GENDER CONVERGENCE IN THE

AMERICAN HERITAGE TIME USE STUDY (AHTUS)

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ABSTRACT

We present evidence from a new comprehensive database of harmonized national time-diary data that standardizes information on almost 40 years of daily life in America. The advantages of the diary method over other ways of calculating how time is spent are reviewed, along with its ability to generate more reliable and accurate measures of productive activity than respondent estimates or other alternatives. We then discuss the various procedures used to develop these harmonized data, both to standardize reporting detail and to match with Census Bureau population characteristics. We then use these data to document historical shifts in Americans' use of time, particularly focusing on gendered change in paid and unpaid work. We explore these data to find new and more complex evidence of continuing gender convergence, not just in aggregated totals of hours worked, but also in (1) the distributions of activity through the day and the week, (2) the sorts of activities that marital partners do together, as well as (3) the processes of construction of the diary accounts themselves.

NON-TECHNICAL SUMMARY

This paper compares changes in the daily activities of women and men in the United States from 1965 through 2003 as an example of the potential use of the American Heritage Time Use Study (AHTUS) dataset, a newly created resource. The AHTUS project has coded time use diaries into a format that allows researchers to compare the daily activity patterns of a national sample of people in the USA around the middle of each of the last five decades. In the time diaries, people recorded their activities in their own words, and also wrote down what time of day they changed activity, what else they were doing at the same time if they did more than one activity simultaneously, who else was present, and where they were. This paper explains how the authors co-ordinated the information from each year into a directly comparable dataset, then examines the general patterns of paid work, unpaid domestic work, personal care and free time of women and men. We find that men's behaviour has changed very slightly, with men performing slightly more domestic work as the decades have advanced. Women in the USA are now tending to perform more paid work and less unpaid domestic work, and women's daily patterns are becoming more similar to the patterns of men, though significant gender gaps remain.

1- INTRODUCTION

This article introduces the American Heritage Time Use Study (AHTUS), developed by the Centre for Time Use Research (CTUR) at the Institute for Social and Economic Research at the University of Essex, UK. The AHTUS merges the new American Time Use Survey, collected on a continuous basis beginning in 2003 by the US Bureau of Labor Statistics, (BLS) with four previous national time-use studies collected by two academic survey centres, in a harmonized format appropriate for a wide range of economic and sociological analyses[i]. We use it, in this article, to identify several dimensions of *gender convergence* in the US across the latter half of the twentieth century. We focus on changes in the distribution of paid and unpaid work tasks over the period 1965 to 2003, looking not simply at total time devoted to these activities, but at changes in the underlying "time-profiles" of activities through the day, and how husbands and wives arrange their time together.

One major advantage of time diary-based evidence is that time spent in different sorts of activities (paid work, unpaid work, personal care and so forth) can be *added together* to sum to *exactly* the 1440 minutes of the day. Previous studies (for instance Robinson and Godbey 1999; Bianchi 2000; Aguiar and Hurst 2006) have focused on overall averages of time devoted to each activity, ignoring the rich contextual information available in these historical diary accounts, concerning who else was present during an activity, and when or where the activity occurred The analysis in this article moves beyond previous assessments of patterns of historical change, both in terms of the quality of data employed and the complexity of time questions examined.

This article begins with a brief review of the previous national U.S. time-use surveys on which the AHTUS archive is based. Our substantive analyses first concentrate on the overall changes in paid and unpaid work. They show an overall reduction in the total productive work time (the sum of paid and unpaid work), a virtual diachronic constancy of time devoted to sleep and personal care, and a relative increase in time for activities outside production (including leisure and consumption). The general direction of this activity change suggests that women and men lead more similar lives now than 40 years ago, although women's time patterns have been altered

more considerably than men's. Moreover, these data illustrate the persistence of gender difference in the time when partners are together – when there is unpaid labour to be done during leisure time, women still remain more likely to be the people who carry out the chores.

2 - MEASURING TIME USE IN THE USA

The Bureau of Labor Statistics (BLS) initiated the first continuous time-use data collection (the American Time Use Survey – ATUS), interviewing a sub-sample of more than 20,000 respondents aged 15+ from the last wave of the Current Population Survey (CPS) across all months from the start of 2003. This provided the impetus behind the Glaser Foundation's funding of the systematic harmonization of previous US time-diary use materials for analysis alongside the new ATUS data. The archive draws on the experience of the University of Essex time use group in harmonizing earlier European and other diary studies.

Much of what has been previously surmised about time use in the USA came from time estimate questions – questionnaire items that asked respondents to estimate how much time they spend on some activity over a particular time period, such as per year or in a "usual" week. Among the activities on which national historical data used such estimates include time spent working, doing voluntary work, attending religious services, travelling, socializing, and watching television, as in the General Social Survey (GSS) of the University of Chicago.

Probably the most widely used time-estimate questions have been for market work hours (also collected for BLS in the CPS), in which survey respondents are asked to report how many hours they worked last week and provide an estimate of the usual hours per week they worked in the preceding year. This CPS question has been considered the "gold standard" for assessing change in the work patterns of men and women. One great advantage of CPS estimate questions is that they usually take a respondent less than ten seconds to answer, in contrast to the full time diary, which can take from 10 to 40 minutes to complete (depending on the degree of detail requested). This makes it far more cost-effective to ask estimate questions in the CPS, which surveys all workers in about 50,000 households every month across the

full year. In contrast, time-diary studies have in the past been based on samples of 1,000-10,000 respondents, with fresh diary samples typically collected only every ten years. Another advantage of the paid work estimate question is that it has been administered since the late 1940s, with parallel data going back much earlier, whereas the first US national diary study was only first conducted in 1965 and had notably lower response rates than the estimate surveys. The size of the CPS sample also makes it possible to examine quite detailed breakdowns of work hour estimates by gender, marital status, presence and ages of children, and other household and personal characteristics.

Estimate questions have drawbacks, however. Recalling details about time spent in an activity involves complicated calculations. Asking someone "How many hours did you work last week?" assumes that each respondent interprets "work" the same way, searches memory for all episodes of work, and is able to correctly identify and sum all the episode lengths across the day or across days in the last week. Obtaining accurate responses regarding time use is particularly difficult in the survey context, in which respondents are expected to provide on-the-spot answers in a few seconds. What seems at first to be a simple estimate task turns out to involve several steps that are quite difficult to perform, even for a respondent with regular and clear work hours and a repetitive daily routine. One consequence is that, when asked to provide daily and weekly estimates of several activities, survey respondents give estimates that add up to considerably more than the 168 hours of time each week (Hawes, Talarzyk, and Blackwell 1975; and Verbrugge and Gruber-Baldine 1993).

The appeal of the time-diary approach is that respondents are not asked to make complex yet vague calculations, but to simply recall their activities sequentially for a specific period, usually the previous day. In that way, it becomes possible to reduce the respondents' recall period and reporting task, first to cover all daily activities, and second to ensure that the resulting account preserves the "zero-sum" property of time—that the activities total exactly twenty-four hours in a day. That means that if one activity increases across time, it must be compensated-for by a decrease in other ways of spending time.

Diaries[ii] are well established tools for social scientists. By the time Sorokin and Berger (1939) introduced "time budget" analysis to American sociologists, time diaries has been deployed in a variety of contexts[iii], from studies of farm households (Walker and Woods 1976; Vanek 1974), unemployed industrial workers in 1930s' Austria (Jahoda, Lazarsfeld and Zeisel 1972), low paid workers' families in London and Liverpool (Pember-Reeves 1913, Jones 1934) as well as measures of national productivity in the USSR (Strumilin, referenced in Zuzanek 1980: 10-14). An extensive literature confirms the reliability and validity of diary data (Michelson 2005; Robinson and Godbey 1999; Juster and Stafford 1985).

Research comparing diary methods with questionnaire estimates of paid work vary from articles favouring diary-based estimates (Robinson and Gershuny 1994; Robinson and Bostrom 1994; Niemi 1983)—in terms of work estimates being higher than work time reported in diaries—to those finding only slight advantages to the diary approach (Bonke 2005). However, there is less research comparing diaries with other methods of estimating hours of unpaid work. Studies which have collected both diary and questionnaire estimates at the same time demonstrate that diaries produce more defensible estimates. However, the nature of systematic differences between diary and questionnaire estimates may be inter-related with other factors, with Danish data suggesting that women's diary and questionnaire estimates of unpaid work being more divergent than men's (Bonke 2005), the reverse pattern emerging in British data (Kan 2006), and no gender-related divergence, but varying degrees of disparity in the estimates of different age groups in Norway (Kitterød and Lyngstad 2005). In the U.S, both men and women overestimate their housework by about 50% (Marini and Shelton 1993; Press and Townsley 1998; Robinson and Presser 2000). Some contributors to this literature suggest that aggregate estimates generated by the far less expensive direct questions and the more expensive diaries are sufficiently similar that for research questions where the simple aggregate of time in work is central, either diaries or estimates may suffice (e.g. Bonke 2005). However, diaries hold the clear advantage where the dynamics or context of work is central to the research (such as examining work episodes in relation to time spent with household members as in Figure 6 below, the spread of work across the day (as in Figure 7 below), how work is associated with travel or time at home, and the

integration of work life with leisure time) (Fisher and Layte 2004, Michelson 2005, Gershuny 2000).

That is not to say the diary method is without flaws. Respondents can still embellish accounts, but in order to portray themselves as hard workers or light television viewers, respondents must fabricate the activities that precede and follow the one they want to exaggerate. As diaries cover only a short period, respondents probably realize that they may work less or watch television more than usual on any given day, so the incentive to distort is reduced (though certain activities, particularly criminal or violent activities seldom explicitly appear in time-diary accounts). Diary keepers who simply cannot remember what they did at a particular time may substitute a habitual activity for what actually took place. Even so, the diary still presents us with a far richer and more persuasive source of individual and family activity patterns than any present alternative (Michelson 2005; Gershuny 2000; Robinson and Godbey 1999).

