several occurrences of the same locution are repeated in the diary of a single person. For example, 19 episodes in a single diary include *negozio di abbigliamento*, which seems to be clearly due to the fact that the person in question works in such a shop.

Table 6.10 - Examples of locutions of place from the model in figure 6.5 - Years 2002-2003

PREP	POSS	AGG	SOST	PREP	POSS	AGG	SOST
a			casa				
davanti a			casa				
nella	mia	seconda	casa				
nella	mia		casa			futura	
a			casa		mia		
a			casa	di	mia		madre
a			casa	del			vicino
vicino (a)			casa				

The adjective which describes the noun can indeed be composite, and therefore individuate in turn another prepositional syntagm: “*a casa / del vicino*”, “*a casa / di mia figlia*”. Such a structure can be repeated as a pluri-adjectival function of the first noun; recursiveness often involves a third level, as in: “*ad una festa / di compleanno / di un amico*”. Lastly, in the diaries contractions such as “*vicino casa*” (standing for “vicino a casa”) can also be found.²⁵

Such locutions, since they are so-called *spatio-temporal modalizators*, were divided ex-post into thematic sub-classes. These draw a difference between “home” activities (own house, relatives’ houses, friends’ places and others) and “outside of home” activities, connected to motion (*in bicicletta, con i mezzi pubblici, ...*), role-places (*dal parrucchiere, dal giornalista, ...*) or various environments/sites (*in ufficio, in banca, al negozio, fra le bancarelle, ...*).

In table 6.11, the locutions are grouped according to the prepositions characterising their *incipit*, and the relative incidence of occurrences on the total number of locutions found is indicated.

²⁵ In this sense, for completeness’ sake, in the case of *Tus* an “implicit” preposition must be considered as defined by W (which, as explained, indicates the separator of the third part of the text of an episode in which the place of the activity is described; W stands for ‘where’). For example, “W *casa*” and “W *sedia a rotelle*” are examples of a contraction of the propositions “a” and “sulla”, respectively.

Table 6.11 - Examples of locutions of places according to the initial prepositions - Years 2002-2003

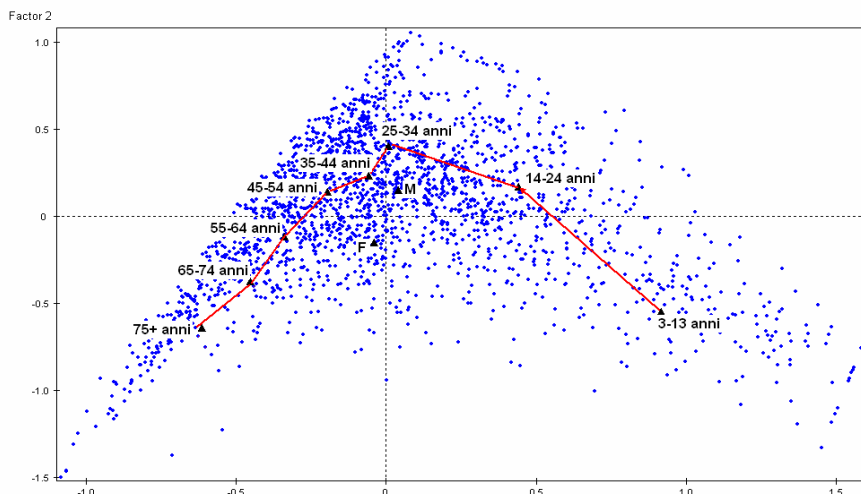
INCIPIIT OF THE LOCUTION	% N	Examples
in, nel, dentro, in mezzo, fra	39.4	in auto, in cucina, nel letto, nei campi, dentro il ristorante, in mezzo alla natura, fra i banchi del mercato
a, al	24.2	a casa mia, a ballare, al bar, al circolo anziani
da, dal	14.7	da scuola, dall'ufficio, dal parrucchiere
su, sul, sopra, sotto	9.1	su una panchina, sul divano, sopra il negozio, sotto l'ombrellone
verso	4.1	verso casa, verso la macchina
presso, vicino, intorno, dintorni	4.0	presso la propria abitazione, vicino al caminetto, intorno al camino, dintorni del paese
davanti, dietro	2.2	davanti alla tv, dietro il bancone
fuori	1.7	fuori città
per, x	0.5	per strada, x il paese

6.7.2 - Analysis of content

After the application of the model, false positives were eliminated, thus reducing the set to 5,421 expressions and their lexicalization. The latter, since it is so important, determines a growth of the size of the vocabulary of the corpus (40,619 different entries), and a diminution of the total occurrences (from 9 to 7.42 millions). The total of the occurrences of the lexicalized locutions, which is now net, is 1,306,763, equal to the 17,6 percent of the total occurrences of the corpus.

It is possible to emphasise the correlations between places and individual characteristics via factorial analysis. The latter allows one to reconstruct in detail the relationship between the various kinds of locutions and the individuals, by partitioning the corpus of the diaries according to age and sex. From the overall analysis of all the locutions, such strong relationships emerge that the resulting map - shown in figure 6.3, where each point individuates a locution and the barycentres of the age classes are connected by a line - can be described according to the slogan "Each age has its places".

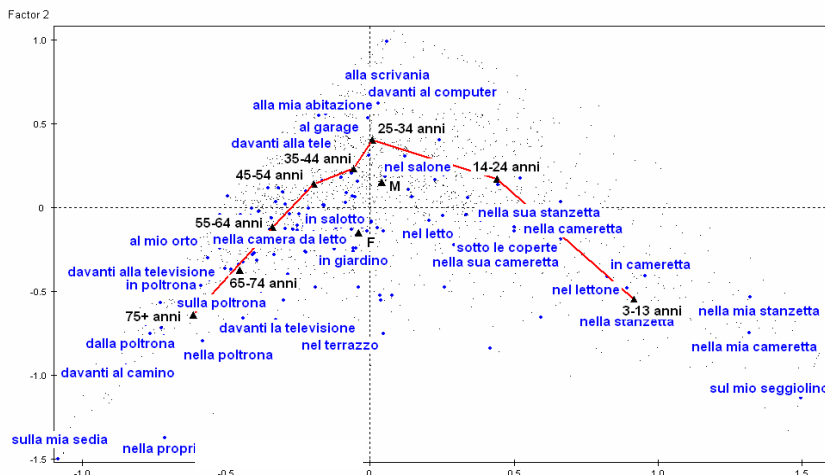
Figure 6.3 - Factorial analysis of the locutions of place by age groups - Years 2002-2003



As can be observed in the factorial plane, in the young age there is a marked variability of places; the latter increases as age increases (the maximum is reached around the age of 20-25, in proximity to the origin of the factors), and then decreases as the old age approaches.

Getting into the details of the sub-classes, let us consider the thematic list relative to “places inside one’s house” (figure 6.4). The maximum variety of places during the day occurs for the age groups ‘in-between’ (*davanti al computer, nel salone, in giardino ... nel terrazzo*), while as years go by mobility (which begins in the early years: *sul mio seggiolino, nella mia cameretta*) gets more and more limited (*davanti alla televisione, in poltrona, davanti al camino*) and eventually disappears (*sulla mia sedia*).

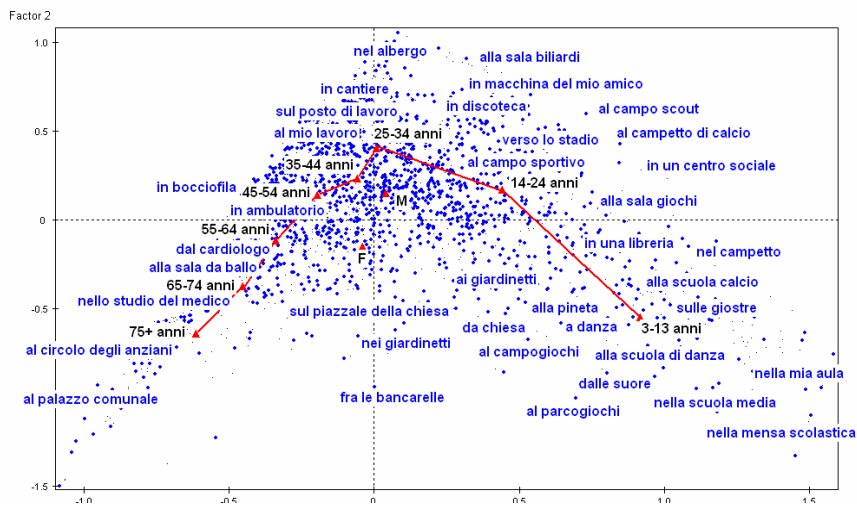
Figure 6.4 - Factorial analysis of the locutions of place relative to the theme “places inside one’s house” according to age groups – Years 2002-2003



As for the locutions in the “outside of home” sub-class (Figure 6.5), it can be seen that homologous places, corresponding to the same activity, are called differently by different age groups: “*a scuola di danza*”, or simply “*a danza*” for children, “*in discoteca*” for young people, “*alla sala da ballo*” for the elderly.

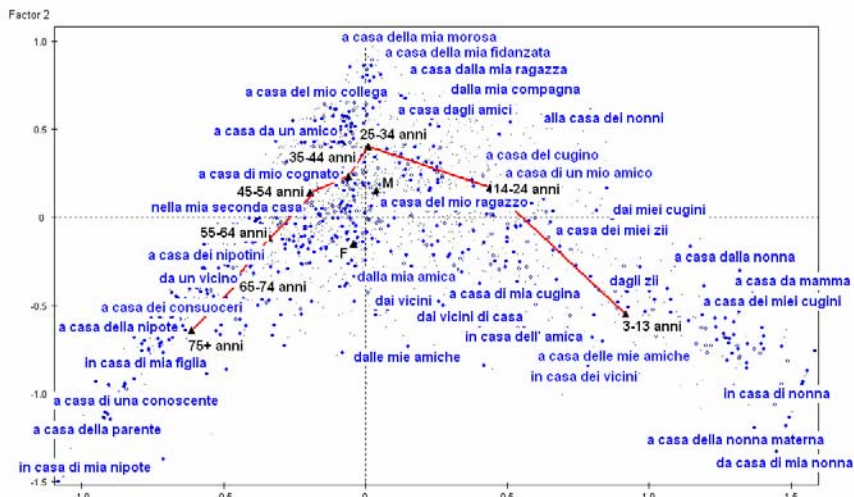
The construction of the model just described, although capable of finding thousands of relevant cases, and therefore to constitute a good linguistic indicator of locutions of place with respect to the daily human activities, will never provide us with an exhaustive ‘product’. Nor is the model able to account completely for expressions found in different situations, and even in similar corpora. Nonetheless, this model represents an example of a non-banal linguistic resource for capturing the potential “sense” of the places that people go to and live in, according to their age (where the correspondence is probably univocal from the speaker (for instance, a 3 or 4 years old child) to the place (*nella mia cameretta*), but not vice versa).

Figure 6.5 - Factorial analysis of the locutions of place relative to the theme “outside of home” according to age groups - Years 2002-2003



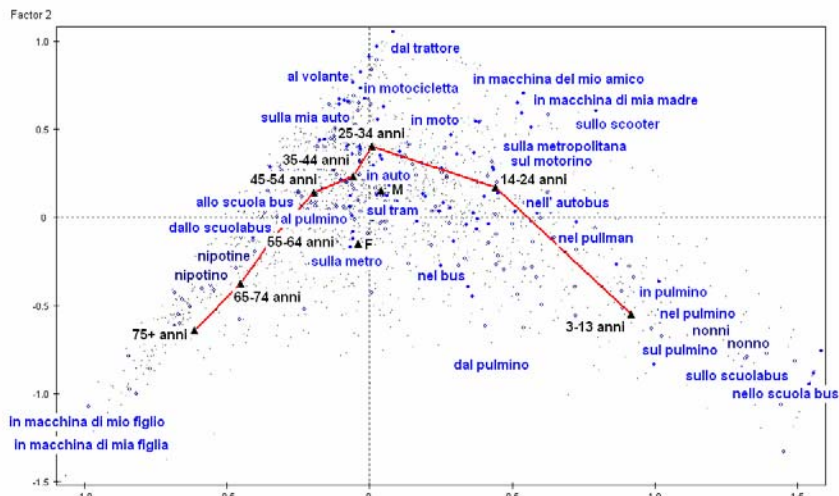
A selection of the locutions referring to the concept of “home” allows one to grasp some gender differences. In the plane of the first two factors with respect to the line connecting the age groups, the localizations for women are at the bottom, while those for men are on top. The map in figure 6.6 emphasise certain related phenomena involving, for instance, “*in casa dell’amica*”, “*dalle mie amiche*” and similar expressions, as opposed to “*a casa di un mio amico*” or “*dalla mia ragazza*”, “*a casa della mia morosa*” and so on.

