# 24 hours of solitude

[Working paper]

Giacomo Vagni

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This paper investigates the quality and reliability of the *With Whom Information* of time use diaries. In this paper, we will mainly do three things: analyze the missing data, examine the relation between the *with whom diaries* and the *activity diaries* and finally compare partner's report of time with each other.

# Validity and Reliability

Epistemology of the social sciences is grounded in the classical distinction between the concepts of validity and reliability. These concepts are used when referring to the instrument of measurement but also to the data themselves. Broadly define, validity refers to the question: “are we measuring what we ought to measure?” and reliability to the question: “How consistent, regular or constant are the results measured by the instruments of observation. The question of interest in this paper is the co-presence data of time use diaries.

## What co-presence data actually measure ?

The validity of the co-presence raises important questions. What exactly does measure co-presence data ? The obvious answer has been *the time spent with others*. Researchers have not found this answer trivial because co-presence data is mostly analysed as secondary data, meaning that it is analysed in its relationships with activities. The most well-known and studied co-presenc time diary is time with children. Time with children has mostly been conceptualised in reference of the activity of child care. The point I would like to raise is the following : what does spending time with others measure *by itself* ?

Social network analysis never use time use data to measure personal network. It uses stylized “network” question or network survey. One of the most prominent network survey in the U.S. is the GSS (General Social Survey). It measures network with questions like …

Sociology of families neither use time use data to measure family relationships for example. Time spent with others has an ambiguous status. Is it somewhat acknowledge that spending time with family members is crucial for contemporary families but it could not *by itself* measure family relations. In quantitative, family sociology stylized question such as “do you feel that your family is united and bonded by strong tie or …”. In qualitative analyis, there is a strong emphasis on the *recognition* and “display” of family practices. Typically, the concept of “display” is telling of this emphasis on the cognitive aspect of family belonging. Time spent with family members can by itslef tell something about relationship of family members.

So what is “spending time with others” tell us, as social scientists, about the contemporary world we live in ? The question is complex and difficult to answer. This is what validity ask to co-presence data of time use survey.

## How to measure reliability of co-presence data

In this paper, we will not address the issue of validity but the one of reliability.

The issue of reliability of co-presence data has been addressed by ?? for the … Juster still focuses heavily on activities. He noted that tests of validity can only be “indirect” because there is no way to know what *really happened* during respondents day. There is no objective landmark to compare the diaries with.

He proposes five indirect measures of quality of time use diaries. Quality of diaries is reflected by: the number of activities reported, the variety of activities, the number of secondary activities reported, the number of missing cases and the timing of report (when activities are reported on hour or on half hour)[[1]](#footnote-1).

How these five measures can be used to assess the reliability of co-presence data?

The first two points are problematic when considered for a measure of reliability for co-presence. We can reasonably assume that spending time with others does not follow the same pace and the same “logic” as performing activities. The number of people encountered during a day can not tell us something about a diary validity. We can think for instance of socially isolated individuals who reported being alone all day (even though it is not clear to being alone means being isolate) or couple who spend the whole day together. The idea of “small varieties of activities” is also problematic and related to the previous point. Because it is not sure what co-presence really measure, “variety” can very well reflect the extent of social contacts of individuals. In our view, it does not make much sense to consider the number or diversity of co-presence cases in order to assess their quality.

The third point is not applicable simply because co-presence data are recorded simultaneously which allow researchers to study the complex interactions of co-presence categories.

The last two points seems more relevant to co-presence data. Because time use studies are mainly focused and collected for the activities, the missing cases of co-presence is a good indicator of the global quality of the data. Regarding the point of timing (hourly or half hour report), we should consider it as a measure of quality. But here again, this measure is not absolutely clear when individuals report few different episodes during the day.