Time Diary Methodology in the USA

Most time-diary studies in the United States retain elements of the first national-scale USA diary study, one carried out as part of the most extensive comparative time-diary studies of its time - the 1965 Multinational Time Budget Study (Szalai 1972). That survey collected a single-day 24-hour time diary registering main activity, simultaneous activity, location, and who else was present, as reported in the respondent's own words and were coded using a harmonized coding frame. Diaries were collected from one person aged 19 to 65 in urban households in which at least one member was employed and from each of twelve different countries. Until the 2003 ATUS, which collected half of diaries on weekend days and half on week days, studies were designed to collect diaries from an even distribution of days of the week. Since the 1975-76 study, the national USA studies have spread the collected data across all seasons of the year. Except for 1965, survey weights balance the distribution of AHTUS diaries by season and day of the week. A schematic comparison of methodological differences across the surveys is provided by Table 1, with more detail outlined in Appendix 1.

Producing the AHTUS

The harmonization exercise was designed to retain the highest level of accurate detail possible that could be found across the various surveys[iv]. Though the activity information was not always collected in the same way in each survey (as is evident in Table 1), the activity variables are consistent enough across studies to be used for cross-time analysis (Egerton et al. 2005) - with the exception of the 2003 ATUS secondary child-care estimates, which are starkly out of line with secondary care recorded in the earlier surveys (Bianchi et al. 2005; Fisher 2005). This harmonization effort revealed the significance of using all the variables in the diary when classifying activities, rather than simply relying in the entry in the main activity column (Fisher 2006). We did not over-write information recorded in the original surveys, though we have corrected a number of data-entry errors in the time diary episode files of some of the older datasets.

We conducted filtering and consistency checks for all variables, and for the same variables across waves for respondents in longitudinal 1975-76 survey. We have included a number of flag variables that mark cases of inconsistent information. Though error levels for demographic variables were low in most surveys, we encountered a number of problems from corrupted episode data files from the 1985 survey (that may be corrected in the future by matching them with the apparently uncorrupted simple time-in-activity files).

Table 1 - Methodological Details of Surveys Currently in the AHTUS Database					
	1965-1966	1975-1976	1985	1992-1994	2003
Survey Organization	Survey Research Center, University of Michigan,	Survey Research Center, University of Michigan	Survey Research Center, University of Maryland	Survey Research Center, University of Maryland	United States Bureau of Labor Statistics and United States Census Bureau
Funder	National Science Foundation (NSF)	NSF, US Department of Health, Education, & Welfare	NSF; ATT	Environmental Protection Agency	USA Department of Labor
Sample	Jackson 759 diaries National 1262 diaries	4584 diaries (main respondent only)	2636 diaries	7514 diaries	19,663 diaries
Age range	19-65 (some up to 69)	18+	12+ (18+ in AHTUS)	0+ (18+ in AHTUS)	15+ (18+ in AHTUS)
Months	November-December 1965; January-February; March – May 1966	October-November 1975; February-March; May-July; September-October 1976	January - December 1985	September 1992 – October 1994	January-December 2003
Response Rate	82% Jackson; 74% national sample	72% first wave; 45% did all 4 waves	55% overall, 51% for mail back sample	63%	58%
Mode of collection	Self-completion with guidance from interviewer	Self-report waves 1&4; phone waves 2-3	3 samples: CATI; self-completion, personal interview (only self-completed in AHTUS)	CATI	CATI
Diary Type	Mostly designated day	Previous day	Designated day	Previous day	Previous day
Notes on Sample	Sample of urban households having at least one employed member; separate national and Jackson MI samples	Sample of all households ; longitudinal-4 waves; reduced diaries for spouses (if married)	Sample of telephone households; all eligible household members asked to keep diaries	Sample of telephone households	Sample of all households; former respondents in CPS Wave 8; Parents with dependent children over-sampled

We made a number of adjustments to the diary files, imputing activity codes in short gaps for cases where we could make logical inferences of the unrecorded activity by using information respondents recorded in the location and social partner columns, as well as from constraints imposed by the combinations of activities before and after these short gaps. We also used information in these other fields in the diary to disaggregate some original "primary" activity codes[v], in order to construct the activity codes for the harmonized file. These imputed time activities have separate codes, and thus are easily distinguished from the originally coded activities

We amended original survey weights to match CPS age and sex profiles and to balance the distribution of diaries by day of the week and season after excluding poor quality diaries[vi], and also to compensate for attrition in the 1975-76 survey. These weights ensure an appropriate cell distribution of days-of-the-week for each sex and age group in each of the component surveys after the exclusion of the low quality diaries. The resulting AHTUS variable distributions did not differ markedly from population statistics, with the important exception that larger proportions of the AHTUS respondents were well educated than found in the population (Egerton et al. 2005) – a typical problem in U.S. surveys, particularly those conducted by telephone. More detail appears in Appendix 1, with full documentation and the data available at http://www.timeuse.org/ahtus/.

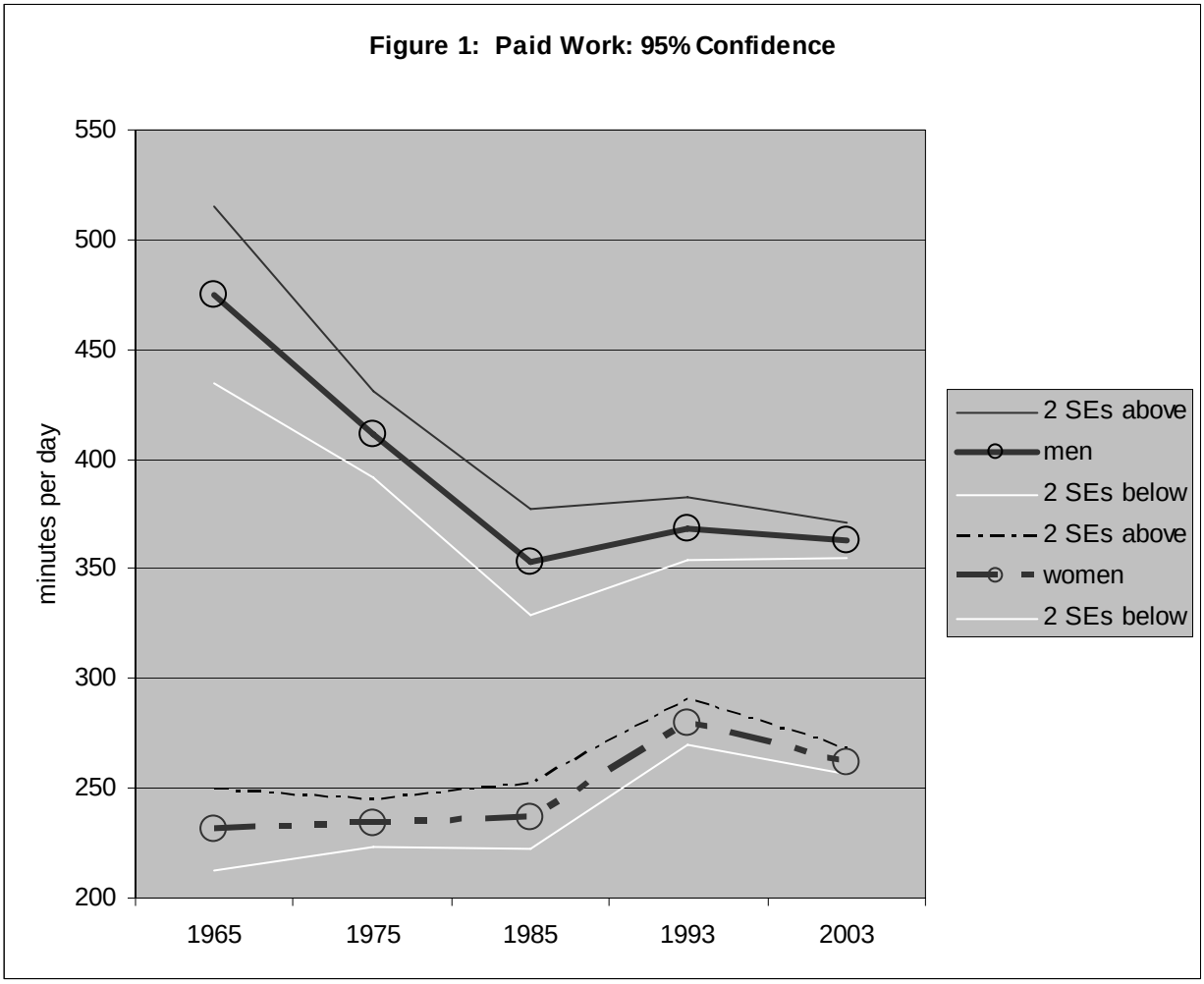
3 – CHANGES IN THE DAILY ACTIVITIES OF WOMEN AND MEN IN THE USA

Our tabulation of change in the allocation of productive time is for US adults aged 19 to 64, an age range used both because the 1965-66 samples only collected diaries from working age people and because trends in the changes in *total* work are most plainly evident amongst the population for the ages that perform the majority of *paid* work. We focus on the evolution of work, in the broadest sense – following the conceptualizations of Walker and Woods (1976) and Hawrylyshn (1977) – of activities that someone might commission a "third party" to carry out for pay without losing the main sorts of direct utility derived from that activity[vii].