Figure 6.6 - Factorial analysis of the locutions of place relative to the theme “home” according to age groups - Years 2002-2003



Lastly, from the selection of locutions having to do with the theme “means of transportation”, one can infer the way in which, in the activities involving motion, the typology of the place must be correctly interpreted. Textual analysis makes this easier. The map in figure 6.7 bears witness to the fact that, the means of transportation remaining the same (car), the way of using it changes largely depending on the individual’s age, especially with respect with shifting from a passive to an active use of the car. Also, one again finds different expressions for young and elderly people (*in macchina di mia madre* or *in macchina di mio figlio*) and for adults (*al volante*, *in auto*, *sulla mia auto*) respectively.

Figure 6.7 - Factorial analysis of the locutions of place relative to the theme “means of transportation” according to age groups – Years 2002-2003



6.8 - Concluding remarks

The experimentation described, as the reader may have noticed, does not offer exact “statistics” concerning the daily activities. Rather, it gives a perspective as regards possible types of quantitative analyses that the methods of textual statistics and the tools of *text mining* allow one to perform on textual data.

According to the experience presented here, quantitative measures made on the basis of unstructured data such as textual data express their greatest informational potential at the “*meso*” level, allowing, at the same time, for a synthesis and for a descriptive analysis of the evidence under study. The case studies proposed show how the extraction of useful information from the text allows one to obtain very accurate measurements of specific phenomena that can be correlated to individual characteristics (gender, age, education differences and others).

For instance, the inference is straightforward to the fact that further multidimensional analyses would allow for the definition of a fine-

grained correlation between specific phenomena that can be of interest, connecting activities, places and actors between each other. Starting from the most important phenomena so identified, it would then be possible to produce real statistics on the day-types (working days, Saturdays, Sundays) or any other context variable, such as number of components of the family, dimension of the municipality of residence, geographic location and so on. Regarding “actors”, it must be observed that, due to the nature of the textual corpus (composed of 50,000 diaries), the “ownership” represented by the “I/author of the diary” must be handled through the categorial variables relative to the individual (sex, age, education and so on); instead, the “object of the activity” or the “relationship with” (or, at any rate, the class of the activities carried out with several people) are to be defined according to the classes of actors described in section 6.5, and are therefore the same as for any other textual data.

In conclusion, it must be noticed that the choice of elaborating data by organizing them by day and not by episode prevented from evaluating the duration of the activities. It is obvious, though, that this can be done, and the analysis presented here can be repeated at the level of episodes. One further potential development consists of the possibility to separate the three fields of textual information, and isolate the secondary activity from the main activity, and the place of the activities from the activities themselves. In this sense, one possible limitation can be encountered at the level of text mining, due to the fact that the text for each of the three fields is short, and the number of fragments huge (from a few dozens to more than one and a half million).

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7. Main innovations in the coding and correction process in the Time Use survey 2002-2003

7.1 - Introduction

In the past years, the quality of statistics, especially that of the official statistics, has been object of growing debate. Statistical information has become, over time, a public asset, a decision-making contribution and an instrument of the public opinion. Hence, quality represents now one of the main properties of statistical data. However, just as in any other production sector, the problem regards quality as a whole.

In literature (Eurostat, 2002), statistical information is considered just as any good or service to change the concepts developed in the quality sector of industrial goods and products. The quality of data is its capacity of meeting the cognitive needs of the users of such data¹. It cannot be expressed as a synthetic measurement but requires a set of evaluations and information. In the statistical research domain, the

This chapter was written by Barbara Baldazzi (paragraphs 7.1, 7.3, 7.6), Tania Cappadozzi (paragraph 7.2), Mascia Di Torrice (paragraph 7.4) and Lisa Francovich (paragraph 7.5.) - Istat.

¹The quality of a good or service is defined in the Iso norms 8402-1984 as: “The possession of all the characteristics that satisfactorily meet all requirements, whether explicit or implicit, of the user”.

productive process of a data requires an input, a throughput and a product/service or output. Producers of statistics must not only establish the validity of data but must also document the process of such data as the result of the measurement strategies adopted. Hence, in addition to the concept of data quality, a new concept is introduced (Filippucci et al., 2000): quality of the measurement process. Statistics producers, among which Istat, have succeeded in their most complex work, to create a statistical system whose work method strives in all its phases, to reach the highest quality and that explains clearly to every user how a data is constructed and how it must be interpreted.

Accordingly, Istat developed its Family Multi-purpose “Time Use” survey taking into account quality control in all its data production phases. Each survey phase was indeed object of careful planning, organisation, harmonisation and monitoring. This document describes the innovative choices that have been adopted for the data coding, control and correction phases, in the survey instruments used and characteristics of the variables object of the survey. To this purpose, it was decided to focus on the daily diary (Paragraph 7.2), the weekly diary and the correction of the questionnaires’ quantitative variables for various purposes. To use the daily diaries, it was indeed necessary to develop a new data registration and coding system (Paragraph 7.3), and to implement ex-novo the data control, correction and verification instruments. As regards the weekly diaries, they were analysed using ad hoc instruments that evaluate at the same time all the information of interest for checks and controls (Paragraph 7.4). Finally, the quantitative variables of the questionnaire were corrected by using regressive techniques² (Paragraph 7.5).

7.2 - Coding of the textual data of the daily diary

The “Time Use” survey is conducted by means of daily diaries that gather the data. Based on the previous experiences of Istat (Istat, 1993) and on the literature (Eurostat, 2000; Haraldsen, 1999; Ehling, 2004), diaries with pre-set periods are clearly most suitable for such purpose. It

² The correction of the qualitative variables was excluded because it was developed according to Istat’s standard methods; see volume “Il sistema di indagini Multiscopo”, Roma: Istat, 2006 (Metodi e norme, n. 31).

is indeed easier to remember what has happened rather than when it happened (Tanur, 1992). Even when we plan our day according to time, it is usually more difficult to remember the exact moment in which an event took place (Haraldsen, 1999). The techniques that help remember such times, e.g. the pre-set intervals, make it easier for the respondent to describe the activities carried out from a time-driven viewpoint. Therefore, the survey conduction is based on a daily diary with a fixed schedule that divides a day's 24 hours into 144 10-minute intervals (Figure 7.1).

By requesting the respondents to fill in the daily diary, it is possible to gather detailed information on the organisation of the individual times, how they divide their 24 hours into their different daily activities, travels, places seen and with whom.

The respondents describe the carried out activities and the places seen, using a plain language and freely choosing how to express themselves. The gathered data are then submitted to a complex coding system through which codifiers "translate" the answers into codes, considering many individual and family data that contribute in assigning the exact code to each activity.

To correctly assign a code, it is very important to interpret precisely the context in which the activities are carried out, their sequences, their purposes, the place and moment of the day, week, or season in which they took place.

The coding phase remains the most delicate and important one in a Time Use survey because of the many dimensions the description of the activities in the diaries refers to.

Figure 7.1 - Daily diary: compiling instruction

4	Che cosa sta facendo? Indichi le attività che svolge ad intervalli di tempo di 10 minuti! Se l'attività dura più di 10 minuti può trascrivere il tempo di inizio e di usare le virgolette.	Che cos'altro sta facendo? Indichi l'attività contemporanea più importante. Se l'attività dura più di 10 minuti può trascrivere il tempo di inizio e di usare le virgolette.	Dove si trova o come si sta spostando? Indichi il luogo in cui si trova o il mezzo di trasporto che sta usando. Se il tempo dura più di 10 minuti può trascrivere il tempo di inizio e di usare le virgolette.	È da solo o con persone che conosce? Non risponda se sta dormendo, lavorando o se sta a scuola in un'aula. Se si sta spostando per più di 10 minuti può trascrivere una breve descrizione.	5	
					Da solo Con familiari conviventi Con meno di 10 anni o più Con altri familiari non conviventi Con altre persone che conosce	
07.00 — 07.10	Mi sono svegliata		A casa mia		X	07.00 — 07.10
07.10 — 07.20	Mi sono lavata					07.10 — 07.20
07.20 — 07.30	Ho svegliato mio figlio				X	07.20 — 07.30
07.30 — 07.40	Ho preparato la colazione	Ho ascoltato la radio				07.30 — 07.40
07.40 — 07.50	Ho fatto colazione	Ho letto il quotidiano				07.40 — 07.50
07.50 — 08.00	Ho lavato i piatti	Ho ascoltato la radio				07.50 — 08.00
08.00 — 08.10	Ho rifatto il letto di mio figlio					08.00 — 08.10
08.10 — 08.20	Sono andata al nido per accompagnare mio figlio		A piedi		X	08.10 — 08.20
08.20 — 08.30	Sono andata al lavoro		In autobus		X	08.20 — 08.30
08.30 — 08.40	Lavoro (prima o unica occupazione)		In ufficio			08.30 — 08.40
08.40 — 08.50			"			08.40 — 08.50
08.50 — 09.00			"			08.50 — 09.00
09.00 — 09.10			"			09.00 — 09.10
09.10 — 09.20			"			09.10 — 09.20
09.20 — 09.30			"			09.20 — 09.30
09.30 — 09.40			"			09.30 — 09.40
09.40 — 09.50			"			09.40 — 09.50
09.50 — 10.00			"			09.50 — 10.00

dalle 7.00
alle 10.00

Trascrivere una riga in verticale per indicare che è da solo o con altre persone che conosce per più di 10 minuti

Trascrivere una riga in verticale o usare le virgolette per indicare che la permanenza in un luogo o in un mezzo di trasporto dura più di 10 minuti

Trascrivere una riga in verticale o usare le virgolette per indicare che un'attività dura più di 10 minuti

Stia segnalando tutti gli spostamenti, precisando il mezzo per cui si sposta? Non dimentichi di indicare per ciascuna attività che svolge se è solo o con qualcuno!

Faccia attenzione a non indicare più di un'attività nello stesso riquadro! Ricordi di distinguere l'occupazione principale dal secondo lavoro, indicando lavoro principale, altro lavoro (secondo lavoro, ecc.)!

As one of its fundamental principles, a coding process must use a classification system harmonised at a European level³ and based on objective criteria. Consequently, it was decided to use Eurostat classification system (Eurostat, 2000), and introduce additional codes to adapt it to Italy's specific needs, though without prejudicing international comparability. Activities are classified according to a hierarchical structure, with four possible levels of details.

Each code at the highest synthesis level (one digit) is divided into sub-codes (two, three or four digits) that refer to activities evermore detailed but always part of the main category described under the one-digit code (Prospect 7.1). For example, code "021 - Eat, drink" is part of the codes that fall under "0 - Personal care", which, then again, is divided into two codes nationally introduced, "0211 - Main meals" and "0212 - Snacks, etc".

Prospect 7.1 - First digit activity codes

- 0 Self care
- 1 Paid work
- 2 Study and instruction
- 3 Household work family care
- 4 Voluntary activities, free help to others families, social and religious participation
- 5 Social life, leisure and cultural activities
- 6 Sport and open-air activities
- 7 Arts and games
- 8 Mass media e communications
- 9 Trips and displacements

The list of codes used to classify places and means of transport is much wider than the 24-code list of Eurostat, since it provides for 53 different types of places and means of travels.