Juster used partner’s report in order to assess reliability of diaries. However, his perspective is to assess the quality of activities not of co-presence data. Using partner’s report has quality assessment of co-presence diaries is important in our perspective. The results of the “mismatches” between partners should be carefully interpreted. It is reasonable to assume that a great deal of variance between partners is due to different perception of the situation. If this is the case, and if it is possible to control when the discrepancy is due to bad report rather than different perception of what is going on, then this apparent flaw can be turn into powerful sociological information about gender or about couple’s relationship.

This paper is divided in two sections. The first section will analysis the missing cases of co-presence time use diaries. We will first describe the aggregate and desegregate mean missing time in co-presence diaries. We have chosen three binary variables with which we will disaggregate our results throughout the paper: gender, the presence of children in the household (aged less than 15) and the day of the week (weekend and weekdays). We will then regress the co-presence missing time by a set of relevant sociological variables to control if some groups have more likelihood to not report co-presence information. We then will explore the activities related to missing co-presence and their distribution during the day. The second part is dedicated to partner’s report of co-presence.

# Data

The data we used for this paper is the UK Time Use Data 2000. We focused our analysis solely on couples, with or without children. We made sure to keep only couples where both partner filled the diaries but also who filled the two diary days (one weekend and one weekday).

In order to control more closely our analysis we selected respondents aged from 25 to 44 years old. The mean age for men is 28 years old (sd = 5) and for women 27 (sd = 5).

73 \% of couples of the sample do have children living in the household. About 45\% of couples with children have children aged less than 5 years old. Children living in the household are not older than 15 years old. We excluded student, disabled and retired respondents from the analysis. We kept all the ethnicities present in the original sample with the following distribution: 95\% of whites and 5\% of non-whites. The ONS estimation is however 86\% of whites in Britain[[2]](#footnote-2). The homogamy of education is strong: individuals holding a higher education degree have 12 times more likelihood (p-value $<$ 0.001) to have a partner with the same qualification than having a partner holding a lower education.

Table 1 and table 2 display the employment characteristics of the sample. They correspond roughly to the estimation of the Labour Force Survey 2000. Only 28\% of women with children are working full time against 80\% of women with no children. 22\% of women with children are looking after home. Children have little effect on men's employment status with respectively 96\% of men with children working full time and about 95\% with children working full time.

# The Distribution of With Whom Time

The *With Whom diaries* provide information about 5 possible categories of time spent with others: (1) being alone, (2) with the child or the children, (3) with a household member and (4) with a non-household members.

The information is then quite restricted. However, we believe that is it still possible to extract crucial information from these diaries. In order to simplify our task we removed ``complex'' households (living with parents, siblings and so on) from the sample. The only household member beside the child is the partner. The question of non-household members is more complex because the person could be a kin, a friend or just an acquaintance. We will explore further what can be inferred when imputed from activities. For the moment we will use the term ``acquaintance'' for the time spent with non-household members.

The diaries contain `normal' missing cases when respondents are sleeping, working or studying. A consequence of this is that we do not know with whom people have spent their night or if their workplace is rather ``social'' or not. We will discuss this issue later on.

We constructed a variable of time spent with others including all interactions of the 10 categories. We identified the `true' missing cases when respondents where not working/sleeping/studying nor declared being with someone else (or alone). Table 3 and graphic 1 give the distribution of time with others during weekends and table 4 and graphic 2 during weekdays. We disagregated our analysis by gender. The missing category is displayed in the graphics in grey colour.

There is about 53 minutes of true \emph{with whom} missing~\footnote{In this paper missing data denotes \textbf{with whom} missing data.} during the weekend and 45 minutes during weekdays (displayed in the \emph{sum} of table 8 and table 9). Men with children have the most missing data during the weekend (about an hour) followed by women with children (55 minutes). It seems then that children have an impact on the with whom missing cases. Men with no children have only 38 minutes of with whom missing during weekends. Missing data decrease slightly during the weekdays. Men with children still have the highest number of missing cases but about 10 minutes less than during weekend. This `10 minutes’ rule applies for the other groups as well (gender x children).