Trends in Paid and Unpaid Work

The AHTUS dataset produces striking pictures of change in total work time, and of continuing convergence between the different sorts of work undertaken by men and women in the USA, which are, even after the extensive recoding and standardization described above, not dissimilar to those reported in Robinson and Godbey (1999). The first sequence of diachronic graphs (Figures 1, 4, and 5) traces trends in work for men and women aged 19-64 separately, showing trend averages and their 95% confidence intervals. Figure 1 first shows time in paid work, education, training, and other activities associated with work or education (commuting, applying for jobs or courses) from 1965 to 2003. Figure 4 then displays time devoted all unpaid work (including yard work and shopping but excluding - for reasons explained below - child care). Figure 5 then sums Figures 1 and 2, and additionally includes time in child care (as a "primary activity"), to show patterns of total work time.

Figure 1: Paid Work: 95% Confidence



Source: AHTUS data released 2006

Figure 1 shows the statistically significant decline in men's time devoted to paid work along with other activities in the workplace and activities which enhance or facilitate work prospects (job applications, training) over the first three decades. The second two decades show a small, but probably not statistically significant increase, which still leaves the men's 2003 mean time in activities associated with paid work and education substantially (and significantly) below the 1965 estimate. The women of this age group show a partially opposing trend, with an initial rise in paid work and related time, but with the major statistically significant increase concentrated during the 1985-1995 decade, as significantly more women entered the labour force..

Others who looked at change in the four broadest categories of time use (paid work and related, unpaid work, sleep and personal care, non-committed time) noted this trend before the release of the 2003 ATUS (for instance Robinson and Bostrom 1994; Robinson and Godbey 1999). The finding has raised some controversy from other researchers with a particular interest in hours in paid work, who argue that life in the United States has grown more harried with passing decades, but who base their conclusions on the BLS work estimate data rather than diary data. Schor (1993) argued that work estimate data between 1979 and 1991 showed that hours actually increased significantly, that peculiarities of the smaller diary samples offer a better explanation than a actual behaviour change for this drop; and that the general expansion of women's participation in the labour force mean that hours worked by the population of the USA as a whole have risen. Jacobs and Gerson (2004) argue that estimate hours worked have held roughly constant over the last four decades, but that the proportion of people working has increased and the total number of holidays taken by Americans has remained constant or even fallen, meaning that the total time committed by the population to paid work has increased (29-31). However, Figure 1 confirms that men's work time has been roughly constant -- but over the last *two (not four)* decades, while women's has obviously increased as more of them have entered the labour force. In that way, the findings presented here do not necessarily conflict with the conclusions of Jacobs and Gerson.

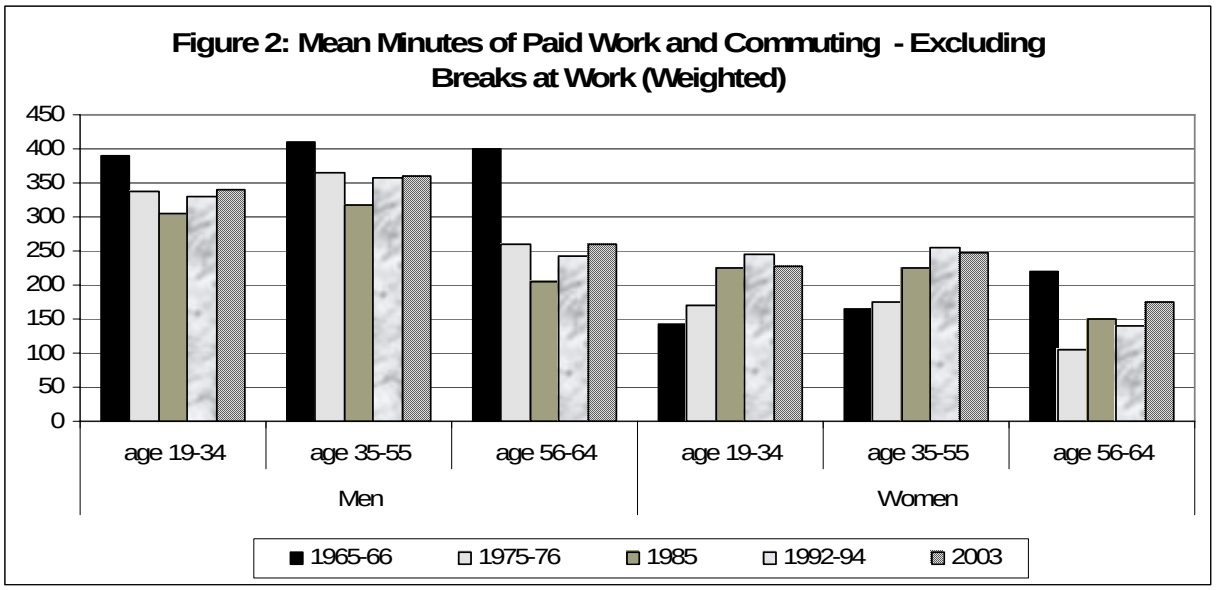
This article considers the broad domain of activity associated with paid work, education and training for work among people of working age – a somewhat broader

category that the specific matter of hours of paid work of interest to Schor and Jacobs and Gerson . Hidden *within* this summary pattern lies a range of divergent social changes, including the early retirement in some industries, the longer work-days now undertaken by the better educated, both of which are outside the scope of the present article. While the figures here do support the suggestion that the 1965-66 sample is somewhat idiosyncratic (reflecting the special sample selection criteria of the Szalai study), nevertheless Figure 1 indicates trends from 1975-76 onwards which are generally consistent with those from the 1965-66 data.

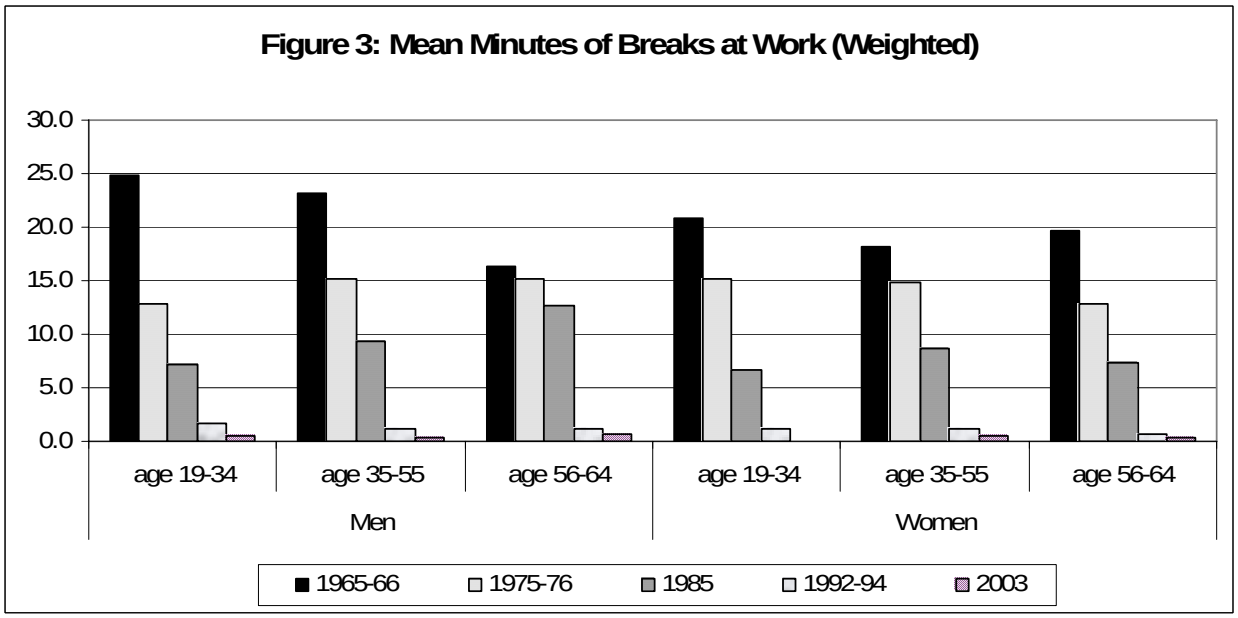
Figure 2 examines paid work time more closely by age and indicates that women's hours of paid work (plus commuting) only increased from 1975-76, then levelled from the mid 1990s. Figures 3 lends more support for the work intensification hypothesis. The relatively level proportion of time dedicated to paid employment tasks in Figure 2 contrasts sharply with the time taking a break at work (as opposed to doing something else, like making private phone calls or going to the bank during break time). Figure 3, which shows the average minutes on break while at paid work (only among workers reporting some paid work activity in their diaries) has dropped steadily from 20 minutes in 1965-66 to roughly only half a minute in 2003. Correspondingly, the proportion of workers taking a work break dropped from over half in 1965-66, to under half in 1975-76, around a third in 1985, less than 7% in 1992-94, and less than 2% in 2003. While some of this decline may be a function of fewer activities reported in later surveys (so that short episode activities like breaks would be less likely to be reported) or that work breaks are less formal and scheduled, this is the clearest possible diary evidence of a more harried work life.

Figures 1 to 4 also show how the increasing proportion of women in the workplace has increased the total daily participation rate of paid work in the United States. While people are at the workplace, women's hours of paid work—and thus total hours of paid work for the whole population--have slightly increased, as "down time" at work in (i.e. breaks not involving other activities), has faded from the conscious daily life of people in the USA. Taking the whole range of activities associated with paid work and training for or applying for work (i.e. including this "down time"), the

overall time devoted by men has declined and by women has increased. That is the reverse of the pattern for unpaid work examined in Figure 4.