7.2.1 - The assisted coding system of the daily diary

Experiences at Istat have revealed some critical aspects of manually coding the textual information of the diary (that is, "daily activities" and

³ Eurostat guidelines advise to use a mixed harmonisation approach: in input and in output. The input approach can be used mainly for the diary format and uniform classification system while the output one can be used to obtain comparable estimates.

“seen places”), and registering only the codes (Istat, 2006b). They include poor accuracy of the coding work, difficulty in monitoring the operations and the necessity of reading the paper diary to correct the errors. Consequently, it was decided to invest in innovative coding strategies to reduce the discretion of the codifiers, all the while keeping down the realisation times and allowing for an efficient monitoring.

Hence, it was decided to use an assisted coding system, the Blaise software, which supports and facilitates the work of the codifier whose critical capacity remains, though, the core of the activity (Romano et al., 2004). The assisted coding was preferred to the automatic one, deemed as not apt at taking into account the many factors that contribute in assigning the correct code.

Preliminary activities had to be carried out before developing this system, activities closely linked with the innovative choice of registering the diaries’ textual information on computer support. In particular:

- To implement the Blaise software, two dictionaries were elaborated for the activities and for the places/means of travel, registering and then re-elaborating the textual information contained in the 500 diaries from the 1996 pilot survey;
- To use this software for assisted coding, it was decided to register all textual information from the 51,206 diaries gathered, constructing a textual archive per content and dimension Istat had never pursued (Table 7.1).

Table 7.1 - Number of strings the daily diaries gathered, by type of information

	Primary activity	Contemporary activity	Place
Number of strings	1,475,246	414,979	1,221,372
<i>Number of different streaks</i>	240,252	58,345	31,791
Number of words	4,973,359	1,477,047	2,887,369
<i>Number of different words</i>	29,478	12,960	9,292

7.2.2 - Assisted coding instruments

Concretely, the Blaise software allows the codifier to have all the contextual information necessary to correctly code the activities (such as

individual and family structural characteristics). Moreover, it provides two “supports” for the assisted coding: the hierarchical coding system, with a browsable tree structure, and a dictionary (Istat, 2002b).

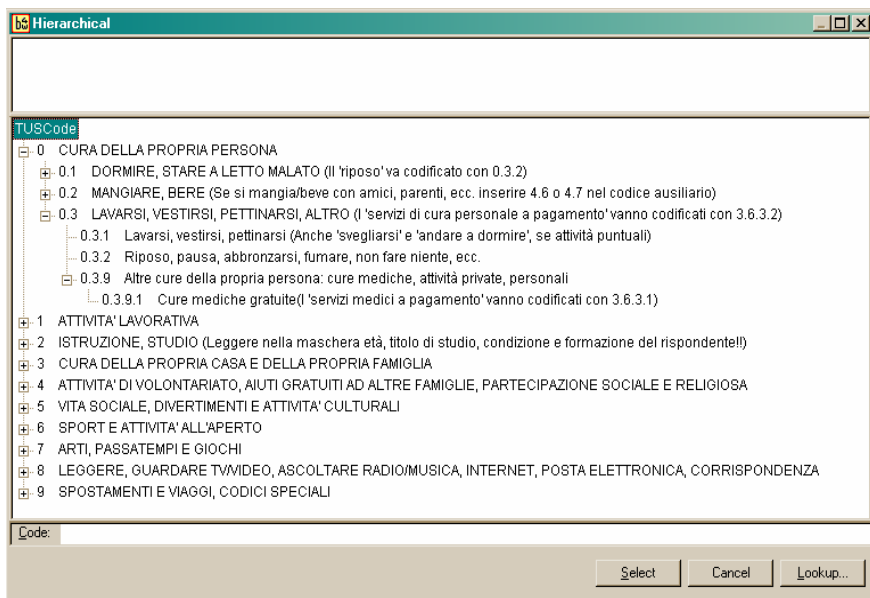
Thanks to the hierarchical coding system (Figure 7.2), the codifier can quickly see the classification adopted for the activities in its hierarchical structure. Its particular features help to find the code, such as:

- 1) Use of descriptions as explicative as possible, in particular for the more general codes, which always contain clear references to the more detailed codes under it.
- 2) Indication of other system sections in case of similar activities with different codes.

For example, code “03 - Personal care” in the hierarchical system of the software is described as follows:

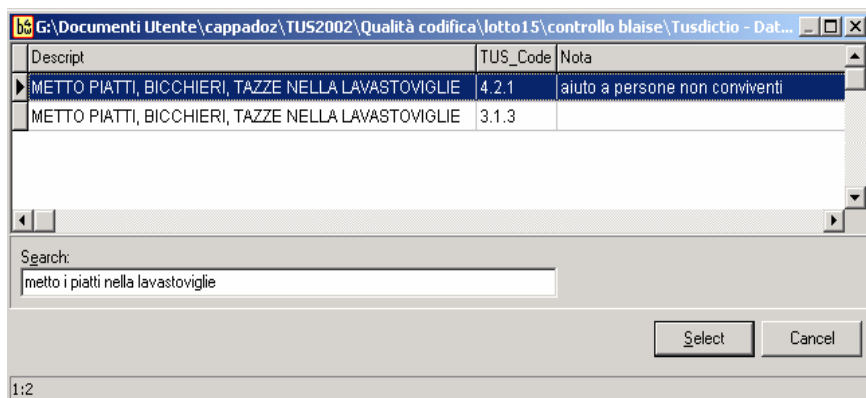
03 - To wash, get dressed, prepare, relax and other personal care (personal care services against payment are coded as 3632).

Figure 7.2 - The hierarchical coding system



The “dictionary” serves to relate the classification to the plain language that respondents use and to help codifiers clear any doubts they might have in assigning the codes and consequently the discretion of their operation. As further help, it also contains a “Note” field that displays specific syntheses as to the correct use of the various codes (Figure 7.3).

Figure 7.3 - Activity’s dictionary



The decision to introduce the assisted coding has brought many advantages, such as less codifiers, real-time monitoring of the coding operations and evaluation of the codifiers’ performances, helping identify on time any systematic error. Generally, it has helped to greatly improve the quality of the data compared to Istat’s experiences with the Time Use surveys.

A future challenge to be met regards the valorisation of the archive, as it represents an enormous informative wealth not only for analyses purposes but also to further refine the coding process. The latter aspect can be pursued both by updating the activity and place dictionaries, and by developing automatic coding software to be added to the assisted coding in cases of limited linguistic expressions and irrelevant context information.

7.3 - Data control and correction process of the daily diary

As previously seen, the development of an efficient system for producing time use data has led to innovative decisions being taken both for data registration and for coding strategies. The control and correction system of the daily diary data required planning ex-novo the strategy and the instruments to be used.

The control and correction procedure involved an integrated set of methods for treating non-sample errors, all of which strive to produce complete and coherent data (Della Rocca et al., 2004). The control and correction strategy for the diary data was text-driven since the textual information was used both to implement the corrections and to evaluate their “quality”. Hence, the process adopted served two purposes: to provide for a deterministic error control and a correction system developed with computer procedures, alternated with a manual error control and correction system.

7.3.1 - *The process phases*

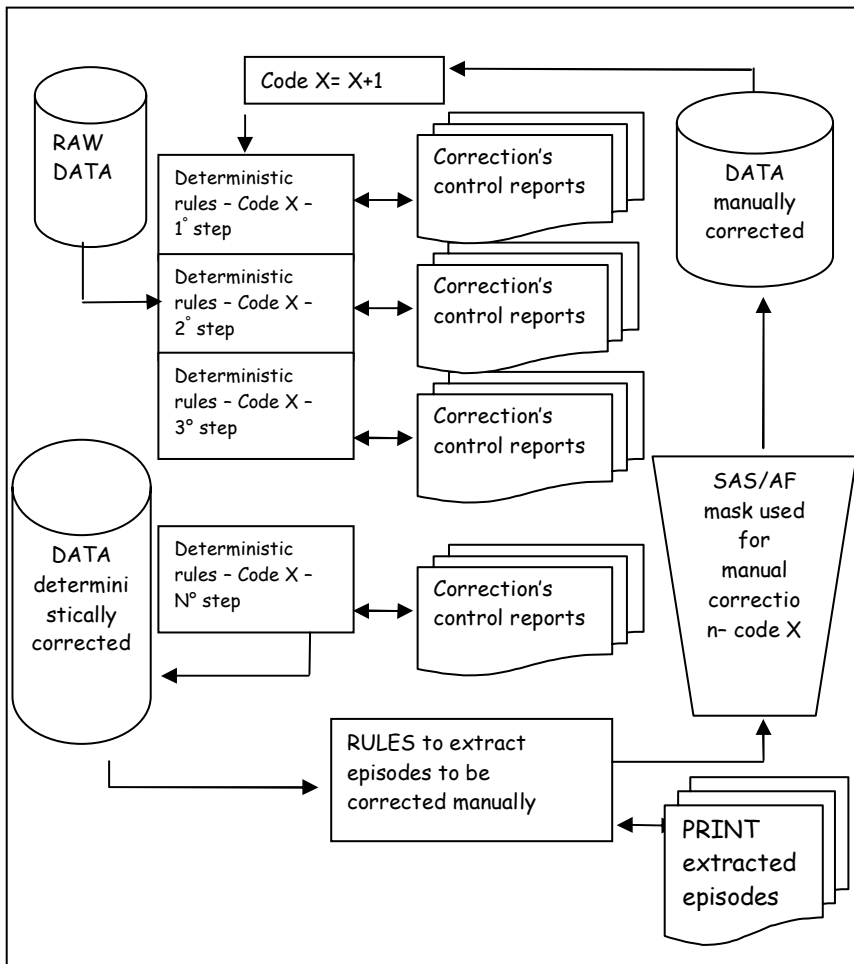
The control and correction system provided for an articulated report system (before-after controls) that verified the “quality” of the operation done. Such report, which highlights the incorrect episodes, their correction, the two previous and the two subsequent episodes, allow to keep under control not just one single correction but the whole context in which it was done. The correction rules were indeed validated only after carrying out an accurate analysis of the report. Hence, the generalised corrections were performed only when the error conditions were clearly identifiable and the correction actions identified.

A mask in Sas/af was used for editing the manual corrections in various cases, such as when it did not seem appropriate to apply the generalised correction rules as they would have caused incoherencies in the overall sequence (e.g. it might seem right to correct one single episode but the sequence would appear contorted). This was also the case when the same type of error led to two or more types of calculation based on the context, or when the correction had to be done analysing inter-individual information.

Figure 7.4 illustrates the control and correction process for code X: the various Sas procedures for its deterministic editing were performed in sequence after accurately analysing the priorities in the rules (some rules had to be done before others while others were part of a sequence

of rules). Each phase of the deterministic corrections produced a correct database and a before-after control report.

Figure 7.4 - The correction process



7.3.2 - Identification of the errors and editing of the rules

Because the data control phase is very delicate, it was decided to prepare a series of computer procedures that would reveal any possible critical aspect from the data in terms of errors found, such as:

- Registration errors (presence of codes without meaning);
- Redundant information (same code in the main activity and in the contemporaneous activity);
- Inadequate level of detail of the code;
- Episodes with missing answers in the activity or in the location code.

It revealed to be much more difficult to survey the incongruence between main activity and the contemporaneous one, between activity and place, between activity and the persons involved. The following problems were identified and resolved:

- Codification errors (incongruence between textual description and code assigned; wrong use of similar codes);
- Incongruence of the activities with the socio-personal and family information and with the type of day;
- Incongruence in the time sequences;
- Change of places without indication of a travel and vice-versa.

Some examples include assigning a code normally used for adults to classify activities carried out by children (a play between children is codified as 73, while a play activity with children carried out by an adult is codified as 38). Another example is assigning a code normally applied to an activity and carried out with other persons to an activity carried out by a person alone (code 511 indicates persons alone socialising with family members). The lack of coherence in the sequence of activities has led to the necessity of developing procedures that take into account the global vision of the diary.