Let us take a quite look at the distribution of the with whom categories. Let us begin by couples without children living in the household during weekends. The working/sleeping/studying hours (j) are almost even for men and women. The \textbf{declared} time spent in ``nucleo`` (with partner and children) is about the same for men and women (23 and 24 minutes). Men declare spending for time (alone) with the partner [372 minutes] and (alone) with the acquaintance [107 minutes]. Interestingly, women declare spending more time \emph{with the partner and the acquaintance}. This could mean that the time was perceived as ``shared`` by women and in a more ``dyadic`` fashion for men. It is not possible to know exactly with the aggregate mean time where the discrepancy comes from. It still seems that is it a matter of perception because if we sum the time with acquaintance for women ($10 + 3 + 103 + 97$) and for men ($7 + 5 + 93 + 107$) we get almost the same mean time with the \emph{presence of aquaintance} (213 minutes and 212 minutes). The `awake' time spent with the partner is considerable for couples without children, about 6 hours and 10 minutes (42\% of a 8am to 22pm day).

During the weekdays, time with the partner is rather similar for these couples (209 minutes for women and 217 for men). We can see clearly the ``conjugal time'' (in yellow) during the evening in figure 2. During weekdays, time with children is almost reduced to none and the time with acquaintance is roughly cut by half. Women tend to spend about 20 minutes more with acquaintance than men.

For couples with children the story is a little different. During the weekend, time alone is roughly divided by two when compared to couples without children. Women still declare spending more time alone (72 minutes vs 65 minutes). This could be due to the fact that men spend more time working or sleeping.

Here again men declare spending more time spent with the partner (124 minutes versus 115 minutes for women). The time spent with the nuclear family is exactly the same (277 minutes, 4 hours and 37 minutes). Men also tend to spend more time with acquaintance, even in ``absolute'' term when summing the presence of acquaintance for men and women. If time in ``nucleo`` is declared equally, the time that women declare spending with children reflect \emph{real} time with them. Women spend about 116 minutes (alone) with children compared to 105 minutes for men. The ``conjugal time'' is clearly affected by children, from 367 minutes for women without children to 115 minutes for women with children. What about the time where the partner is present despite children or aquaintance ? Summing the partner's presence ($367 + 23 + 10 + 103$) [8h23] for women without children and for women with children ($ 115 + 227 + 81 + 21 $) [7h24], we can still note the lower level of time with the partner. During the weekdays, men spend more time alone (104 minutes) versus 92 minutes alone for women. The time with children (without anyone else present) is stunningly different for women and men with children during weekdays: about 213 minutes for women and only 53 minutes for men. The working/sleeping time is highly differentiated by gender when children are present with 697 minutes [11h37] for women and 907 minutes [15h07] for men.

Men still manage to spend more time with acquaintances, mostly during evening. We can see that women with children meet their acquaintances during the day (acquaintance is in ``light purple'' in figure 1 and 2).

# Missing data

## Socio-demographical patterns

In order to understand if missing data are associated with specific groups, we ran OLS regression with the missing time as outcome variable.

Table 5 displays the explanatory variables. We decided to keep 9 key socio-demographical variables for the model: Gender, Age (tightly correlated with the age of children for couples with children), Number of Children, Civil Status (married or not), Education, Income, Missing Income (dummy), Ethnicity (white versus others) and Region. Table 6 displays the full model without the interaction with gender and table 7 displays the OLS by gender.

The OLS model is the following:

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We can see in table 6 that the number of children has a positive effect on missing time with others (or alone). In average, there is about 23 minutes of missing time when \emph{2 or more children} are present in the household compared to individuals with no children in the household (reference). Having a primary education is also positively correlated with missing time. Ethnicity has a negative effect for missing time.

In table 7, we can see that women aged between 30-40 years old have about 22 minutes more missing time than younger women. Individuals holding a primary education also have a net effect of 45 minutes of missing on average compared to individuals with a higher education degree. Ethnicity have a strong negative effect (so less missing time). For men, children have a positive impact on missing time. Ethnicity still retain this negative correlation for men.