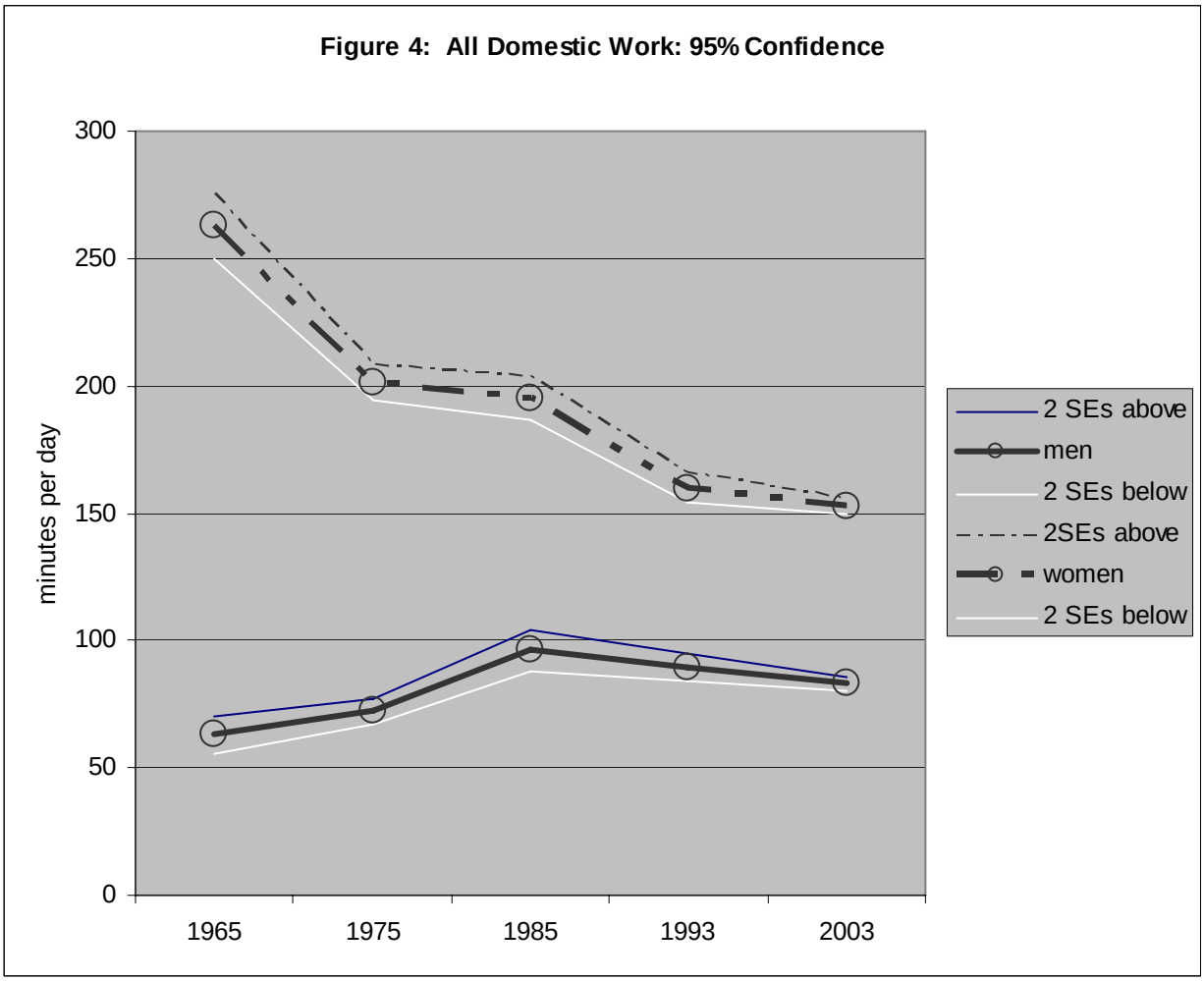
Source: AHTUS data release 2006



Source: AHTUS data release 2006

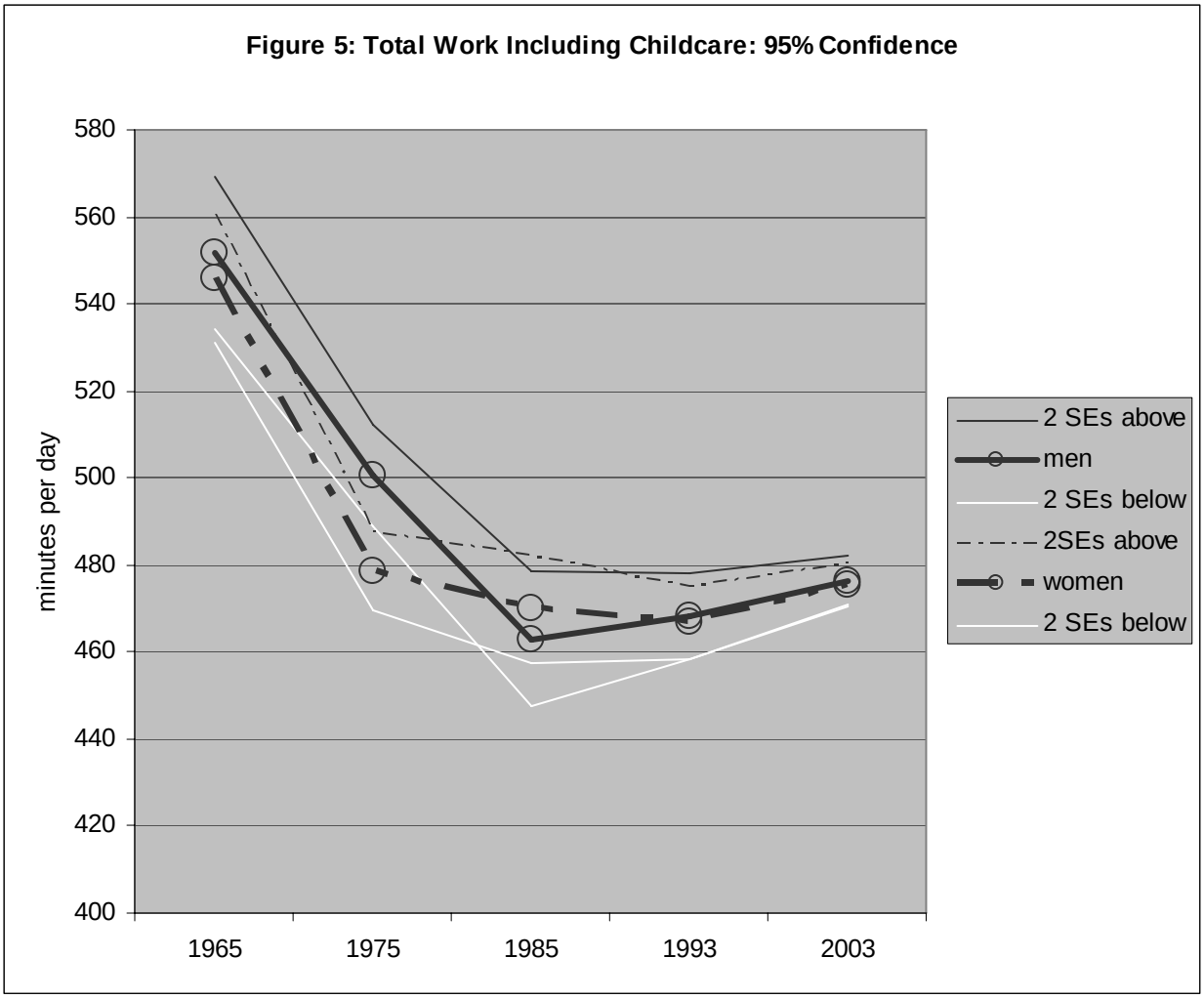
Figure 4 charts the trends for all unpaid domestic work (including cooking, cleaning, yard work and shopping, but excluding childcare) over the period. Men's unpaid work rose significantly during the first half of the period, and showed a (non-significant) decline - perhaps best interpreted for the moment as "no change" - during the second half of the period. Men of all ages performed an average of two episodes of unpaid work per day, and between 85 and 90% of men participated in unpaid work on any given day.

Figure 4: All Domestic Work: 95% Confidence



Source: AHTUS data released 2006

In contrast, nearly 100% of women engaged in some form of domestic work each day. In contrast with men, as Figure 4 suggests, women's total time in unpaid work declined significantly across the period essentially offsetting their increased time in paid work. Though this drop primarily results from reduction in women's time food preparation and cooking (see Appendix 2 - a finding also noted by Hamermesh 2005), the average number of episodes of unpaid work for women of all ages dropped from 5 in 1965-66, to 4 in the 1970s and 1980s, to 3 in the 1990s and in 2003.



Source: AHTUS data released 2006

The AHTUS data do exhibit a surprising increase in time main activity childcare - an apparent doubling for women and a tripling for men (not shown here). Bianchi et. al. (2005) compare main activity care time in the ATUS with two more recent USA time-use studies not presently included in the AHTUS (that is 1998-1999 and 1999-2001) that show a similar jump in child-care time at the end of the century. Perhaps increased concern with children's safety prompted by events such as Columbine and September 11 may partially account for this rise[viii], though we cannot at present exclude the possibility that these results are also influenced by the 2003 ATUS instrument itself.