During the codification phase, codifiers are instructed to use auxiliary codes in the special signal field to signal any problem that needs to be resolved in the following control and correction phase (Istat, 2002a)⁴. This, indeed, allows the researcher to choose the best solution during the data control and correction phase. In other words, even

⁴ For example, auxiliary code 11 signals the presence of several activities reported subsequently though within the same episode; auxiliary code 62 signals an activity that is not coherent with the place in which it was carried out; auxiliary code 21 signals the lack of a travel made in correspondence to a change of location, etc.

though respondents were asked to follow precise rules when drawing up the diary, it appears that some events were particularly difficult to describe.

To develop a text-driven correction, it was necessary to accurately control the textual information available. The condition was that no manipulation was to be done a priori to the textual data and that the latter became an analysis unit in applying the control and correction edits.

Though the language is subject to shared rules, it expresses meanings that can change depending on the context. Hence, at times, the description of the activities is not enough for their codification; it becomes necessary to read the context where the activity was carried out (Bolasco, 1997; Camporese et al., 2001; Fraire, 2003). Various dimensions could alter the meaning: e.g. sequence of activities, purposes, places and seasons in which they took place and linguistic capacities of the respondents (Cappadozzi et al., 2001).

Finally, not all respondents perceive time in the same way: activities carried out at the same time could be perceived differently.

A graphic form⁵, or word written as such in the text, is the simplest statistical unit: it reflects a practical, methodological and generalised choice because easily identifiable. However, their use excludes any reference to the context while grammatical and semantic ambiguities increase. To solve this problem, it was considered to apply sequences of two or more words or even of entire phrases⁶. Subsequently, during the control and correction phase, the textual information was entered through “key words” or *lexias*⁷.

The first step to designing control edits and subsequent data correction was to prepare procedures in Sas that would reveal any error. The control edits were formulated considering any interaction between

⁵ A graphic form is formally defined as a sequence of characters limited by adequate separators (space or punctuation). A. Morrone, *Procedura per la selezione di sequenze ripetute di testo* (Firenze: La Nuova Italia editrice, 1999).

⁶ A parallel with usual textual statistic techniques can be called repeated segments, or sequences of graphic forms limited by sequence separator characters, also known as poly-form because made up of sequences of graphic forms (Morrone 1999).

⁷ The *lexias* are defined as minimum lexical behaviour units whose meaning is univocal. Some examples of key words and phrases used for correction include “tv/television/television set/television news”, “lunch break”, “arrival at work/work”, “start... work/are”, the verb “to sleep” in all its declensions, etc.

codes and codes, and codes and text as well as the sequence of episodes and their inter-relation.

The implemented procedures are rather complex because of the need to identify the wrong record and the wrong sequence of records, of the possibility of using both codes and textual information and any interaction among them; and of the priority to correct.

Some examples: a) use of the code relative to the previous activity and/or following activity; b) use of the text (even of the previous and/or following activity); c) use of the place where the activity is carried out or means of transport (even the code of the previous and/or following place/means; d) use of the person's structural variables (e.g. some codes agree only with specific ages of the respondents); e) use of information on the family (for example, some codes relative to child care were different according to whether the care was given by family members or by persons outside the family); f) use of auxiliary codes.

7.3.3 - *Manual correction*

The manual control and correction system of non-repairable errors based on automatic procedures was developed, implementing an interactive, flexible and simple-to-use Sas/Af-developed software that displays the diary episodes to be corrected, the next episodes and other information on the person and family.

In the mask, every highlighted episode in orange indicated one or more error. In addition, it signalled the code of the found error (column *err*), the text of the main activity (column *datpri*) and the code associated to it (column *catpri*).

It indicated the previous five and the following five episodes, information on the duration of the activity (column *dur*), structural information on the respondent and family (gender, civil status, professional status, job, number of family components, kinship with the other members), and the number of children, if any (button *altri dati*). Finally, it included information on the compilation month (*mmdg*) and type of day (working day or holiday - *tipgio*).

Figure 7.5 - The Sas/af mask for manual corrections

anno	profam	pramid	Sesso	età	statur	ncatp	lpraz2	lpruz2	cond	professione	msidg	lpgio	
06			1	061	2	02	2	2	1	braccante agricolo	07	DUM	
ini	fin	dur	est	datipi			calpi	datcon	calcon	duogo	duogo	conchi	causi
10:40	11:00	0:20		fuori per strada			5043			per strada	50	25	
11:00	11:10	0:10		parlo con alcuni amici			616				45	05	
11:10	11:20	0:10		passeggio con mia moglie			611				50	0	
11:20	11:50	0:30		ci fermiamo a comprare dei pasticcini al bar			661				20	0	
11:50	12:20	0:30		ci avviamo verso casa			6036				50	0	
12:20	12:30	0:10	20	rientro a casa			6036			in casa mia	11	0	32
12:30	12:40	0:10		accendo la tv			621			in casa mia	11	0	
12:40	12:50	0:10		metto i pasticcini in frigo			620			in casa mia	11	0	
12:50	13:00	0:10		aiuto mia moglie ad apparecchiare la tavola			6121			in casa mia	11	0	50
13:00	13:10	0:10		pranziamo			6211	guardo la tv	621		11	0	
13:10	13:30	0:20		pranziamo			6211				11	0	

record: 408 di 425

In case of need, the button *famiglia* allowed reading the diaries of the other members of the family, in order to check, for example, the activities carried out at the same time and together with other members. The auxiliary codes were indicated in the column *causi*.

At the end of each correction, the mask displayed the status of the correction done at that moment: the number of diaries corrected and to be corrected.

7.4 - Control and correction process of the weekly diary

Another innovative aspect regarded the control and correction process of the weekly diary, which was introduced in the 2002-2003 edition with the purpose of surveying the exact daily distribution of the paid working hours over a specific week. All respondents aged 15 and over who worked at least 15 minutes during the reference week were requested to indicate the time intervals dedicated to paid work (Istat, 2006b).

Problems relative to the particular compilation modalities and to the lack of past references made it necessary to adopt a completely new approach for planning the check plan. Ever since the beginning, it was taken into consideration the possibility of using information present in the other models relative to the person, which could provide information useful for correcting the data present in the weekly diary.

The preparation of a check plan, which was logically done for all the analysis and correction activities of the gathered data, resulted in a very important document for the next operative phases. Such document helped verify, at any moment, the exhaustiveness of the controls provided and record the actual carrying out of the check and correction activity. Moreover, it guaranteed the accuracy of the activities and allowed doing a logic separation between conceptual moment and operative moment of the check (which, sometimes, involved separating the functions from the human resources involved). The analysis was done according to the possibility of defining formal edits, closely dependent on the nature and structuring of the information, and on the existence of compilation rules to be given to the respondent who must respect them to avoid incongruent information. Initially defined at a theoretical level, the check plan was subsequently integrated in order to provide for controls capable of discovering incoherencies initially not expected but which showed up when analysing the data.

The attention in the first phase was given to possible errors in the weekly model only, divided in two macro-categories: errors in a single work interval and errors in the overall work time of a day or week, that is the sum of a day's working intervals.

In order to represent the error as best as possible, it was decided to produce reports that would add to the information of the day containing the incorrect interval also the general situation of all the days of the week of the respondent.

Errors in a single work interval were, in most cases, corrected, considering the information from the other working days, if present, of the weekly diary. In case of “standard” days describing equal or similar work intervals, such similarities allowed to perform the correction. The following example shows an error in the first working interval of the second working day (Tuesday), which ends at a formally wrong working hour⁸ since the minutes ending the interval present a cadence different than the quarter of hour. In this case, it was easy to perform the deterministic correction as it required only visualising the working intervals of the other days, given their repetitiveness.

As regards the problems of working time calculated from each interval recorded in the weekly diary, controls were hypothesised for revealing “suspect” situations, which not necessarily implied anomalies but did require to be verified. However, the complexity of such verification required to have the whole set of data on the respondent’s working situation from the weekly diary and, where possible, from the daily diary and individual questionnaire.

Hence, an instrument had to be developed to visualise contextually all information relative to the person simply and quickly in order to perform qualitatively higher analyses and corrections, to manage highly difficult cases of error and perform accurate corrections.

Of course, it was necessary to view the daily diary’s information only when the day described was one of the working days part of the weekly diary’s week.

7.4.1 - The automatic correction

By evaluating the respondent’s overall situation, it was possible to identify types of error subsequently corrected by means of adequate automatic correction procedures.

For example, when no lunch or dinner breaks were recorded, massive correction was performed because of the extent of the error and, in many cases, the impossibility to compare the data with the daily diary (either lacking or not filled in one of the “useful” days).

The non-recording of a break generated indeed higher working intervals of six hours. Such intervals were then object of careful analyses in order to develop efficient correction edits for calculating the

⁸ The weekly diary provides for a fixed hour scheme that, for every day of the week, divides the daily 24 hours into 96 15-minute intervals.

lunch/dinner break and divide the working interval. For example, it excluded the need to perform corrections when the “long” interval was accompanied by other working intervals within the same day: the day presented itself as a “segmented” working day.

In the other cases (one single higher working interval of six hours, without other intervals), it was deemed necessary to proceed with the correction because the non-indication of the lunch/dinner break probably derived from the respondent not reflecting on the fragmentation of his/her own day.

7.4.2 - Comparison of the working times: the “hour window” of the daily diary

The application that enables to contextually view every day of the described working week and “attach” it to the information from the daily diary where possible, served also the purpose of evaluating the so-called “hour window” of the daily diary. The “hour window” of the daily diary is the episode or group of episodes of the daily diary that corresponds, temporally speaking, to one or more working intervals described in the weekly diary. The analysis of the “hour window” allows answering the question: “What activity does the person declare to have performed during a specific time interval described in the weekly diary?”. In other words, it intends to verify whether the persons’ declarations regarding the working times can be considered as plausible or not, in case of suspected error.

Such application allowed to view, every day of the described working week for every person, especially the record or records that caused the error, and contextually the information of all episodes of the daily diary.

The evaluation of the daily diary enables, for example, to calculate, in the weekly diary, the working hour scheme and solve the missing partial answers (of that specific day of the week).

On the other hand, the operation was symmetric: the higher accuracy of the weekly diary allowed to identify codification anomalies in the daily diary when there were no indications of “wrong” intervals (Paragraph 7.4.3).

The daily diaries were carefully read only to evaluate the day that indeed coincided: there is indeed no sufficient reason to believe that the other days of the described week are similar to the one described in the

daily diary, nor that the days of the weekly diary each other as regards the working hours.

7.4.3 - Beyond the check plan: an example of wrong compilation of the weekly diary's hour scheme due to indication of "wrong" working intervals

Despite the initial studies carried out in view of preparing an articulated and deep check plan, the analysis of the data sometimes reveals unexpected situations.

For example, the survey revealed groups of persons who wanted to indicate having worked, maybe due to the psychological pressure or "weight" of their working activity, or to self-declare their activity as important. Likewise, other persons felt they had worked during the reference week even though, in reality, the activity they describe could not be really considered as a job.

Errors of interpretation were identified for some subjects, after viewing the activities actually carried out during the day described in the daily diary (where present), evaluating the age of the respondent and how they see themselves:

- Home makers; the working intervals actually described the home activities carried out in their own house and thus non-paid;
- Persons who carry out voluntary activities;
- Persons who freely help family members in their activity (e.g. retired persons who help their children or persons who help their spouse in their shop);
- Persons who indicate job searching a working activity;
- Persons who carry out their own activities for personal or family purposes (e.g. painters who work in their own house);
- Persons who inappropriately identify the activity carried out as work (e.g. students who are at school or persons who take care of the family's garden and land without being farmers).