The OLS only explain 4\% of the variance of missing time. This low $R^{2}$ is actually a good sign because it means that the missing time is not associated with these important sociological variables.

## Missing data and activities

In this section, we will explore the activities performed during the missing time. Table 8 and 9 describe the activities done when the with whom information is missing. The \emph{sum} is the mean time of missing cases. Most of the missing time during the weekend is due to Tv (11 min), housework (8 min), odd jobs (5 min), travel/commute (6 min), cooking (3 min), eating (3 min) and leisure (3 min). The proportion of 3.66\% refers to the total percentage of missing time during one day (52 min divided by 1440).

During weekdays, Tv, housework and travel are still the activities having the most with whom missing cases.

Figure 3 and 4 show the sequence of missing (with whom) time by activities. The colour red indicates the ``deepth'' of missing. During the weekend, three main patterns appear: missing time when watching Tv during the evening (from about 19:30 to midnight), odd jobs during the afternoon and housework during the morning. During weekdays, missing time during the evening while watching Tv and housework during the morning are still strong. Missing cases are also present during commuting hours, in the morning between (7:30 to 9:00) and between 17:00 until 18:00.

Table 10 and table 11 gives the distribution of activities of missing time by gender and presence of children.

# Comparing With Whom and Activities

In this section, we will try to see the relation between activities and time spent with others (or alone).

We are trying to see if there are illogical statements like ``being alone socialising'' for example. Understanding better this relation will help us get a sense of who are the ``other non household members'' and if it is possible to extract possible patterns. Figure 7, 8, 9, 10 and 11 show the activities performed by time spent with someone else (or alone). These figures have three axis: \textbf{x} is the activity axis (breakdown by colours), \textbf{y} is the time from 0 to 1 (1440) [pay attention that the angle of the 3d plot display the end of the day in the counter-intuitive direction], the \textbf{z} axis is the mean time. The advantage of a 3d plot is that we can at the same time observe all the activities together but also their \emph{distribution}.

Figure 7 and 8 display the activities by time alone for men and women \textbf{during the weekend}.

When men are alone they are mostly commuting, doing odd jobs, doing housework and watching Tv. Women are first doing housework, commuting, watching Tv, shopping, doing odd jobs and cooking. The principal ``conjugal time'' activity is watching Tv, especially during the evening (in orange in figure 8). Then comes eating and commuting. Women are also reporting Tv, but then instead of eating they report housework. The activity the most shared with acquaintance is socialising for both men and women, which show a possible evidence of consistency between with the whom information and the activities. Leisure comes next, then commuting, eating, watching Tv. We can notice that acquaintance are slightly skewed on the left, during the beginning of the day, for women and skewed on the right for men, mostly during the evening.

1. The MTUS Bad Diary guidelines are :

   (a)  have valid values for day of the week the diary was kept as well as a significant proportion of basic background variables about the diarist, including age and sex;

   (b)  have no more than 90 minutes missing time per 24-hour diary (calculated after diary processing, filling in gaps in main activity with information recorded in other sections of the diary;

   (c)  have at least 7 episodes per 24 hours (defined from the original sequence data as a change in main activity, secondary activity; location or any other dimension of the diary);

   (d)  have at least 3 of the 4 basic activities described in Section 5 above which most people undertake at least once per day (with exceptions for people who recorded care of adults, children or pets on their diary day but otherwise have a good quality diary, as well as cases of people who record sequences where we have some idea where missing basic activities took place. The four basic activities include: sleep and rest; eating and drinking; self care; and travel or exercise.   [↑](#footnote-ref-1)
2. http://www.ons.gov.uk/ons/rel/census/2011-census/key-statistics-for-local-authorities-in-england-and-wales/rpt-ethnicity.html [↑](#footnote-ref-2)