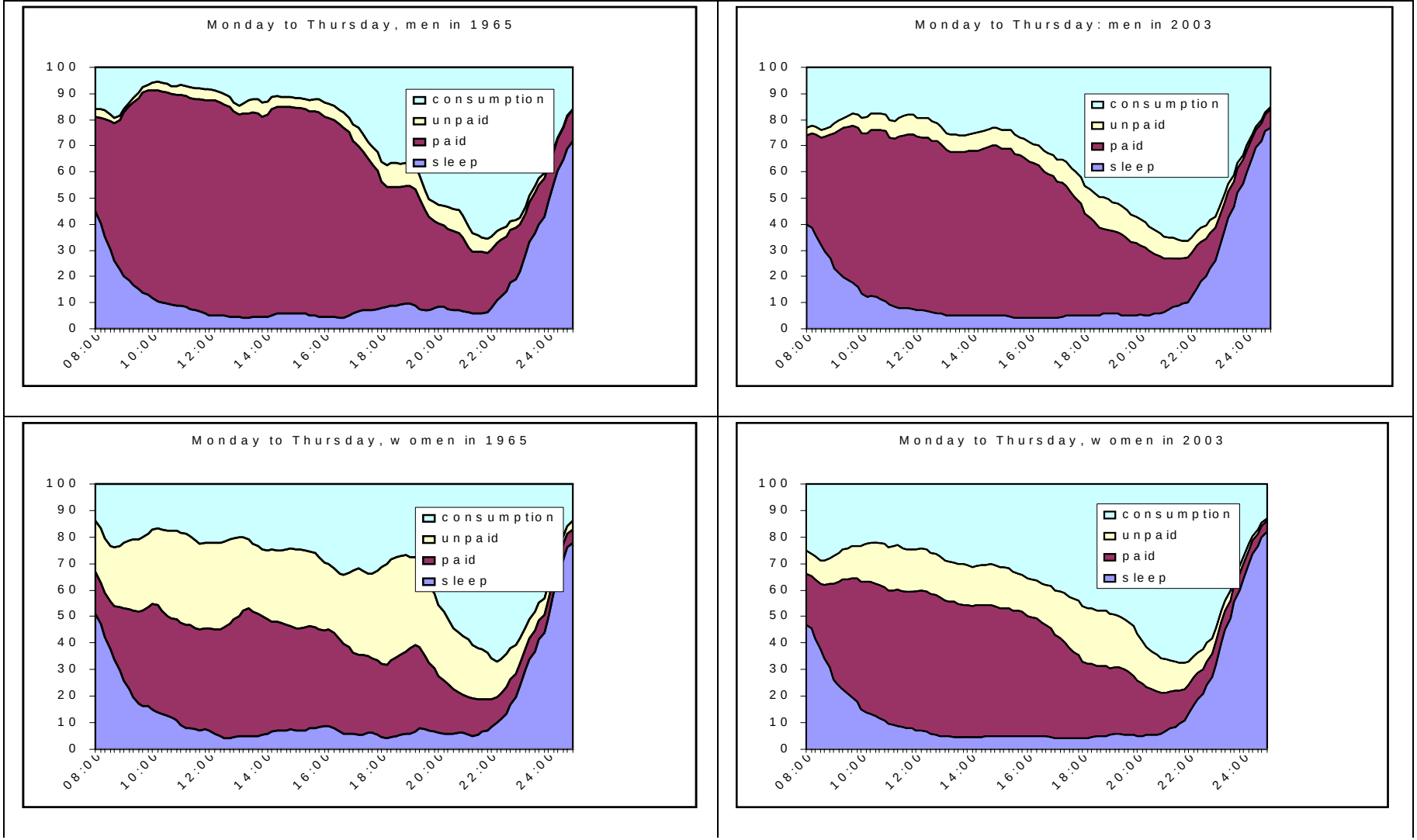
Irrespective of these concerns, childcare clearly falls within the "third person" criterion of work, so, in the estimates of the trends in the totals of work given in Figure 5, we have added in childcare to the paid and unpaid work estimates set out

in the previous two figures. We see what can only be described as a striking reaffirmation of the almost 15% fall in total work time from 1965 to 1985. That decline, as well as the amount of total productive activity, is remarkably similar for both men and women - especially so given the different composition in terms of paid and unpaid ratios for men and women. The small increase in the total of work time since the mid-1980s is plainly not statistically significant. But this aggregate view of the trend in the two more recent decades again masks the substantial changes in these distributions (particularly of paid work participation rates and work times, among both men and women): those with higher levels of educational or career attainment work more, and those with lower levels of attainment work less.

Daily Sequences in 1965 and 2003

So far we have considered the simple averages of time in "primary" activities. But diary evidence presented in this way masks much of its unique information about the times of day that the various activities are undertaken by different sorts of people. Figure 6 presents just the very simplest sorts of comparisons, of primary activities through the course of weekdays during 1965 and 2003, for the same population aged 19 to 64.[ix] Reading from left to right through each of these four charts, one can see that the bottom band, representing sleep and personal care, diminishes rapidly from 7 AM (at which time around 40% of men and 50% of women are still asleep). By 10 AM much the largest part of the society's time is devoted to the two central bands of activity of paid and unpaid work. Thereafter the top band, representing leisure, rather continuously increases through the day, reaching its maximum at around 9 PM, after which an increasing proportion of the population goes to bed - an activity which approaches 90% of the population by midnight.

Figure 6: Change in Activities Through the Day, Weekdays, 1965 and 2003



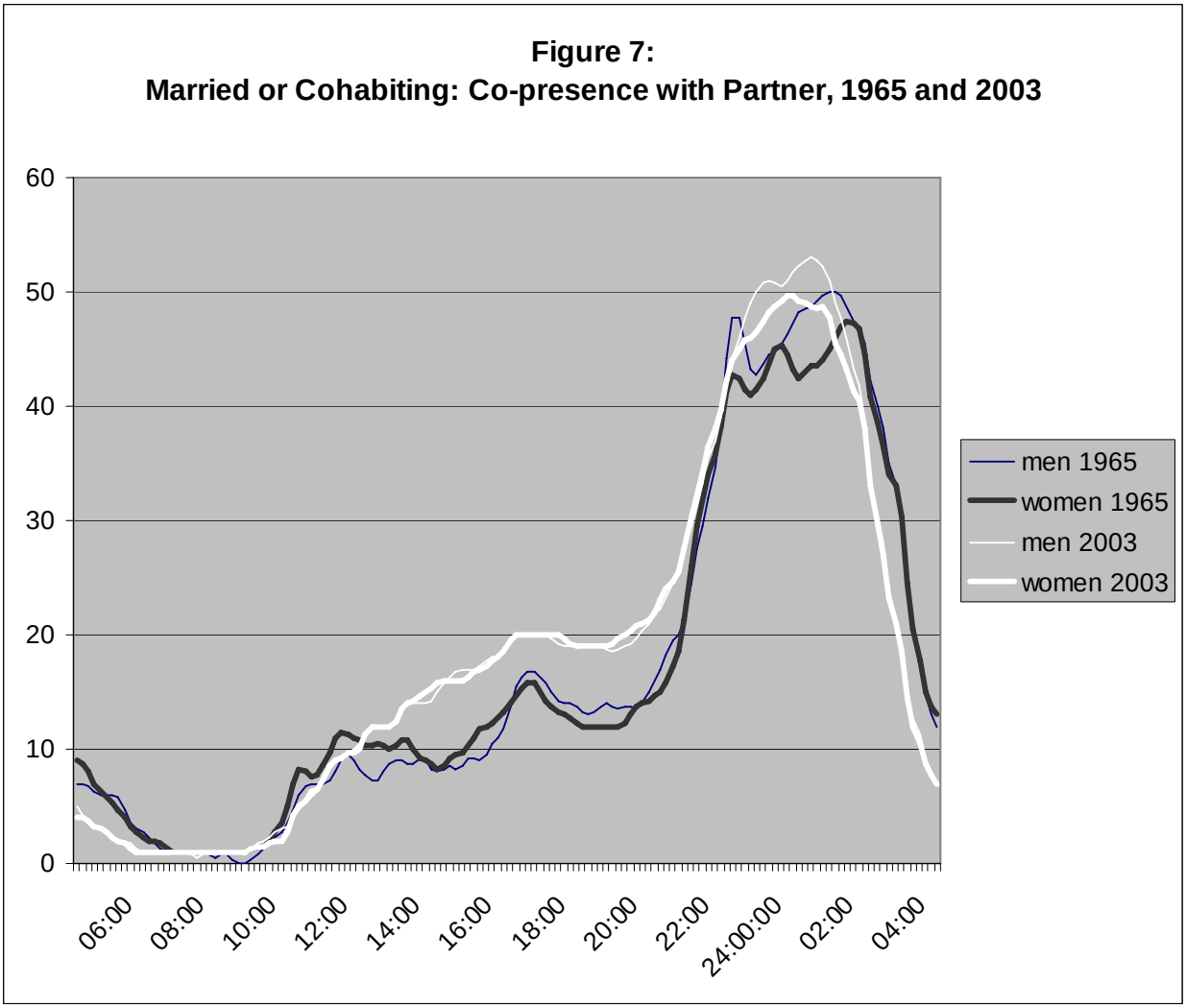
Source: AHTUS data released 2006

Comparing first the pairs of charts vertically, we find a considerable difference between men's and women's activities in the 1960s in terms of the relative thickness of the bands representing paid and unpaid work. For women as a group, we can see that paid work represented a little less than half of all work activity throughout the majority of the day, whereas for men it represents something more like 90-95% until mid-evening, and unpaid work - at no point more than about one-fifth of all work. Considering this difference in types of work activity, it is perhaps surprising that the overall width of the two central bands is quite similar, so that men's and women's daily leisure profiles in 1965 resemble each other quite closely.

The changes in men's activities through the weekday from 1965 to 2003 reflect exactly what we have already seen in the aggregate time-trends in Figures 1 and 6. Men have substantially reduced their paid work — reflected in Figure 6 as a reduced width band throughout the day. Their increase in unpaid work is also distributed throughout the day, although in this case apparently concentrated more in the evening. Still, the changes remain relatively minor: men in 2003 behaved in their weekdays pretty much as men in 1965.

But the change is far more dramatic for women. By 2003, their unpaid work in the middle of the day had diminished to occupy less than one quarter of the total of work time. Women in 2003 still do more unpaid work – more than twice as much unpaid work as men at any point in the day. Nonetheless, as much as the men of 2003 still look like the men of 1965, the profile of a woman's day in 2003 resembles the men's 2003 daily profile more than it does the women's day-profile in 1965.