7.5 - Correction of the quantitative variables of the individual and household questionnaire

Numerous methodologies can be used to correct quantitative variables (deterministic, donor, regression, etc). Each one of these meets specific objectives of data correction and presents both advantages and disadvantages. In our case, most of the quantitative variables were corrected by means of the regression imputation method, which, according to Grande and Luzi (2002), “adapts well” to the quantitative variables. Among its advantages, it enables to preserve well the original distribution of the variable under correction and its association measurements with other variables; moreover, it allows to impute (unlike the donor model, for example) values that were not observed in the initial distribution, calculated on the exact records. Finally, it has proven to be very efficient when the initial distribution was not considered reliable and therefore, deemed best not to keep it⁹.

Because there were so many cases of errors to be submitted to correction, it was necessary to resort to two different correction methods:

- a) Deterministic method: in many cases, it is useful for the preliminary editing of the variable, as it corrects some of the possible wrong values, and is applied during the imputation phase where possible;
- b) Multiple regression calculation: it is applied to univocally identify the correct value.

The control and correction process of the variables includes the following steps:

- 1) Definition of the types of possible errors: missing values, undue answers, non admitted values, outlayer, incompatibilities with values of other quantitative variables;
- 2) Analysis of the distribution of each variable (mean, standard deviation, and so on), calculation of the rate of non-response, evaluation of the presence of a distortion, and finally the control

⁹ Nevertheless, this method presents some defaults: the regression imputation can induce distortions in the distribution of the variable submitted to correction, and in the association measurements with the variables not used in the regression model. Moreover, it is necessary to prepare a different model for each variable (problem that has been in part solved thanks to the used software), and, in case parametric regressions are used, it requires formulating hypotheses on the form of distributions of the variables involved. Finally, the calculation can be influenced by abnormal values present among the exact records, when not excluded by the distribution.

- of the logic-conceptual link between the variable to be corrected and the other information held in the questionnaire;
- 3) Analysis of the statistical associations between the variable in object and other variables (quantitative and non) logically linked to it, to identify, on the one hand, the distortion and, on the other hand, variables to be included, as regressors, in the imputation process;
 - 4) Identification of the correction strategies: applying either the deterministic method or the regression calculation, or both of them;
 - 5) Defining the correction steps: definition of the correction sequence of the variables, should one of these be included among the regressors in the imputation model of the other variables;
 - 6) Structuring of the SAS mputation programmes (usually after the data correction takes place) resorting to the *IVEware* in case of regression imputation;
 - 7) Control of the imputation result by comparing the distribution before and after the correction, throughout the instruments described in paragraph 7.5.3.

7.5.1 - Combinations of correction methods

It was usually sufficient to apply the *deterministic method* when the correction of the values was univocally determined.

The *regression imputation* (as sole correction method) was used when variables, that presented no wrong values but only missing responses, did not require applying deterministic corrections, when no systematic errors were found in the original distribution and when the values had to be calculated considering a high number of data.

It was decided to *combine both methods* to all the variables that presented situations ascribable to both groups previously described.

7.5.2 - Implementation of the corrections

The deterministic rules (that is correction and imputation) were implemented directly in Sas, while the multiple regression imputation was done using a specific Sas application, called *IVEware*¹⁰. Such

¹⁰ It was developed by a group of researchers from the Michigan University and freely distributed on internet: <http://www.isr.umich.edu/src/smp/ive/>.

software enables to manage cases of non-responses (which are not due to distortions), deals with complex data sets and can be applied in cases of high number of variables, both continuous and categorical. The imputation strategy is based on a series of multiple regressions, which differ according to the characteristics of the variables to be calculated: e.g. a linear regression in case of variables defined as “continuous”, a model based on the Poisson¹¹ distribution in case of counting variables (that is, with no negative values).

This software allows calculating one or more variable considering a set of co-varied variables previously selected and which become regressors in the process. It is possible to choose such regressors by identifying variables that present a statistical association, not necessarily high, with the variable to be corrected. In addition, it allows setting limits to the imputable values to avoid calculating extreme values, even though they are admitted in the variable to be corrected. These limits can be specified in a rather complex way, that is, considering the links with the values other variables assume.

Finally, it is possible to calculate the values even only for a subset of the records.

7.5.3 - Control procedure

The control procedure involves identifying a set of indicators and instruments useful for evaluating the correction process and the threshold beyond which the variations in the corrected variable are no longer acceptable. The following indicators were calculated for each variable, except in some rare cases:

- Error incidence, by typology of error (as previously described), before and after the correction; as regards the outlier, only a reasonable share remained after the corrections;
- A distortion index of the mono-varied distribution of the variable under correction;

¹¹ For further information on the methodological aspects of the software used, see Raghunathan T.E., Solenberger P.W., Van Hoewik J., *IVEware: Imputation and Variance Estimation Software - User Guide* (University of Michigan, 2002), 11. Per ulteriori informazioni sugli aspetti metodologici sottostanti al *software* utilizzato si rimanda alla pubblicazione sopra citata e a Raghunathan T.E., Lepkowski J.M., Solenberger P.W., Van Hoewik J., *A Multivariate Technique for Multiply Imputing Missing Values Using a Sequence of Regression Models* (Survey Methodology 27, n.1 2001, 85-95).

- The percentage variation of some distribution statistics: mean, median, mode, standard deviation;
- Values of the Cramer V index, which measures the association of the variable to be corrected with other variables, before and after the correction, and its percentage variation;
- The bar graphs of the mono-varied distribution before and after the correction, in order to graphically overview the impact of the correction process.

7.6 - Conclusions

Undoubtedly, many approaches allow the increase of the data quality: each one of these can be more or less opportune and valid. However, a real improvement in the quality results from the methodological and theoretical decisions taken: it is best to balance costs and benefits given that the objectives remain always the one of data quality. The strategy for the correction system, characterised by an interaction between the general deterministic procedures and the manual corrections, and by the specific control and correction plans of the quantitative variables and the weekly diaries, together with the control of the reports has proven to be timely and innovative. In addition, the investment sustained for registering the alphanumerical strings has enabled to extend the quality control system of the codification and correction work and to evaluate precisely the correspondence between text and code. While the registering of the strings has made the correction system more complex, the codes have been better specified and made more precise. All this has ensured a high level of quality and congruence of the micro-data.

Finally, in the future, a careful analysis of the most frequent errors could allow to identify the weak points of the classification system and of the codification process, always with the objective of improving the quality of the data.

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8. Time Use and Labour Force: a proposal to integrate the data through statistical matching

8.1 - Introduction

Statistical matching techniques can be used to combine and enrich information gathered from various sample surveys. The idea is not new and can be dated back to the 1960s when National Statistical Offices began to diffuse public use files. These techniques were looked upon with a justified mistrust, especially because of the assumption of conditional independence underlying their use. In the past years, though, they have been the object of a growing interest: as new methods and procedures to solve any problem linked with their use have been elaborated, their experimentation has even been developed in some cases.

This has particularly been the case for the National Statistical Offices (see, D'Orazio, Di Zio, Scanu; 2006 and Raessler; 2002).

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In Italy, statistical matching have been experimentally carried out by the Italian National Statistical Institute (Istat) has illustrated in D'Orazio, Di Zio and Scanu (2006), De Rose, Parisi and Liseo (2006) and Schoier *et al.* (2006).

Istat's sample surveys represent the ideal environment to experiment the potentialities of the statistical matching methods. Integrated data allow using the informative wealth that comes from the surveys originally designed to answer to different needs. In this work a particularly interesting case will be considered: it regards the integration of data that come from two important Istat surveys: the Labour force survey (hereafter called Lfs) and the Time use survey (hereafter called Tus). The objective of this integration is to create at a micro level, a synthetic file of both surveys that allow us to study the relationships between variables measured in each specific survey. To create an synthetic archive becomes easier when there is a wide set of common variables and when it is possible to exploit similarities between the survey designs as it happens for Lfs and Tus Surveys: these two surveys have been designed harmonising the definitions adopted and the formulation of the questions. In particular, the questions aiming at identifying the condition of "employed", present a high level of harmonisation¹.

The chapter is structured as follows: after describing in paragraph 8.2 the two surveys and the characteristics that can ease integration of the data collected, some topics are identified in paragraph 8.3 which the integrated data will help study more in-depth. The main ideas and some technical details of the statistical matching methods are recalled in paragraph 8.4. Paragraph 8.5 shows how these techniques are applied to create an integrated file based on the data coming from both the Time use and the Labour Force surveys. Finally, paragraph 8.6 reports some concluding considerations.

¹ In order to reach a better correspondence between the definition of employed as shared at a European level and its operative translation, in both surveys, the surveying of the condition of employed is no longer based on the subjective condition the subject declares. The questions held in the questionnaire directly refer to the working situation relative to a specific week, usually the one before the interview. First, the respondent is asked whether, during the reference week, he or she has worked at least one hour (a job which provides for a pay or a non-paid job if regularly carried out in a family member's company). Subsequently, if respondent has not worked during such a week, the respondent is asked whether he or she was absent from work during that period.

8.2 - Time use survey and Labour force survey

To integrate these two sources means to have great potentials for studying the peculiarities of work and life quality in Italy. By using together the data relative to the specific variables of both surveys, one would be able to analyse the characteristics of employment and the time balances at the same time. Hence, on the one hand, the subjective information and the organisation of the life times will help enhance the analyses of the labour market. On the other hand, the analyses of the working condition characteristics that result from the labour force survey will integrate the Tus more general analysis of the quality of life.

The possibilities for a reciprocal enrichment have been largely recognised (see the 17th *International Conference of Labour Statistics* in 2003 and the 2003 and 2004 works of the Paris group). The emphasis was indeed put on how the integration of the two surveys could contribute to analysing the different participation modalities in the labour market determined by hour and contract flexibility. During the 17th International Conference of Labour Statistics “*participants supported the work carried out by the ILO in this field and agreed fully with the need to revise the current standards, given the crucial role of working time in both economic and social domains. Several raised the need for guidelines on: (...) the usefulness and limitations involved in using and combining various sources, such as labour force and time-use surveys, for improving data quality. (...) Time-use surveys are useful, especially for measuring hours worked of workers in the informal economy, in home-based work, and by the hidden or undeclared workforce, as well as to measure absence from work*”.

8.2.1 - The Time use survey

The Time-use survey is very productive and detailed as regards the dimensions relative to the organisation of the life times and to the perception of life quality. In accordance with Eurostat guidelines, the 2002-2003 survey was carried out using individual and household questionnaires as well as daily and weekly diaries to study the daily time division of people living in Italy.

Many different methods can be applied to analyse the data gathered, each of which with the purpose of understanding better the behaviour

² Ilo (2003), 17th *International Conference of Labour Statistics*, Final Report.

people assume with respect work experience, especially as regards employees.

All this is in full harmony with the strong inter-connections recognised between the labour force surveys and the time use surveys. Among their main objectives, they indeed aim at contributing in formulating work policies (providing more reliable data on the hours worked and on the new more flexible forms of work organisation) and better family policies (analysing the difficulties of reconciling work with running a family).

In relation to work-family reconciliation, the Italian survey questionnaires have allowed studying the modalities people adopt when organising their work (usual work hours, frequency of overtime work, second job, atypical work contract, etc) and how they use the labour market's flexibility instruments (part-time, flexible start and end of working hours, parental leaves, etc). They also enable us to examine the difficult superimpositions of the various life times with the work times for some specific professional categories³. In addition, a lot of attention was given to persons not present on the labour market (either because they have left it or because they have never even entered it) and job seekers, though always keeping in mind family conditioning on the participation in the labour market. Finally the picture that emerges from the "objective" life condition of the interviewee is enriched and completed with the interviewee's degree of satisfaction regarding his personal time organisation and various daily life contexts.

Since the daily diary helps measure the time dedicated to the various daily life activities, it enables us to contextualize each work interval (or any other activity) carried out on a specific day (randomly assigned to the sample household and all its components) into a 24-hour period. Hence, it enables to estimate the time dedicated to daily work and to study its level of "fragmentation" (number of intervals/interruptions), flexibility (exact start and end of working hours) and intra-relations with the other life times. In addition to the intra-individual analyses, the inter-individual analyses help highlight the connection between work times and life times of the various members of the sample household.