Figure 7:
Married or Cohabiting: Co-presence with Partner, 1965 and 2003



Source: 2003 VS. 1965 AHTUS data

Multiple Activities from Event Data: Spouse Co-presence and Housework

Figure 7 compares the profile of co-presence with marital or cohabiting partners throughout the day for 1965 and 2003, separately for husbands and for wives,. We see that the male and female accounts correspond reasonably well with each other, with some small divergences in reported levels of co-presence (in both years, and for the moment unexplained) emerging only around midnight. There is a clear historical change in the profile during the afternoon and early evening, which is explored further by *combining* activity and co-presence data in Table 2.

Table 2 - Minutes Per Day of Co-presence, Ages 18-64, Married or Cohabiting: 1965-2003										
	Means						Standard errors			
	1965			2003			1965		2003	
	Total	With partner	CoPres Ratio	Total	With partner	CoPres Ratio	All	With partner	All	With partner
All Co-presence										
Men	1440	249	0.17	1439	271	0.19		6.4		3.4
Women	1440	245	0.17	1439	266	0.18		6.3		3.3
Unpaid Work										
Men	65	20	0.31	88	33	0.38	3.2	1.4	1.8	1.0
Women	293	47	0.16	176	45	0.25	5.4	2.2	2.1	1.2
M/F Ratio	0.22	0.42	1.90	0.50	0.75	1.49				
Paid Work										
Men	489	55	0.11	394	35	0.09	8.5	1.8	3.9	0.6
Women	200	47	0.23	257	32	0.12	7.3	1.4	3.5	0.6
M/F Ratio	2.44	1.19	0.49	1.54	1.09	0.71				
Consumption										
Men	363	169	0.47	435	201	0.46	6.6	5.3	3.1	2.8
Women	394	148	0.38	451	188	0.42	5.9	4.7	2.8	2.6
M/F Ratio	0.92	1.14	1.24	0.96	1.07	1.11				

Source: AHTUS data released 2006

The first panel of Table 2 (labelled All Co-presence) simply calculates time spent with the spouse or partner through the whole day. The men's and women's totals differ only insignificantly – by less than 5 minutes per day. There does seem to have been a small and but statistically significant increase in partner co-presence of about 20 minutes per day over the almost 40-year period. The "partner co-presence ratio", (defined as the proportion of available time spent in the company of the partner) only rises from .17 in 1965 to .18 or .19 in 2003.

By calculating the product of the co-presence and the primary activity fields, the three lower panels in Table 2 relate the three broad categories of unpaid work, paid work and consumption time to the partner's co-presence. These three scores very nearly sum to the total of partner co-presence (the fourth general category, personal care and sleep, is omitted because very little co-presence is reported). In these lower panels we see more evidence both of historical change and some considerable gender differences. This latter phenomenon is quite remarkable, and potentially revealing of the process through which the diary accounts are constructed.

While the surveys in the AHTUS dataset do not allow us to directly test the co-presence reports of spouses/partners[x], we can compare the accounts given by women in couples of their time with husbands with the accounts given by men of their time with their wives. Consider the 1965 entries for partner co-presence in the unpaid work panel. The sample of "wife" diarists report spending 47 minutes engaged in domestic work while with their male partners, whereas the sample of "husband" diarists report spending only 20 minutes engaged in domestic work with their partners. Most of this 27 minute difference could be accounted for by the 21 extra minutes that men account for as *leisure* with their spouse present. This implies that when couples were together in 1965, the husband often took leisure while the wife spent her time doing housework (as for example where he sits in front of the television, perhaps talking with her while she sets the table and finishes food preparation).

More important for our present purpose is the historical convergence in the two columns of male/female co-presence ratios. This difference between the partners, while still evident in 2003, is much reduced in scale: the processes of *personal*

representation within the social construction of time use appear to become more similar, just as men's and women's overall patterns of time use come to resemble each other more closely.

4 - Conclusions

We have documented the reduction in American men's paid work over the period 1965-2003, which was accompanied by a smaller increase in their unpaid work, a change that was concentrated within the first three decades of the five decade period. We saw an even more substantial decrease in women's unpaid work, again concentrated mostly in the first three decades of the period, more or less offset by their increases in paid work. Women's and men's aggregate allocation of time - and also the sequential organization of their days - look more similar over time. But differences still remain; earlier convergence processes appear to have stalled. And this process was disproportionately that of women's activities coming to look like men's, rather than the reverse.

The new harmonized cross-time dataset provides, in addition to standardized demographic variables, a new activity coding scheme - intended to constitute benchmark categories for future comparisons of US time allocation studies. Together with the other diary fields, harmonized for the first time within the AHTUS, these provide a much more flexible and comprehensive approach to time-use research, one in which analysts can exploit all the features of the diary instrument, rather than the almost exclusive focus on averages of primary activities that characterizes previous time-diary research. The provision of the harmonized, diachronically comparative, episode-file data, including primary and secondary activities, location and co-presence, now allows analysts to reconceptualise the daily activity focus, combining evidence from different diary fields to make use of the extensive sequence and time-of-day information recorded in the original diary instruments – factors entirely lost in the traditional time-diary analyses to date.

This new data archive also provides a major opportunity for international comparisons with the new Harmonized European Time Use Study (HETUS) coordinated by Eurostat, with harmonized diary studies from more than a dozen EU states collected around 2000, and with the Multinational Time Use Study (MTUS) which allows international comparisons with more than 20 countries, stretching back to the 1960s. Our group is presently working to merge the MTUS and the HETUS with the AHTUS to further extend the range of national coverage, with the goal of providing a source of micro-level information on time use similar to the information on money resources provided by the widely used Luxembourg Income Study.

Since the ATUS is now established as a continuous survey; and the HETUS exercise is scheduled for a new round of data collection around 2010, the international comparative time-use research framework, as envisioned in the pioneering UNESCO-funded Szalai study more than a half-century ago, now moves much closer to reality.

Appendix 1 - Brief Introduction to the American Heritage Time Use Study (AHTUS)

A1.1 Summary Description

This appendix covers additional information on the American Heritage Time Use Study (AHTUS). AHTUS data and documentation may be downloaded from http://www.timeuse.org/ahtus/. [xi]

The open-ended diary reports from each of the original USA surveys were coded using a standard activity coding scheme, largely based on the code list developed for the 1965 Szalai (1972) project, consisting of about 100 (or which 85 are available in surviving datasets) general ("2-digit") activity codes, and sometimes broken down into a more detailed "3-digit" classification with approximately 250 activity categories. The designers of the BLS survey devised a new classification scheme, influenced by the Eurostat (2004) 167 category activity classification from the Harmonised European Time Use Study (HETUS) and the Australian Bureau of Statistics code frame (215 activity codes), but which also reflected the priorities of various US government agencies, such as time spent completing security procedures. The ATUS code includes 564 categories, which have been reduced in the AHTUS to 92 categories which appear in the majority of the surveys (detailed below).

In additional to making the harmonization programs available to researchers, the dataset includes three harmonized data files for each original survey:

- a respondent-level file with harmonized information about individuals and households
- a diary-level file coded into 92 main activity categories
- an episode-level file in which each row contains each activity recorded by each diarist.

The episode level file contains the full breakdown of context information (to the extent recorded) for each episode – the main activity, any simultaneous secondary activity, its location (see below), mode of transport (see below), and who else was present.

The AHTUS' provision of this episode-level data is unique among harmonized comparative time-use archives. The diary-level file with its aggregated totals of time devoted to primary activities is made available for the simplest sorts of summary statistical calculations, But we expect that a growing proportion of analysts will start with the episode file, using relevant context information to construct a summary file appropriate to the analyst's needs. The episode file also allows analysis of patterns of activity and timing of activities through the day.

A1.2 Surveys Currently Included in the AHTUS

1965-1966 Time Use Survey

The oldest dataset included in the AHTUS is the 1965 survey collected by the Survey Research Center at the University of Michigan. This study has two relatively small samples, one which followed the Szalai survey methodology (to sample a typical industrial mid-sized urban location), and a second national sample of all urban areas (with 2021 diaries collected across both samples). Both surveys sampled households where at least one member was employed in an industry other than agriculture, then selected one adult aged 19 to 65 to keep a single-day diary of activities. Respondents in this 1965 survey completed "tomorrow" diaries, that is respondents were visited by an interviewer who explained and left the diary to be filled out for the following day; the interviewer then returned on the day after that "diary day" to check over, correct and collect the completed diary (Robinson, 1977). Sayer, Bianchi, and Robinson (2004) compared the 1965 sample characteristics with parallel characteristics from the March 1965 Current Population Survey, and concluded that its sample closely approximates U.S. population characteristics. An analysis of the full national sample of 1975 diaries indicated that the activities reported by that full sample matched those who would have met the 1965 criteria (Juster and Stafford 1985).

1975-1976 American's Use of Time: Time Use in Economic and Social Accounts Survey

In 1975, the Survey Research Center, University of Michigan, personally interviewed 1,519 adult respondents aged 18 and over, who reported diaries for the previous day in the Fall of that year (Robinson 1976); in addition, diaries were obtained from 887

spouses of these designated respondents, which increased the sample size to 2,406 respondents. These respondents became part of a panel, who were subsequently re-interviewed in the Winter, Spring, and Summer months of 1976[xii]. High levels of attrition in the later panel waves and problems in using the original file (which is not at all user-friendly, and contains some hitherto unidentified major errors[xiii]) explain why virtually all previous analyses (including Aguiar and Hurst 2006) have simply ignored the subsequent waves, and analyzed only the first wave (including spouses)—adopting appropriate weights to compensate for the over-representation of couple households. In the AHTUS files, we have adopted precisely the opposite approach, using all four waves of data (with additional sample weights to compensate for non-response). As the spouse diaries include less information than main respondent diaries (spouses were asked to record main activity and location only, while main respondent diaries include main and secondary activity, location, and presence of others), we produced a separate supplementary file that included both the main respondent and the spouse diaries for all four waves with distribution and attrition weights. In this paper we use only the main respondent file.

1985 American's Use of Time Survey

In 1985, the Survey Research Center at the University of Maryland conducted a national study in which single-day diaries were collected from more than 5,300 respondents aged 12 and over. This study employed the same basic open-ended diary approach as the 1965 and 1975 national studies. An important innovation in the 1985 study was the explicit attempt to spread the collection of diary days across the entire calendar year, from January through December 1985.

The 1985 study included experimentation with mode of data collection. The majority of diaries in the 1985 study were collected by a mail-back method from a sample of Americans who were first contacted and completed a "yesterday" diary by telephone, using the random-digit-dial (RDD) method of selecting telephone numbers. If the respondent agreed, diaries were then mailed out for each member of the participating household, aged 12 or over, to complete for a particular day for the subsequent week. Respondents completed and then mailed back their time diaries for coding and analysis.

Some 3,340 diaries from 997 households were returned using this mail-out procedure during the 12 months of 1985. The other 1985 data included parallel diary data from 808 additional respondents interviewed in a separate personal-interview sample in the summer and fall of 1985, in addition to the 1,210 “yesterday” diaries obtained by telephone as part of the initial contact . Unfortunately, the episode level data are no longer available for the personal-interview and telephone-interview samples. The AHTUS episode file consequently covers only the mail-back sample, and early testing of this file suggests that some degree of error remains in the data (Gershuny 2005). We use only aggregated data from the 1985 mail-back sample in this article.

1992-1994 National Human Activity Pattern Survey (NHAPS)

The University of Maryland’s Survey Research Center conducted national random digit dial (RDD) telephone interviews between September 1992 and October 1994, collecting 9,386 diaries about the previous day from respondents of all ages (parents were asked to complete diaries for young children when a young child was selected as the diary keeper in the household). Only those respondents aged 18 and above are included in the main AHTUS files, with diaries from younger people in separate supplementary files (not used in the foregoing analysis). This study did not include pivotal questions about marital status and income. A 1995 survey followed a similar methodology (for people aged 18 and older) but asked the income and marital status questions. This is not currently included in the AHTUS, but may be added in future.

2003 American Time Use Survey (ATUS)

The BLS began collecting time diaries from one person per household in a sub-sample of households that completed the eighth and final wave of the Current Population Survey. The survey collects diaries throughout the year. This sub-sample over-samples households with young children and only included people aged 15 and older. All diaries are collected over the telephone (with people in households without a phone sent a voucher to call and complete the diary from a pay phone) about the previous day’s activities. Half of diaries were collected on week days and the other half on weekend days. The large sample size permits breakdown of time by more detailed population groups than is possible in the smaller and older datasets. While the ATUS is a continuous and on-going study, only the 2003 data are included at this time.

A1.3 Harmonized Activity Categories in the AHTUS

		1965-66	1975-76	1985	1992-94	2003
-8	item missing	x	x	x	x	x
1	general or other personal care	x	x	x	x	x
2	imputed personal or household	x	x	x	x	x
3	care	x	x	x	x	x
4	sleep	x	x	x	x	x
5	imputed sleep	x	x	x	NO	x
6	naps and rest	x	x	x	x	x
7	wash, dress, personal care	x	x	x	x	x
8	personal medical care	x	x	x	NO	x
9	meals at work	x	x	x	x	x
10	other meals & snacks	x	x	x	x	x
11	main paid work (not at home)	x	x	x	x	x
12	paid work at home	x	x	x	x	x
13	second job, other paid work	x	x	x	x	x
14	work breaks	x	x	x	NO	x
15	other time at workplace	NO	x	x	x	x
16	time looking for work	x	x	x	x	x
17	regular schooling, education	x	x	x	x	x
18	homework	x	x	x	x	x
19	short course or training	x	x	x	x	x
20	occasional or other	x	x	x	x	x
21	education/training	x	x	x	x	x
22	food preparation, cooking	x	x	x	x	x
23	set table, wash/put away dishes	x	x	x	x	x
24	cleaning	x	x	x	x	x
25	laundry, ironing, clothing repair	x	x	x	x	x
26	home repairs, maintain vehicle	x	x	x	x	x
27	other domestic work	x	x	x	x	x
28	purchase routine goods	x	x	x	x	x
29	purchase consumer durables	x	x	x	x	x
30	purchase personal services	x	x	x	x	x
31	purchase medical services	x	x	x	x	x
32	purchase repair, laundry services	x	x	x	x	x
33	financial/government services	x	x	x	x	x
34	purchase other services	x	x	x	x	x
35	care of infants	x	x	x	x	x
36	general care of older children	x	x	x	x	x
37	medical care of children	x	x	x	x	x
38	play with children	x	x	x	x	x
39	read to, talk with child	x	x	x	x	x

		1965-66	1975-76	1985	1992-94	2003
Harmonized Activity Categories in the AHTUS						
40	adult care	x	x	x	x	x
41	general voluntary acts	x	x	x	x	x
42	political and civic activity	x	x	x	x	x
43	union and professional activities	NO	x	x	x	NO
44	volunteer child/family organization	NO	x	x	x	NO
45	volunteer fraternal organization	NO	x	x	x	NO
46	other formal volunteering	x	x	x	x	NO
48	acts for religious organization	x	x	x	x	NO
49	worship and religious acts	x	x	x	x	x
50	general out-of-home leisure	x	x	x	NO	x
51	attend sporting event	x	x	x	x	x
52	go to cinema	x	x	x	x	x
53	theater, concert, opera	x	x	x	x	x
54	museums, exhibitions	x	x	x	x	x
55	attend other public event	x	x	x	x	NO
56	restaurant, cafe bar	x	x	x	x	x
57	parties or receptions	x	x	x	x	x
58	imputed time away from home	x	x	x	x	x
60	sports & exercise	x	x	x	x	x
62	walking	x	x	x	x	x
63	cycling	NO	x	x	x	x
64	outdoor recreation	NO	x	x	x	x
65	physical activity, sports with child	x	x	x	x	x
66	hunting, fishing, boating, hiking	x	x	x	NO	x
67	gardening	x	x	x	x	x
68	pet care, walk dogs	x	x	x	x	x
70	general indoor leisure	x	x	x	x	x
71	imputed in-home social	x	x	x	x	x
72	receive or visit friends	x	x	x	x	x
73	other in-home social, games	x	x	x	x	x
74	play musical instrument, sing, act	x	x	x	x	NO
75	artistic activity	x	x	x	x	x
76	crafts	x	x	x	x	x
77	hobbies	x	x	x	x	x
78	relax, think, do nothing	x	x	x	x	x
81	read books	x	x	x	x	x
82	read periodicals	x	x	x	x	NO
83	read newspapers	x	x	x	x	NO
84	listen to music (CD etc.)	x	x	x	x	x

		1965-66	1975-76	1985	1992-94	2003
Harmonized Activity Categories in the AHTUS						
85	listen to radio	x	x	x	x	x
86	watch television, video	x	x	x	x	x
87	writing by hand	x	x	x	x	x
88	conversation, phone, texting	x	x	x	x	x
89	use computer	NO	NO	x	x	x
90	imputed travel	x	x	x	x	x
91	personal or adult care travel	x	x	x	x	x
92	travel as part of paid work	NO	NO	NO	x	x
93	travel to/from work + other work	x	x	x	x	x
94	travel	x	x	x	x	x
95	travel related to education	x	x	x	x	x
96	travel related to consumption	x	x	x	x	x
97	travel related to child care	x	x	x	x	x
98	travel for volunteering or worship	x	x	x	x	x
	other travel					
Location Variables and Category Codes in the AHTUS						
INOUT - outside, inside or in vehicle						
-8	location unknown	x	x	x	x	x
1	outside	x	x	x	x	x
2	inside	x	x	x	x	x
3	in a vehicle	x	x	x	x	x
ELOC- location, includes implied from activity codes as well as diary columns						
-8	location unknown	x	x	x	no	x
1	own home	x	x	x	x	x
2	other home	x	x	x	x	x
3	workplace	x	x	x	x	x
4	school	x	x	x	x	x
5	services or shops	x	x	x	x	x
6	restaurant, café, bar	x	x	x	x	x
7	place of worship	x	x	x	x	x
8	travelling	x	x	x	x	x
9	other	x	x	x	x	x

		1965-66	1975-76	1985	1992-94	2003
MTRAV - mode of travel						
-8	not answered	not	not	x	x	no
-7	not travelling	present	present	x	x	x
1	car, truck, motorcycle			x	x	x
2	public, mass transport			x	x	x
3	walk (including child carried)			x	x	x
4	cycle			limited	x	x
5	other or unspecified mode			x	x	x

A1.4 Sample Distribution by Selected Classificatory Characteristic AHTUS

Weighted Distribution (frequency and column %) of age by survey

		1960s	1970s	1980s	1990s	2003
18 to 24	Count	337	850	403	856	2205
	%	16.95	19.45	15.79	12.39	12.49
25 to 34	Count	418	936	605	1472	3288
	%	21.03	21.41	23.70	21.30	18.63
35 to 44	Count	470	579	475	1514	3685
	%	23.64	13.25	18.61	21.91	20.88
45 to 54	Count	437	659	339	1135	3409
	%	21.98	15.08	13.28	16.42	19.32
55 to 64	Count	298	589	331	767	2331
	%	14.99	13.48	12.97	11.10	13.21
65plus	Count	28	758	400	1167	2731
	%	1.41	17.34	15.67	16.89	15.47
All	Count	1988	4371	2553	6911	17649
	%	100	100	100	100	100

Weighted Distribution (frequency and column %) of sex by survey

		1960s	1970s	1980s	1990s	2003	Total
Men	Count	942	1991	1179	3074	8407	15593
	%	47.38	45.55	46.16	44.47	47.63	46.58
Women	Count	1046	2380	1375	3839	9242	17882
	%	52.62	54.45	53.84	55.53	52.37	53.42
	Count	1988	4371	2554	6913	17649	33475
All		100	100	100	100	100	100