³ Istat has published in 2006 the results of a first analysis carried out on the forms of superimpositions between work times and life times.

The weekly diary surveys every paid work interval carried out on each day of the reference week. The information gathered is specifically used for analysing the *working times*; it integrates data of the daily diaries in order to provide a complete picture of the working week (that is, the reference week most suitable for surveying the *working times*).

8.2.2 - *The Labour force survey*

The Labour force survey represents the main informative source for studying the labour market. This survey is carried out in every country of the European community in accordance with the standards established in Eurostat community regulations. Every three months, it provides official estimates on the number of employed and unemployed persons, rates of activities, employment and unemployment, etc.. Since 2004, the Italian Lfs has been restructured: its informative contents have been enlarged and its methodologies modified⁴. The vastness of the information gathered allow us to examine the peculiar aspects of the Italian participation in the labour market: professional condition, economic activity sector, type of working hours, job duration, profession carried out, etc. Moreover, it is also possible to investigate dimensions relative to the quality of the job (for example, in 2004 and 2005, estimates were provided on the under-employed in relation to hours worked and on the employed in relation to the education degree obtained).

8.3 - **Integrated use of data from the two surveys: potentials and topics of interest**

Participation in the labour market is a complex phenomenon. In addition to what the traditional indicators describe, it involves a wide range of modalities and intensities in attitude and behaviour.

⁴ The passage from a quarterly survey to a continuous survey has allowed restructuring it in terms of contents and methods. The contents have been made conform to Eurostat definitions and have been extended. While the survey used to gather information on the first week of the three-month period, it is now carried out on all 13 weeks of the same period. As regards the survey technique, it is carried out through an electronic questionnaire according to a mixed Capi/Cati survey technique. Previously, it was carried out by means of face-to-face interviews and a paper questionnaire.

To obtain further information on the subjective aspects of labour market participation, it is not enough to simply identify the aggregate of employees and describe main features of the work activity. Likewise, they do not provide data on the individual strategies adopted to optimise the level of family-work reconciliation. These strategies could be a non-voluntary part-time job or could involve opting for a different hour regime to fit the family life organisation.

Various different aggregates can be identified within the inactive population based on the attitudes and behaviours of the persons involved. Some of these aggregates include, for example, the so-called “grey area”, or people who do not officially appear as job seekers from a strict definition viewpoint but who closely “gravitate” around the unemployment area. They become the object of strategic analyses for labour policies because they indeed identify the areas of possible interventions for heightening participation rates.

The employment’s “weak” areas and the inactivity’s “strong” areas, thus, reveal the dimension of the “*potential labour supply*”⁵, a dimension that can also be examined from the Time-use survey’s perspectives.

The complexity of these participation forms can be analysed based on both surveys, using to the fullest, the strong points of each survey.

The Lfs better defines labour market aggregates and presents highly detailed information on the non-standard work activities. Especially as regards part-time workers, workers with a fixed-term contract and freelancers, it includes a set of questions that allow us to examine the characteristics of the job, the motivations, whether the decision for the non-standard work activity was voluntary or non-voluntary.

Compared to the Tus, the Lfs surveys at a higher level of detail the economic activity sector and the profession carried out.

Finally, it also includes specific information on the weekly working hours (usual and real working hours of first job, usual and real working hours of any possible second job), on the wish of having different working hours than those worked during the reference week and the real availability to work a different number of hours. The combination of these data allow us to construct the aggregate of under-employed in

⁵ OECD (2002), *The Potential Labour Supply*, in Acts of the 20^o meeting of the Working Party on Employment and Unemployment Statistics. Paris.

relation to hours worked, which identifies a labour force which is potentially on the labour market.

From a more general perspective, the Time Use survey provides wide and detailed information on the life conditions of the various social aggregates of interest (workers, specific professional categories, job seekers, the unemployed, etc). It supplies data on the use of the working times per types of respondents and work typologies. Hence, it allows us to study the working life models, relating them with the time dedicated to other activities (sport, personal care, travel, etc) and with the respondents' level of satisfaction. Moreover, the information on the working times can be enriched with the data relative to the workplaces and to the territorial mobility for work reasons. The latter includes all the journeys made to reach the workplace as well as all the journeys made during the working hours. It also allow us to estimate the brief pauses or lunch breaks made during the working hours.

Because the Tus helps us to estimate the proportion of persons employed in a work activity in every hour of the day, it makes also possible to identify the types of workers for whom the Lfs's traditional questions have more difficulties in indicating precisely the working hours. Likewise, it is possible to study the professional categories whose working hour modulation differs from the traditional one (9:00-17:00). The categories of teachers is a good model of atypical employment: they often work outside of their usual working hours (correction of paperwork at home) and often have some difficulties in indicating precisely the time of paid work.

While the many common variables facilitate the construction of particular profiles, additional analysis variables specific to each survey can further be associated to them. For example, it is possible to construct in each survey the profile of a Southern woman who lives with a partner, has a young child, works part-time and has a fixed-term contract. On the one hand, specific variables of the Lfs can be associated to this profile, such as the incidence of under-employment in relation to the hours worked, details on the profession, etc.. On the other hand, variables included only in the Time Use survey can also be associated to it: distribution of the weekly working hours, super-imposition of the working activities with the family care activities, level of satisfaction expressed, etc.

In the case of the above profile for example, statistical matching could make it possible cross-tabulation of the variable "wish to work

more” (Lfs) with the variable that regards the organisation of the daily activities (Tus). Hence, it allows us to analyse how the availability to work more reconciles with the organisation of the other life times (especially the time devoted to caring for the family).

8.3.1 - Participation in the labour market, working times and life times

In general, the interesting aspect of using statistical matching for these two surveys regards the analysis of the working times using the survey strategies typical of the Time Use surveys.

In addition to the traditional analyses that can be carried out using the two surveys autonomously and independently, original analyses on topics particularly important for examining the Italian participation in the labour market are possible, including:

- The dimension of the *Working Time Arrangements*, that is, the analysis of the hour schemes adopted in the flexible forms of employment;
- *The under-employment*, with relative analysis of the life times and daily activities of the under-employed in relation to hours worked;
- *The super-imposition of the times*, and the analysis of the segments of super-imposition among the life times as regards some important aggregates of the labour market (such as the self-employed, who often have some difficulties in clearly dividing the times dedicated to work from the times dedicated to other activities);
- The analysis of the *life quality* by specific aggregates of the labour force.

Analysis of data about working hours in data combined by statistical matching could also form the basis for verifying and improving the estimate of the hours worked in the new national accounting system (European System of Accounts or ESA95), which has introduced additional analytical accounting schemes⁶.

The Time Use surveys offer an important opportunity for comparing the estimates of hours worked with the traditional sources (Labour Force, National Accounts), fully aware that their function is not

⁶ It is believed that the diary method is the most apt at “capturing” the complexity of the daily working time (Robinson J.P. and Bostrom A., 1994), especially when the weekly working hours are particularly high or irregular.

only to help better understand the data deriving from the traditional sources but also to produce data that have their own intrinsic importance.

8.3.2 - Strategies to collect integrated information

Of course, should we deem the information typically gathered in time balance surveys interesting for analysing people's behaviours towards work, it might be possible to hypothesise alternative strategies to obtain integrated data. Each strategy presents its own advantages and limitations: the Time use survey could be enriched with questionnaire sections that cover more in-depth employment and could be based on alternative activity classifications (a similar procedure is proposed in Campostrini, Giraldo, Parise and Trivellato; 2001). Such a hypothesis is difficult to realise; any further burdening of the already complex Time use survey instrument will have consequences both on the survey costs and on the quality of the data that would derive from it.

Another suggestion among those proposed in the afore-mentioned Paris Group's papers is to enrich the Lfs with a supplementary weekly diary (to be submitted only to a unit sub-sample) to be done on a regular basis (for example on an annual basis). This would balance the estimates of the hours worked obtained from the Rcl survey. The scopes of this procedure, which is not cost-excessive and only slightly increases the burden on the respondent, would be more limited.

The most concrete immediate possibility, and with obviously much lower costs, regards the use of statistical matching techniques: this is described in the next paragraph and exemplified with an application in paragraph 8.5. Our objective is to give some idea of the quality of the information that can be drawn from the synthetic files constructed by means of these techniques. Obviously, the informative contribution can only be complete and not substitute the wealth of information that would result from a direct survey carried out according to the above-described strategies.

8.4 - Statistical matching techniques

8.4.1 - Statistical matching: an introduction

Instead of setting up new surveys, informative needs can be resolved by means of already available (but incomplete) sources of data,

such as administrative data or sample surveys. The use of integration procedures, when compared to the set up of new surveys is profitable in many ways such as reduction of response burden and reduction of expenses.

The main target of statistical matching is the integration of the statistical information available in different data sets. More precisely, let A and B be two independent sample surveys of size n_A and n_B respectively and such that (Figure 8.1):

- the two samples contain distinct units (the samples do not overlap);
- the two samples contain information on some variables X (common variables), while other variables are observed distinctly in one of the two samples, say, Y in A and Z in B .

Statistical matching techniques produce a *complete* but *synthetic* data set, i.e. a data set which contains joint information on X , Y , and Z . As a matter of fact, this problem can be managed as a problem of treatment of data sets affected by missing data. As a preliminary step, the two sources need to be appropriately harmonised in terms of definitions, concepts, units and classifications.

Figure 8.1 - The two rows represent files A and B respectively. Missing data are the blank squares

Y	X	Z

It is possible to define two distinct approaches. The first approach tackles the problem of missing data by means of imputation procedures (see for instance Singh *et al.*, 1990). A second approach is appropriate when the goal is the direct estimation of some parameters. In this case, it is not necessary to create a complete and synthetic data set, but *calibration* estimators can be considered (see for instance Kroese and Rennsen, 2000).

8.4.2 - Statistical matching techniques

The Statistical Matching techniques that can be used to create a synthetic complete dataset are frequently based on imputation methods. Imputation techniques deal with missing values, they fill in missing values with other admissible values, and therefore can be used to complete white areas in figure 8.1 (i.e. the missing values) by imputing them record by record. In such an approach the final objective is a “micro” objective. In general, statistical matching techniques can be classified in three groups: (a) nonparametric techniques, (b) parametric methods and (c) mixed methods.

In the nonparametric techniques it is worth considering those based on *hot-deck* methods. Hot-deck methods fill in the missing values by substituting them with values observed on other records in the same survey. In particular, if the objective consists in the completion of dataset A (Figure 8.1), hot-deck methods will search file B for a similar record (donor record) to the one to be imputed (recipient record). Once this record is identified, its values for the Z variables will be attached to file A. Hot-deck methods can be divided in three broad groups (for simplicity we will focus our attention on the case of three univariate variables, X , Y and Z):

Random hot-deck: each record in file A is completed with the value of Z observed on a unit randomly chosen in file B. Usually random hot-deck is performed within imputation classes defined using the values of the common variable X , usually named *matching variable* (this is quite simple when X is a categorical variable).

Nearest neighbor hot-deck: a distance measure is chosen (e.g. Mahalanobis, Euclidean, etcetera), then the distance among each record in file A and all records in file B is computed. The value of Z to be imputed in file A is the one corresponding to the record in B at the minimum distance. The distance is computed using the values of the common variable present in both the datasets, i.e. X .

Rank hot-deck: the units in both the files A and B are ordered according to the values of the common variable X . Then, file A is completed by matching each record in it with the corresponding record in file B having the same percentage points of the empirical distribution function computed for X .

The statistical matching parametric methods rely explicitly on a parametric model whose parameters are estimated using data in A and B. In the second step, the estimated model is used to impute the missing

values by randomly selecting values from the estimated probability distribution function, or by imputing the conditional mean value from the estimated model. A classic example is represented by linear regression. In this case, data in file B are used to estimate the linear regression model of Z vs. X (this happens when the objective is that of imputing Z in A). Once the model has been estimated, missing values of Z in A are predicted by applying the estimated regression model for each value of X in A; sometimes a random residual is added to each predicted value.

The third group of methods, the mixed ones, consists in a combination of a parametric model with a nonparametric model. In such a way it is possible to pull together the advantages of both the methods. In particular, a model is used to define the relationships among the variables (advantage of a parametric approach) then a nonparametric procedure is applied to impute the values observed in the survey (advantage of the *hot-deck* techniques). Thus, in practice, a model is estimated and its predicted value is used in the computation of the distance among records (*hot-deck nearest neighbor* is applied).

8.4.3 - The Conditional Independence Assumption

The main objective of statistical matching techniques is to gain joint information on variables that are actually observed in distinct data sources. In a statistical matching micro approach, the main goal is to obtain a data set comprehensive of all the variables that are not jointly observed. From the previous discussion, it clearly follows that the statistical matching problem is not (only) a technical-informatical problem, but also a statistical problem. In this context, a statistical approach to the integration of data sources may greatly improve the use of information from different sources. In the statistical matching problem, the available information is about the couples of variables (Y,X) and (Z,X) , while there is no information on the couple (Y,Z) . In this framework, if the objective is to estimate the joint probability distribution $P(X,Y,Z)$, some assumptions concerning the relationships between the variables (Y,Z) are required. Under the conditional independence assumption (CIA) between Y and Z given X , $P(Y,Z|X)=P(Y|X)P(Z|X)$, the joint probability distribution can be written as $P(X,Y,Z)=P(Y,Z|X)P(X)=P(Y|X)P(Z|X)P(X)$.

In the latter case, files A and B contain sufficient information for the estimation of the two conditional probability distributions. In

general, it is possible to state that most of the statistical matching procedures applied without the introduction of additional information on the couple (Y,Z) assume (implicitly or explicitly) the conditional independence of Y and Z given X .

The following example clarifies the concept of conditional independence in the context of statistical matching. Let X be a categorical variable concerning a geographical partition of a country, for instance Northern Country, Central Country and Southern Country. Let us suppose that the marginal relationship between Z and Y is negative, while the relationship between Z and Y conditionally on X is positive (Figure 8.2). When one of the previously discussed methods is applied, that implicitly assumes the conditional independence, a data-set like that in Figure 3 would be obtained. In this case, the marginal relationship between (Y,Z) is respected, while the independence between Y and Z within the geographical area can be noticed.

Unfortunately, the conditional independence assumption cannot be verified with the data set at hand, since there are no observations with all the variables (Y,Z,X) jointly observed. This assumption must be supported by a priori knowledge of the phenomenon, or by the use of proxy variables on which this hypothesis may be verified. Indirect confirmation of the conditional independence assumption may be derived by analyzing the results obtained by means of techniques based on CIA, for instance by verifying whether some expected results are manifestly violated. A further validation of the CIA may be carried out by using techniques developed in the context of the so-called *identification problem* (see D'Orazio *et al.*, 2006b).

CIA may be avoided when auxiliary information on the variables not jointly observed is available. Techniques used to incorporate auxiliary information in a statistical matching procedure are described in D'Orazio *et al.*, 2006b.

8.4.4 - Possible extensions

When the conditional independence assumption does not hold, it is possible to consider alternative solutions. These can be broadly clustered in two groups of methodologies: methodologies which make use of auxiliary information and methodologies that study parameter uncertainty due to lack of joint information on the variables of interest.

These two alternatives should be taken into consideration if the conditional independence assumption is not appropriate for the surveys Tus and Lfs.

Figure 8.2 - A population to be represented by statistical matching characterized by a marginal negative correlation between the variables Y and Z and by a positive correlation between Y and Z conditionally on X

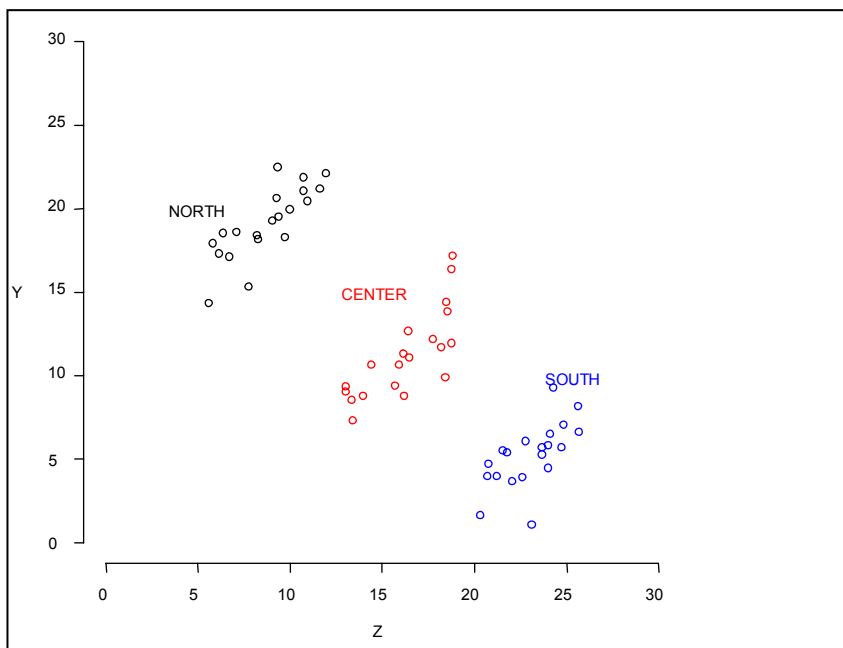
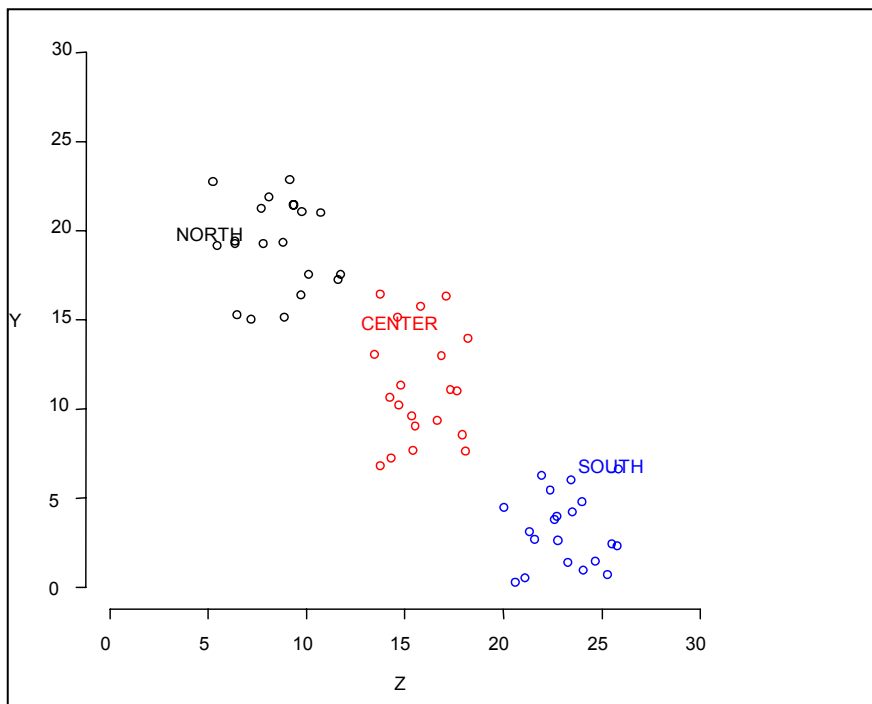


Figure 8.3 - The population actually obtained by means of a statistical matching procedure applied on two data sets A and B where only the couples (X,Y) and (X,Z) are observed respectively



Use of auxiliary information

Auxiliary information may consist of (1) further data sets containing joint information on the variables of interest; (2) information on some parameters describing association between the disjoint variables (e.g. correlation coefficients).

In both cases, all imputation methods (i.e. parametric, non parametric and mixed methods) should take into account the relationship between the variables suggested by the auxiliary information (see Paass, 1986, and Kadane, 1978, for parametric methods; Singh *et al*, 1993, for non parametric methods). Particularly interesting is the approach in Renssen (1998). In that case, the problem is the statistical matching of sample surveys drawn according to complex survey designs. The method is

parametric (the model consists of regression functions) and coincides with the application of methods of calibration of survey weights (constraints are given by the observed totals of the largest files).

Uncertainty

When auxiliary information is not available and the conditional independence model cannot be assumed it is only possible to study how uncertain are those parameters that describe the relationship between the never jointly observed variables Y and Z . More precisely, this approach consists in detecting all the parameter values that are equally sustained under a fixed criterion. Usually, the criterion is the maximum likelihood paradigm and uncertainty is described by all the maximum likelihood estimates of a parameter. This approach is based on considerations in Rubin (1974), where it is explained that a data set affected by missing data as in Figure 1 leads to non unique estimates of association parameters (as the correlation coefficient) between Y and Z . The set of maximum likelihood estimates take the name of *likelihood ridge*. These ideas were first discussed in a statistical matching context by Kadane (1978), and further studied in Rubin (1986), Moriarity and Scheuren (2001, 2003, 2004), Raessler (2002) and D'Orazio *et al* (2006a, 2006b).

8.5 - Some preliminary results

8.5.1 - The data

In order to undertake an experiment of integration of the two surveys by using statistical matching techniques, the Tus Survey has been considered as the recipient survey and Lfs Survey has been considered as the donor survey.

Confining the work only to respondents who were classified as employed, the dataset containing all the records (22.312 records) of the Tus sample collected along the period covered by the survey (April 2002 – March 2003) was used. Only the record for the Lfs sample interviewed during the first three months of 2003 (30.526 records) was taken into analysis.

The statistical matching was also performed on non weighed records while for the ex-post evaluation of the results the weights of the recipient survey, i.e. Tus, were used.

Table 8.1 lists the variables observed in both surveys and that, appropriately aligned for uniformity, were used to perform the statistical matching.

Table 8.1 - Frequency distribution of the matching variables

MATCHING VARIABLES	Weighed data		Non weighed data	
	Tus 2002-2003	Lfs 1st quarter 2003	Tus 2002-2003	Lfs 1st quarter 2003
GENDER				
Men	61.3	61.5	60.5	60.6
Women	38.7	38.5	39.6	39.4
AGE GROUPS				
15-24	7.6	7.3	8.1	7.8
25-34	26.4	26.7	25.2	25.4
35-44	31.4	31.7	30.8	31.2
45-54	23.2	24.0	24.7	25.4
55-64	9.6	9.2	9.5	9.2
65-74	1.4	1.0	1.4	0.9
75 and over	0.4	0.1	0.3	0.1
MARITAL STATUS				
Single	30.5	30.7	29.8	29.9
Married	61.7	64.1	62.6	65.0
Separated/divorced	6.2	4.4	6.0	4.2
Window	1.6	0.8	1.6	0.8
LEVEL OF EDUCATION				
Primary School	9.4	8.7	9.7	9.1
Secondary School	32.8	33.2	33.1	33.5
Higher Education	44.5	45.4	44.7	45.6
Degree	13.3	12.6	12.5	11.8
Not specified		0.0		0.0
HOUSEHOLD SIZE				
1 person	7.9	9.5	7.4	6.7
2 persons	17.4	20.7	16.6	16.2
3 persons	30.8	25.5	30.2	30.8
4 persons	32.1	30.0	33.6	34.7
5 or more	11.9	14.3	12.3	11.5

Table 8.1 continued - **Frequency distribution of the matching variables**

MATCHING VARIABLES	Weighed Data		Non Weighed Data	
	Tus 2002-2003	Lfs 1st quarter 2003	Tus 2002-2003	Lfs 1st quarter 2003
GEOGRAPHICAL AREAS				
North West	29.1	29.2	28.6	28.7
North East	21.6	21.5	21.6	21.5
Centre	20.0	20.0	18.7	18.7
South	20.0	20.4	22.9	23.2
Islands	9.3	9.0	8.3	7.9
TYPE OF MUNICIPALITY				
Centre	15.1	12.7	11.7	10.3
Suburbs of metropolitan area	11.8	9.8	13.0	11.2
Municipality < 2.000 inhabitants	6.0	5.6	9.6	8.3
Municipality 2.001-10.000 inhabitants	25.9	28.3	26.8	28.9
Town 10.001-50.000 inhabitants	25.1	26.9	24.2	25.9
Medium sized cities > 50.000 inhabitants	16.1	16.8	14.7	15.4
ECONOMIC SECTOR				
Agriculture	5.1	3.7	5.7	4.3
Industry	28.8	28.4	29.0	28.6
Services	66.1	67.8	65.3	67.1
TYPE OF CONTRACT				
Permanent	65.7	66.9	65.3	66.5
Temporary	7.4	6.2	7.9	6.7
Self-employed with employees	6.4	5.9	6.4	5.9
Self-employed without employees	20.5	21.0	20.4	21.0

Table 8.1 also shows the frequency distribution of the variables and the impact of the sample weights of the Tus survey. Marginal distributions of the common variables in the two surveys are very similar.