Weighted Distribution (frequency and column %) of education level by survey

		1960s	1970s	1980s	1990s	2003
0 - 8TH GRADE	Count	257	618	163	200	726
	%	13.01	14.21	6.44	2.91	4.11
9 - 11TH GRADE	Count	403	629	241	513	1464
	%	20.39	14.47	9.53	7.46	8.29
HIGH SCHOOL GRADUATE	Count	775	1677	1094	2371	5101
	%	39.22	38.57	43.24	34.50	28.90
SOME COLLEGE	Count	289	687	455	1731	3549
	%	14.63	15.80	17.98	25.19	20.11
COLLEGE GRADUATE	Count	206	391	393	1182	4921
	%	10.43	8.99	15.53	17.20	27.88
POST COLLEGE	Count	46	346	184	876	1889
	%	2.33	7.96	7.27	12.75	10.70
All	Count	1976	4348	2530	6873	17650
	%	100	100	100	100	100

Weighted Distribution (frequency and column %) of economic activity by survey

		1960s	1970s	1980s	1990s	2003
employed full-time	Count	1368	2370	1349	3887	9822
	%	69.41	54.91	53.94	56.51	55.65
employed part-time	Count	54	269	234	738	2335
	%	2.74	6.23	9.36	10.73	13.23
not employed	Count	549	1677	918	2253	5492
	%	27.85	38.86	36.71	32.76	31.12
	Count	1971	4316	2501	6878	17649
	%	100.00	100.00	100.00	100.00	100.00

Weighted Distribution (frequency and column %) of marital status by survey

		1960s	1970s	1980s	2003
MARRIED	Count	1594	2796	1636	10181
	%	80.18	64.07	64.43	57.68
SEPARATED,DIVORCED	Count	109	418	200	2261
	%	5.48	9.58	7.88	12.81
WIDOWED	Count	83	483	183	1269
	%	4.18	11.07	7.21	7.19
NEVER MARRIED	Count	202	667	520	3939
	%	10.16	15.28	20.48	22.32
All	Count	1988	4364	2539	17650

Appendix 2 - Minutes Per Day in All Activities, from the American Heritage Time Use Study: US Population Aged 19 to 64

	men					women				
Means	**1965**	**1975**	**1985**	**1993**	**2003**	**1965**	**1975**	**1985**	**1993**	**2003**
sleep and naps	476	492	498	486	495	494	509	504	501	511
washing and dressing	46	40	49	40	39	58	50	65	56	54
paid work	475	411	353	368	363	231	234	237	280	262
education, study, training	17	19	18	23	15	16	11	9	19	16
cook, clean, laundry	20	30	47	42	36	204	153	135	102	98
other unpaid work	15	24	22	26	22	19	10	17	17	14
shopping, services	28	19	27	21	25	40	38	43	41	40
childcare	14	17	14	10	30	52	44	38	27	61
voluntary, religious	12	16	11	12	14	18	22	16	14	18
out of home leisure	46	56	69	61	68	38	42	48	46	57
Leisure at home	198	223	235	257	243	203	251	245	251	223
travel	93	93	99	94	89	69	77	82	87	85
N	557	1715	849	2619	7962	654	1944	1013	3126	8270

	men					women				
standard errors	**1965**	**1975**	**1985**	**1993**	**2003**	**1965**	**1975**	**1985**	**1993**	**2003**
sleep and naps	20.2	11.9	17.1	9.5	5.5	19.3	11.5	15.8	9.0	5.6
washing and dressing	1.9	1.0	1.7	0.8	0.4	2.3	1.1	2.0	1.0	0.6
Paid work	20.1	9.9	12.1	7.2	4.1	9.0	5.3	7.4	5.0	2.9
education, study, training	0.7	0.5	0.6	0.4	0.2	0.6	0.2	0.3	0.3	0.2
cook, clean, laundry	0.8	0.7	1.6	0.8	0.4	8.0	3.5	4.2	1.8	1.1
other unpaid work	0.6	0.6	0.8	0.5	0.2	0.7	0.2	0.5	0.3	0.2
shopping, services	1.2	0.5	0.9	0.4	0.3	1.6	0.9	1.4	0.7	0.4
childcare	0.6	0.4	0.5	0.2	0.3	2.0	1.0	1.2	0.5	0.7
voluntary, religious	0.5	0.4	0.4	0.2	0.2	0.7	0.5	0.5	0.3	0.2
out of home leisure	1.9	1.4	2.4	1.2	0.8	1.5	1.0	1.5	0.8	0.6
leisure at home	8.4	5.4	8.1	5.0	2.7	7.9	5.7	7.7	4.5	2.5
travel	3.9	2.2	3.4	1.8	1.0	2.7	1.7	2.6	1.6	0.9

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[ii] The instruments used in time-diary surveys often contain less vivid detail and may not be as readable as literary diaries. But by an extraordinary coincidence, one of the first literary diary keepers in the English language, Samuel Pepys, was also, in his professional capacity as Clerk of the Acts of the Navy Office, responsible for the specification and implementation of the original requirement that all Royal Navy ships maintain a Captain's Log, which continuously registers the times of all changes of sails, heading and wind direction. This log—a class of document which thus links 17th century Restoration London directly to the opening sequence of the original Star Trek television series—with its vertically ruled "fields" for the continuous recording of distinct attributes of timed event sequences, is the true progenitor of the "diary" instrument used by modern social scientists.

[iii] Sorokin (1937) provides a footnote containing more than half a page of references to previous time diary studies. Kahneman and colleagues (2004) are certainly mistaken in their recent suggestion (in the pages of *Science*) that their use of a diary methodology for measuring happiness or enjoyment of particular activities is an innovative one. Elchardus and Glorieux.(1987) for example, made extensive use of just this methodology in various articles from the 1980s, as did Robinson and Godbey (1999); moreover, Erlich (1989) carried out an 850 person survey in which respondents recorded their sequences of activities continuously over a 5-day period, while also rating their degree of enjoyment of each activity, and the extent of time pressure they experienced: this material is used in Gershuny and Halpin (1996) as the basis of an ordinal measure of enjoyment of various activities.

[iv] It consists, therefore, of a "lowest common denominator" dataset covering all five decades, enhanced with additional detail available from a subset of the original studies, and with supplementary files covering diaries collected from people younger than 18 in 1992-94 and 2003 and the spouses of main respondents who were asked to complete a reduced version of the main diary in 1975-76.

[v]The five imputed codes cover **sleep and rest** (main activity only); **unspecified personal or household care** (main activity only); **unspecified social activity** (main activity only for 1965-66, 1992-94 and 2003; some cases of secondary activity for 1975-76 and 1985); **unspecified time away from home** (main activity only); and **imputed travel** (main and secondary activity).

[vi] We applied a more standardized and detailed definition of a poor quality diary than has conventionally been employed in previously published research using the time-diary studies from the USA. We 0-weighted diaries meeting any of the following criteria: 1) sex or age of the diarist missing; 2) day of the week the diary was recorded missing; 3) more than 90 minutes of main activity time (after making the imputation adjustments) missing; 4) fewer than 7 activities recorded in the diary; 5) no minutes recorded in two or more of the following 4 broad categories of activity which people perform daily except in exceptional circumstances: a) some form of sleep, rest or time out; b) some form of eating or drinking or smoking; c) some form of personal care; d) travel.

[vii] Using a version of the Ås (1978) 4-category time-use classification

[viii] Fisher (2005) found that diarists in the USA report childcare activity differently depending on whether the diary collected main activity only or main and secondary activity. When given the chance to report simultaneous activities, diarists report some childcare activities (such as reading to children) more often as a secondary activity than as a main activity. When given the chance to report only one activity, diarists recorded more main activity time in reading to children, but less total time reading to children compared with estimates that count time when reading to children as a main or secondary activity. It may be that parents read to children in conjunction with other childcare or other activities (like travel), but recognize that good parents are expected to read to their children, and report more main activity reading to children to ensure that their diary contains an episode of reading to their children.

[ix] We chose to characterize the weekday by the four days Monday to Thursday, because the profile of leisure activities on Friday evenings more closely resembles Saturday evenings than Thursdays—and similarly Sunday evenings resemble Mondays rather than Saturdays. Changes visible in US weekend activity profiles over the 40 year period (not illustrated here) include the virtual ending of Saturday paid work (other than in consumer service industries), which in turn means an even closer gender convergence in day-profiles during weekends than on weekdays; and the "spikes" of consumption activity on weekend days (particularly Sundays), previously noticeable around 9 AM, midday and 6 PM, and representing family mealtimes, have quite disappeared.

[x] The 1965-66, 1992-94, and 2003 datasets covered only one person per household. The 1975-76 survey did collect diaries from both spouses, however, while the main respondent's diary included who else was present, the spouse's reduced diary did not include this diary column. The 1985 dataset collected diaries from all adult household members, but sadly problems matching the episode level information to the background data following corruption of the original data files make this analysis problematic.

[xi] The AHTUS is one of a range of time-use resources available from the Centre for Time Use Research (CTUR) including the Multinational Time Use Study, a comprehensive database of all time-use studies carried out around the world, to lists of and links to time use publications, and information on related conferences and courses (http://www.timeuse.org/).

[xii] Fewer than half (45%) of the original 2,406 respondents completed all four waves, though many more completed at least one further wave. The resulting panel attrition bias is compensated for by the weights provided for the AHTUS. Some respondents (and some new spouses – 667 people in total) were re-interviewed in 1981 (Juster and Stafford 1985). The 1981 re-interview materials were not used in the AHTUS dataset.

[xiii] Such as the accidental combination of respondents' secondary activities with their spouses diary data (where the spouse diary failed to include any secondary activity field)!