Actually some of these variables have been used as stratification variables, which implies that the search for a suitable donor was performed amongst those units that shared the values of such variables. Note that the stratification variables used are not always the same: because of computational limits the first two stratification variables were however kept ("Geographical Area" and "Synthetic Position"), while the remaining variables were introduced to have within a stratum a number of records small enough to allow the software for statistical

matching to execute. Table 8.2 describes the sixteen strata built in this way and the relative number of records in the two archives.

Table 8.2 - Description of the strata created for the matching process

STRATA	Stratification variables					Records Tus 2002-2003	Records Lfs 1st quarter 2003
	Area N/C=North /Centre S/I=South/ Islands	Type of Contract P=permanent S=self-employed	Gender	Age	AreaC= centre		
1114c	N/C	P	M	<=44	C	1,084	1,315
1114e	N/C	P	M	<=44	NE	1,262	1,956
1114o	N/C	P	M	<=44	NW	1,739	2,012
1115	N/C	P	M	>=45		1,994	2,488
1124c	N/C	P	F	<=44	C	907	1,071
1124e	N/C	P	F	<=44	NE	1,210	1,697
1124o	N/C	P	F	<=44	NW	1,638	1,774
1125	N/C	P	F	>=45		1,451	1,838
1214	N/C	SE	M	<=44		1,432	1,979
1215	N/C	SE	M	>=45		1,322	1,856
122	N/C	SE	F			1,333	1,963
2114	S/I	P	M	<=44		2,018	2,974
2115	S/I	P	M	>=45		1,241	1,920
2124	S/I	P	F	<=44		1,154	1,692
2125	S/I	P	F	>=45		629	1,030
221	S/I	SE	M			1,395	2,107
222	S/I	SE	M			503	854
Totale						22,312	30,526

8.5.2 - The matching technique used

All common variables, that do not represent a stratification variable in the n-th layer, were given the same weight to give to them the same importance.

Gower's similarity index is the measure used for selecting the record from the donor survey (Lfs) to associate to the record from the recipient survey (Tus). This index is calculated amongst every record of the receiving archive and all the records of the donating archive; if there are two or more observations in the donating survey that present the same minimum deviation value from the receiving record, then the unit to associate is chosen randomly by assigning to each of them the same

probability of choice. The software described in Coli et al. (2006) was used.

8.5.3 - Some Results

The quality of the results obtained by a matching process depends on the level of preservation of the hypothesis of conditional independence that, as mentioned before, is not empirically verifiable.

Table 8.3 - Cross tabulation of two variables from the two surveys in the synthetic archives (in 1,000 and in percentage)

WILLINGNESS TO WORK A NUMBER OF HOURS DIFFERENT TO THOSE WORKED IN THE WEEK ANALYSED. (SYNTHETIC ARCHIVE: RECORDS DONATED BY LFS 1ST QUARTER 2003)	Hours worked in an average weekday (average generic length)			Total
	0-3 hours	4-8 hours	9 hours and more	
	1,000			
Yes, less hours	901	1,374	509	2,784
Yes, more hours	577	835	238	1,650
No, the same hours	5,669	8,247	2,736	16,651
Don't Know	85	163	54	302
Total	7,232	10,619	3,537	21,387
FREQUENCIES FOR 100 PEOPLE WHO WORK THE SAME HOURS				
Yes, less hours	12.5	12.9	14.4	13.0
Yes, more hours	8.0	7.9	6.7	7.7
No, the same hours	78.4	77.7	77.3	77.9
Don't Know	1.2	1.5	1.5	1.4
Total	100.0	100.0	100.0	100.0

This project will not use external auxiliary information to evaluate the respect of the hypothesis of conditional independence. In order to perform a preliminary evaluation of the results obtained, some variables common to the surveys analysed will be used. These, called “control variables”, are variables which have been used in both surveys but which are not used as matching variables.

One of the possible results obtained thanks to the statistical matching algorithm implemented is shown in table 8.3 by cross tabulating two variables that are observed in the two surveys: paid hours

worked in an average weekday (Tus survey) and the willingness to work a number of hours different to those worked in the week preceding the data collection (Lfs Survey).⁷

Table 8.4 - Distribution of the specific Lfs variable in the original and synthetic archive (in 1,000 and in percentage)

	Willingness to work a number of hours different to those worked in the week during data collection				Totale
	Yes, less hours	Yes, more hours	No, the same hours	Don't Know	
	1000				
Lfs 1st semester 2003	2,780	1,857	15,928	275	20,840
Synthetic archive: variable donated by Lfs 1st quarter 2003	2,692	1,691	16,757	276	21,416
	%				
Lfs 1st semester 2003	13.3	8.9	76.4	1.3	100.0
Synthetic archive: variable donated by Lfs 1st quarter 2003	12.6	7.9	78.2	1.3	100.0

The correctness of such a result can be verified if the marginal distribution of the combined variable is maintained compared to its original marginal distribution in the Lfs survey. Table 8.4 shows that this first control is a successful result because for both absolute and relative frequencies the marginal distribution of the variable stays homogenous.

To evaluate the quality of the synthetic archive the control variables that are observed in both archives are introduced. This allows us to compare the joint distribution of these specific Tus variables with the distributions that are obtained from the synthetic archive when the control variables are donated from Lfs. The variables chosen are:

- working hours (full time, part-time);
- presence of a second job (yes or no);
- night shift (yes, no or don't know⁸);

⁷ The reference population of this table is represented by those employed and who had performed at least one hour of work in the week preceding the Lfs data collection.

Note that the frequency distributions of the control variables are very similar and, above all, the distributions of the control variables donated in the synthetic archive stay almost completely unaltered in comparison to those of the original Lfs archive (Table 8.5).

Table 8.5 - Marginal distribution of the control variables in the receiving archive in the donating archive and in the synthetic archive (%)

SHARED CONTROL VARIABLE	Weighed Data			Non weighed Data		
	Tus 2002-2003	Synthetic archive: variable donated by Lfs 1st quarter 2003	Lfs 1st quarter 2003	Tus 2002-2003	Synthetic archive: variable donated by Lfs 1st quarter 2003	Lfs 1st quarter 2003
WORKING HOURS						
Full Time	88.7	87.8	87.3	88.7	87.5	87.6
Part Time	11.3	12.2	12.7	11.3	12.5	12.4
SECOND JOB						
Yes	3.6	2.6	2.7	3.7	2.6	2.6
No	96.4	97.4	97.3	96.4	97.4	97.4
NIGHT WORK						
Yes	13.7	11.2	11.4	13.9	11.3	11.3
No	86.3	88.5	88.3	86.1	88.5	88.3
Don't know	-	0.3	0.3	-	0.3	0.4

Table 8.6 shows the contingency tables of the specific Tus variable (“paid hours worked in an average weekday”) and the control variables in the original Tus archive and in the synthetic archive (variables donated by Lfs). Also in this case the results are quite satisfying, allowing us to state that, for the variables analysed, the joint distribution obtained by statistical matching represents quite closely the same distributions of the original Tus archive.

⁸ This work mode is present only in the donor survey. It should be noted that the questions relative to this variable are slightly different in the two surveys: while in the Tus survey the interviewee is asked whether he/she works at night, in the Lfs survey the interviewee is asked whether he/she has worked at night during the last four weeks.

Table 8.6 - Contingency tables between a specific Tus variable and the shared control variables in the original archive Tus and in the synthetic archive with the shared control variable donated by RfI (in 1,000 and in percentage)

SHARED CONTROL VARIABLE	Hours worked in an average day					Total		
	Tus 2002-2003		Synthetic archive: variable donated by RfI 1 st trimester 2003					
	0-3 hours	4-8 hours	9 hours and more	Total	0-3 hours		4-8 hours	9 hours and more
	1,000							
WORKING HOURS								
Full time	6,147	10,305	3,558	20,010	6,541	9,877	3,405	19,823
Part time	1,493	930	95	2,519	1,100	1,358	248	2,705
SECOND JOB								
Yes	252	407	185	844	188	299	133	620
No	7,389	10,828	3,468	21,685	7,453	10,936	3,520	21,909
NIGHT WORK								
Yes	877	1,509	707	3,094	783	1,278	428	2,489
No	6,763	9,726	2,946	19,434	6,839	9,926	3,211	19,976
Don't know	-	-	-	-	19	31	14	64
Total	7,640	11,235	3,653	22,528	7,640	11,235	3,653	22,528
	%							
WORKING HOURS								
Full time	27.3	45.7	15.8	88.8	29.0	43.8	15.1	88.0
Part time	6.6	4.1	0.4	11.2	4.9	6.0	1.1	12.0
SECOND JOB								
Yes	1.1	1.8	0.8	3.7	0.8	1.3	0.6	2.7
No	32.8	48.1	15.4	96.3	33.1	48.5	15.6	97.3
NIGHT WORK								
Yes	3.9	6.7	3.1	13.7	3.5	5.7	1.9	11.0
No	30.0	43.2	13.1	86.3	30.4	44.1	14.3	88.7
Don't know	-	-	-	-	0.1	0.1	0.1	0.3
Total	33.9	49.9	16.2	100.0	33.9	49.9	16.2	100.0

A more precise check is obtained by observing whether the relationship that connects the variables of interest (specific Tus variable and shared control variables) is adequately reproduced in the synthetic archive. Table 8.7 presents the Odds Ratio calculated on the previous joint distributions for each pair of modes possible for the specific Tus variable. The form and the strength of the relationship between the variables do not vary, even if in the synthetic archive this correspondence always seems to be less intense than in the Tus donating archive.

Table 8.7 - Odds ratio calculated on the frequency distribution between a specific variable “Time Use” and the shared control variables coming from the original archive Time Use and syntetic archive donated by Lfs

SHARED CONTROL VARIABLE	Hours worked in an average day			
	Tus 2002-2003		Synthetic archive: variable donated by Lfs 1st quarter 2003	
	1st and 2nd type	1st and 3rd type	1st and 2nd type	1st and 3rd type
	ODDS RATIO			
Working hours	0.37	0.11	0.82	0.43
Second job	0.91	0.64	0.92	0.67
Night work	0.84	0.54	0.89	0.86

There are, however, differences in the results obtained for the three different control variables here considered: for the “Working Hours” variable the Odds Ratio calculated in the two archives (the synthetic and the real one) is more distant than those calculated for the other two control variables.

8.6 - Concluding remarks

Application of statistical matching techniques for integration of data from Tus and Lfs is very promising. We showed how it is possible to study relationships between variables never observed on the same unit but observed on similar units in the two surveys.

The strategy of building a synthetic archive combining the data from the survey seems to be successful in this case and some of the problems discussed in section 8.3 can be addressed by analysing the combined archive. Also some open methodological question can be explored by thorough analysis of the combined dataset such as effect of conditional independence assumption.

Nonetheless, the results presented are only preliminary and use of auxiliary information, at least for relationships between those variable of primary interest is necessary to assess the quality of the information provided by the integrated dataset and to control for uncertainty conveyed by the statistical matching procedure.

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